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«**To Stream or Not to Stream** » :
**Les Effets Économiques du
Streaming sur l'Industrie de
Contenu.**

**To Stream or Not to Stream: Impact on the
Economics of Content Industries.**

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Ramadan José ALY TOVAR
CEPN, Labex-ICCA

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PÉNARD Thierry, Université Rennes 1 Rapporteur
TORRE Dominique, Université Côte d'Azur Rapporteur
BENHAMOU Françoise, Université Sorbonne Paris Nord Examinatrice
AGUIAR Luis, Université de Zurich Examineur
MOREAU François, Université Sorbonne Paris Nord Directeur de thèse

PhD Organization

Ramadan Jose Aly Tovar

Université Paris 13

Ecole Doctoral ERASME

Center d'Économie de l'Université ParisNord

Thesis Supervisor

François Moreau

Professor, Université Paris 13

Center d'Économie de l'Université ParisNord

Supervisory Committee

Bertrand Legendre

Professeur, Université Paris 13

Sciences de la communication

Directeur, LabSIC / LabEx ICCA

Marianne Lumeau

Maître de conférences, Université d'Angers

Faculté de Droit, Economie, Gestion

Jordana Viotto da Cruz

Lecturer in Entrepreneurship, University of Edinburgh

Business School

Entrepreneurship and Innovation Group

The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design.

by Friedrich A. Hayek.

«To Stream or Not to Stream »: Les Effets Économiques du Streaming sur l'Industrie de Contenu.

Résumé

L'émergence du streaming a apporté un changement général sur la façon dont les différents produits sont consommés dans le monde. Ces changements concernent non seulement la consommation de ces biens mais aussi les modèles économiques, le commerce international de ces biens et la manière dont les producteurs de ces biens perçoivent les nouvelles technologies. Pour comprendre ces effets, l'auteur a concentré ses recherches sur l'industrie de la musique qui semble être le meilleur exemple de la façon dont le streaming a changé la consommation, la production et d'autres parties de l'industrie dans son ensemble. Pour cela l'auteur commence par analyser comment l'essor de l'ère numérique et des smartphones ont radicalement changé le paysage économique des biens culturels. L'industrie musicale et les maisons de disques ont été parmi les premières à être exposées aux conséquences de la numérisation. Pour comprendre les effets du streaming, les chercheurs ont exploré cette technologie sur différents supports. En ce sens, le présent article fait un tour d'horizon de la littérature créée autour de ce sujet.

Pendant que les services de streaming deviennent le moyen dominant de consommer de la musique enregistrée, les musiciens professionnels restent partagés dans leur opinion sur le streaming, en particulier sur les services gratuits (financés par la publicité) qui génèrent des redevances très faibles. Cet article est l'une des premières tentatives pour analyser empiriquement quels sont les facteurs qui déterminent l'opinion des artistes sur le streaming gratuit. En utilisant les données d'enquêtes auprès de plus de 1 100 musiciens professionnels français, nous soulignons que quatre principaux déterminants affectent l'opinion des artistes sur le streaming gratuit au-delà de leurs préférences individuelles : (i) le streaming gratuit se présente comme un outil de découverte qui aide les consommateurs à explorer le catalogue musical au-delà des stars et des artistes déjà connus ; (ii) le streaming gratuit génère une externalité positive sur le marché de la musique live ; (iii) la situation contractuelle de l'artiste importe également, puisque les plus grandes maisons de disques obtiennent des

conditions beaucoup plus favorables dans le partage des revenus des services de streaming ; (iv) l'opinion des artistes est également façonnée par l'évolution des comportements de consommation de leurs fans.

Pour comprendre comment fonctionne le modèle économique des plateformes de streaming, l'auteur analyse la tarification des biens d'information et en quoi il s'agit d'une tâche difficile. En général, étant donné leur coût marginal quasi nul, ils sont proposés en forfait pour un tarif forfaitaire. C'est une caractéristique évidente dans le cas des plateformes de streaming musical. Néanmoins, la discrimination par les prix pourrait être applicable en fixant différents forfaits à des prix différents et en incitant les individus à s'identifier et à choisir le forfait lié à leur catégorie de consommateurs. En d'autres termes, les plateformes pourraient trouver des moyens de pratiquer une discrimination par les prix au second degré. Nous examinons les effets sur les bénéfices de l'application d'un tel régime et les conflits possibles qui en découlent. Enfin, l'auteur étudie les implications autour du commerce à travers l'utilisation du modèle de gravité qui est le cheval de bataille du commerce international, il a été utilisé pour expliquer les flux commerciaux bilatéraux de marchandises entre différents pays. Ce modèle a également été utilisé à diverses occasions pour expliquer le commerce international des biens culturels, cela a été fait en ajoutant différentes mesures de la distance culturelle, de l'histoire et autres. Nous utilisons un nouvel ensemble de données des 200 chansons les plus écoutées sur Spotify dans plus de 40 pays pendant près de deux ans pour évaluer avec une variante du modèle de gravité les flux commerciaux bilatéraux de musique entre différents pays.

Mot Clès

Économie, Musique, Streaming, Échange international, Modèle d'affaires, Organisation industrielle, Économétrie.

Key Words

Economics, Music, Streaming, International Trade, Business Model, Industrial organization, Econometrics.

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I am extremely grateful to my family, to my grandparents that feed us and provided for us and that never let us fell in hunger or nor have an education. To my aunts and uncles that would be there even when times were hard and would always have a hug and a smile when things went wrong. To my cousins that would show love to us and support us in every way they could. To my brother who show me how high you can go even when no-one is betting on you and, more than anything to my mother. She is the unheroic hero of my life, a person that never searched for recognition, nor praise or exaltation, that has

always done all she can to help others not for gain for herself but just because it is the right thing to do. She has given everything for her children, even when her life was in danger she was ready to give it all up for the safety of her children, when the pain both physical and emotional that my father caused in her psyche and body was insurmountable she would stand stoic to defend us, to fight for us, to give us what we needed. I still remember the blood, the tears, the pain and how she gave her entire self for us. Everything I am and everything I will be, every honor and exaltation, everything good in me that deserves to be noted and told comes from her and is to honor her. I will never be able to repay all that she has done for me even if I had a thousand lives to live. She is my hero and she will always be the best mother anyone could have ever had. I love you mom.

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After all was set and done and, the dissertation over. I find no better words

than those of Alfred Lord Tennyson to end this section of my travel:

*Tho' much is taken, much abides; and tho' we are not now that
strength which in old days moved earth and heaven, that which we
are, we are; one equal temper of heroic hearts, made weak by time
and fate, but strong in will to strive, to seek, to find, and not to
yield.*

Thanks to all of you.

Ramadan Jose Aly Tovar

Abstract

The emergence of streaming has provided a general change on how different products are consumed around the world. These changes relate not only to the consumption of these goods but also to the business models, the international trade of these goods and how the producers of such goods perceive the new technologies. To understand these effects the author has focused his research around the music industry that seems to be the best example of how streaming has changed the consumption, production, and other parts of the industry as a whole. For this the author starts by analyzing how the rise of the digital era and smartphones have dramatically changed the economic landscape of cultural goods. The music industry and record labels were one of the first to be exposed to the consequences of digitization. To understand the effects of streaming researchers have explored this technology in different mediums. In this sense the present paper does a survey of the literature created around this subject.

Meanwhile streaming services are becoming the dominant way to consume recorded music, professional musicians remain divided in their opinion toward streaming, especially towards free (ad-supported) services that generate very low royalties. This paper is one of the first attempts to analyze empirically what are the factors that drive the artists' opinion on free streaming. Using survey data from more than 1,100 French professional musicians, we emphasize that four main determinants affect the opinion of artists on free-streaming beyond their individual preferences: (i) free-streaming stands as a discovery tool that helps consumers to explore the music catalog beyond stars and already well-known artists; (ii) free-streaming generates a positive externality on the live music market; (iii) the contractual situation of the artist also matters,

since the biggest recording companies obtain much more favorable conditions in revenue sharing from streaming services; (iv) the opinion of artists is also shaped by the evolution of consumption behavior of their fans.

To understand how the business model of the streaming platforms work the author analyzes the pricing of information goods and how it is a difficult task. Usually given their almost zero marginal cost they are offered in a bundle for a flat rate. This is a clear characteristic in the case of music streaming platforms. Still, price discrimination could be applicable by pricing different bundles to different prices and inducing individuals to self identify and chose the bundle tied to their class of consumer. In other words, platforms could find ways to do a second degree price discrimination. We examine the effects in profits of applying such an scheme and the possible conflicts arising from it.

Finally the author studies the implications around trade through the use of the gravity model which is the workhorse of international trade, it has been used to explain the bilateral trade-flows of goods between different countries. This model has been used also in various occasions to explain the international trade of cultural goods, this has been done by adding different measures of cultural distance, history and others. We use a novel data set of the top 200 streamed songs in Spotify of more than 40 countries during almost two years to evaluate with a variant of the gravity model the bilateral trade-flows of music between different countries.

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Everyone has his superstitions. One of mine has always been when I started to go anywhere, or to do anything, never to turn back or to stop until the thing intended was accomplished.

by Ulysses S. Grant

Introduction

Music, video games, books and others can be characterized as an information good (Shapiro et al., 1999; Illing et al., 2006; Belleflamme, 2016), for so, they are amenable to digitization and copying through on-line sharing. This brings risks for the owners of the copyrighted materials. Piracy could be accountable for losses in the revenue of the content industry which is induced to search for new sources of income in the era of digitization (Danaher et al., 2010; Bacache-Beauvallet et al., 2015; Dörr et al., 2013; Borja and Dieringer, 2016).

This search has given birth to a new concept, the idea of consuming content without owning it, without a physical possession of the file. This is the so called streaming, in this case, the content files are stored in a server and they can be accessed by users on demand. This new way to deliver content to consumers generates revenue in two ways. On the one hand, consumers that had made an account in the service are allowed to access the content in a legal way. In an idea analogous to the free tv, revenues are collected through commercial breaks between particular content¹. On the other hand, flat rate contracts are offered to consumers that allow unlimited and ad-free access to the content after a monthly payment has been done. In the video Game industry, platforms have been created where all the products are charged. The revenue comes also from two ways. The continuous advertising of the provided softwares, and the charges applied to the consumers and to the software producers².

Hence, the concept of streaming has been translated into a new business model. But the business model of the industry is not the only place where the influence

¹This is usual in the streaming of videos, films, tv programs and music

²This is clear in platforms as STEAM and ORIGIN, in these you will find a continuous feed of advertising of video games and software products that can't run without the platform where they are bought

of this new technology can be found. It has also affected the contents (Diversity of supply, quality, durability, etc.) and the consumer side in it's consuming diversity, willingness to pay, etc.

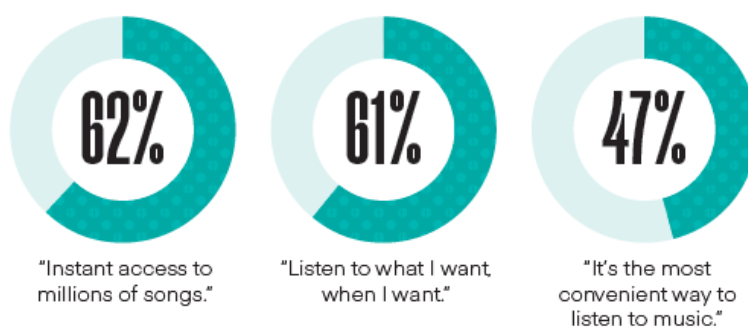
One content has been greatly affected by this change and, it is widely known and universally recognized: The music sector. Music is an universal language. Every nation, every country every tongue has their music associated to it. And countries share their cultural heritages and changes through this medium. It is more widely available to all population than video games, films and even books and, it is an essential part of other medium such as video games, films and tv series. Furthermore it has been the poster-child for the bad effects of piracy and other malfeasance around the illegal acquisition and consumption of goods. Music is also one of the domains where data about it's consumption it's value and others can be easily obtained. The reader can start to make a conclusion that this thesis will focus on music to understand the effects that streaming can have on the content industry and how the adaptation to this new technology bring both opportunities as well as risks.

To have visibility on how this technology has changed the landscape of the music industry the author uses the resources presented by the International Federation of the Phonographic Industry (IFPI), it is the organization that represents the interests of the recording industry worldwide. Through the national groups and industry partners they recollect data from all the industry to produce market size and share reports for their members and the public, they lead the efforts to generate an standard in revenue reporting, analyze and elaborate economic indicators between other functions.

Using the reports provided by this institution the author can observe that this new technology and the use of it in music is popular: the IFPI (2020a) presents a clear picture of it. 89% of people consume their music through music on demand services, listening up to 18 hours a week of music. The growth in streaming has been grater on the 35 to 64 years old but, even while streaming is popular it has not stopped piracy with 23% saying they get and consume music through piracy. Nonetheless, what are the the reasons for 89% of the population consulted in the IFPI (2020a) report for using streaming as seen in figure I.1.

Streaming music is convenient as thanks to the advancement of technology

Figure I.1: Reasons for Enjoying Streaming Music

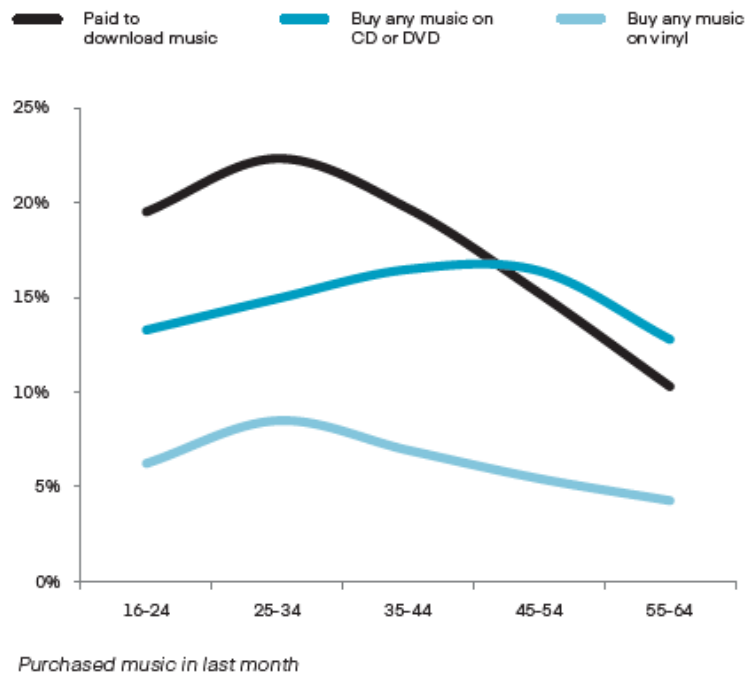


Source: IFPI (2020a)

and the democratization around the world of portable devices, broadband, internet and data packages are more and more available around the world. Of the population consulted through the report 27% of them access music streaming through their portable phones, while an additional 4% access to it through other mobile devices and 19% through their computer while in the case of only younger users 44% of 16 to 24 years old use their smartphone for music streaming and 66% of them would only choose this device to stream and listen to music. Does these general habits transform into purchases of music as seen in both figure I.2 and I.3.

It is possible to see that streaming has been on the rise but, it has not stopped people from buying music. In fact, it is possible to see that, even though the trend of the purchase of music in any format is decreasing it has peaks when individuals are of younger age groups (16 to 24 years old, 25 to 34 years old) and, in the case of CD's and DVD there is a peak on the age group of 45 to 54 years old. Streaming music has not completely displaced the purchasing of this content in physical form. This is also the case of piracy, it is clear that streaming has not been the silver bullet to stop it but, it has provided an exit for those that used as presented in IFPI (2020a), 62% of using music through and illegal form would use music on demand services if piracy was no longer an option.

Figure I.2: Music Purchasing Habits Across Age Groups



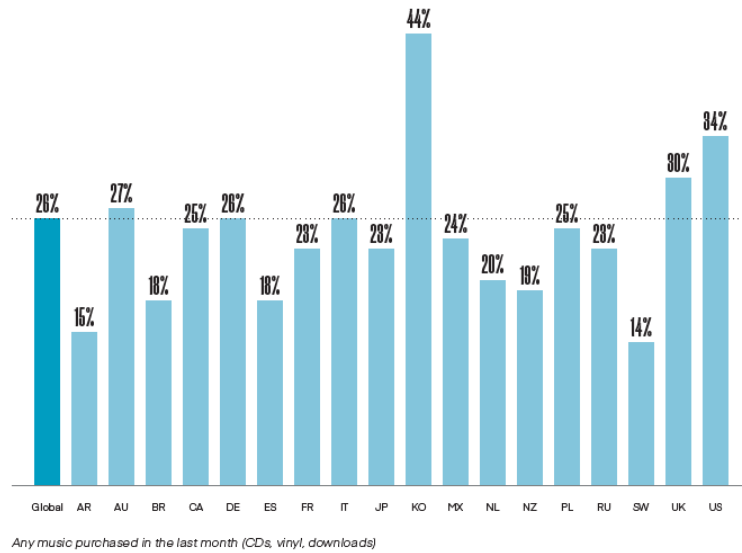
Source: IFPI (2020a)

These trends can be seen also in the recorded music market of France. In this market the general trend of streaming becoming dominant in recorded music in terms of sale seems to be happening in France where streaming growth in 17.7% in 2020 compared to 2019 while the physical market decreased in 36.8% (SNEP, 2020) as seen in figure I.4.

Furthermore, the structure of the total sales of the first semester of 2020 reveal an interesting picture. 62% of the all sales of music were through the subscription supported service while only 7% came from the ad supported service with only 20% coming from the physical sales. This supports the idea that the principal source of revenue for the platforms is the subscription service in France as seen in figure I.5.

As presented by the report from SNEP (2020), the continuous growth from

Figure I.3: Music Purchasing Across Countries

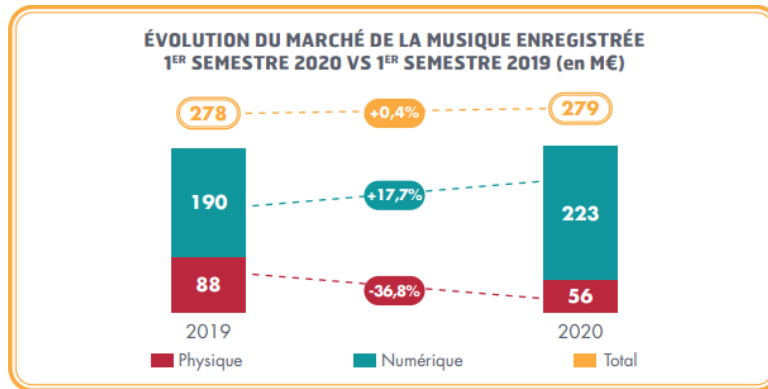


Source: IFPI (2020a)

the streaming that reduces both the download of content and the buying of physical copies has been in a continuous growing trend in the case of France. The trend is not only in the case of France but also globally. The IFPI (2020b) presents the situation in a global scale. It portraits the evolution of the revenues from 2001 to 2019. In this it possible to see that the revenues of the industry have declined from 2001 to 2016. It is since 2017 that there has been growth for the music industry revenues although they are still less than in 2001 as presented in figure I.6.

Moreover, the figure shows how the streaming tranche has steadily taken the place of the physical revenues. Streaming accounts for the 56.1% of the total of revenues from the music industry. This segment of revenues has grown 22.9% compared to 2018. Moreover, subscription streams represents 74.9% of the total streaming segment. It is clear that the greater source of revenues in the case of streaming comes from subscriptions and not from the ad based service

Figure I.4: Music Market Evolution Between the 1st Semester of 2020 and that of 2019



Source: SNEP (2020)

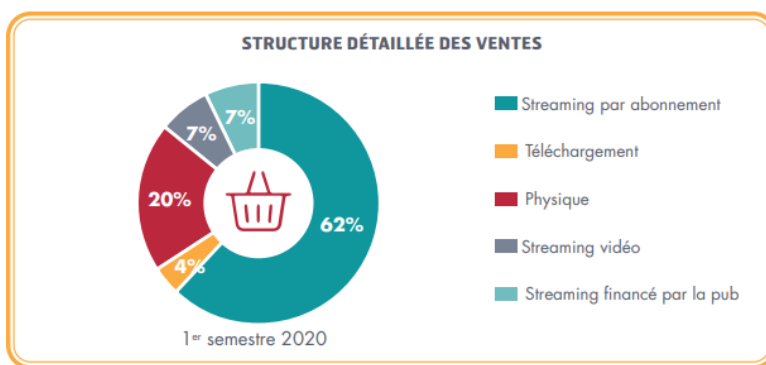
as presented in figure I.7.

This sets a clear overview of the current situation of the music industry around the world. Thus, creating a series of questions around the effects that digitization has on it, creating a series of possibilities for research around the economic effects that this transformation has on the industry.

Nonetheless, several artists have been clear on their disdain for free streaming. Artists such as Thom Yorke, Taylor Swift between others³ have been against the distribution of their catalog through platforms such as Spotify and, although they have recently accepted that these platforms be able to use their catalog their position is not clearly understood. Streaming in either its subscription based or ad based forms has provided new vitality to the music industry. It has provided a way to fight against piracy and illegal sharing creating benefits for artists, labels, songwriters between others. With this in mind the author proposes the following hypothesis:

- *H1: There exists a logic behind the decision of artists to either accept or not free streaming as a medium for their music to be consumed related to*

³<https://www.musictimes.com/articles/82222/20200905/artists-against-spotify-why-dont-streaming-service.htm>

Figure I.5: Detailed Structure of Sales for the 1st Semester of 2020

Source: SNEP (2020)

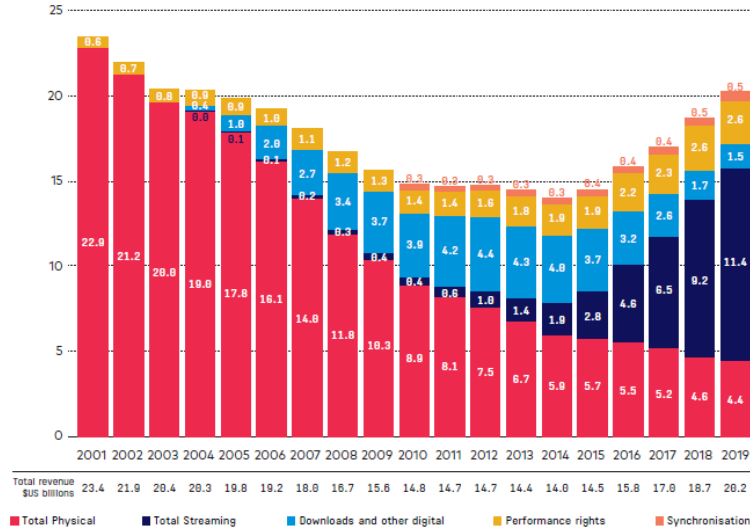
the revenue features provided by streaming platforms.

Furthermore, it seems obvious that streaming platforms have adopted an almost identical business model. They propose to subscriber two types of services: one that is free and the other that is pay in a monthly fee. The people that use the free service has to tolerate ads after a certain number of songs and do not dispose of some of the utilities that the platforms offer. These differences are not enough to move people that is in the free tranche of service to the payed one. Taking into account that the greater part of revenues that come from streaming come from the payed service the the question becomes how to increment this segment to generate greater revenues for the platforms and for the artists. To answer this, the author proposes the following hypothesis:

- *H2: Streaming platforms have the capacities to create several tranches of service that, with different prices, will attract new subscribers and create more revenues for platforms, labels and artists.*

In addition to all of this, streaming platforms have provided a great opportunity for consumers. Distance between countries does not exist in the internet. Streaming platforms provide access to a vast and almost endless catalog, from a vast quantity of countries that would not be accessible to consumers worldwide otherwise. The vast catalog, the almost zero marginal cost of music and, the

Figure I.6: Global Recorded Music Industry Revenues 2001-2019 (US\$ Billions).



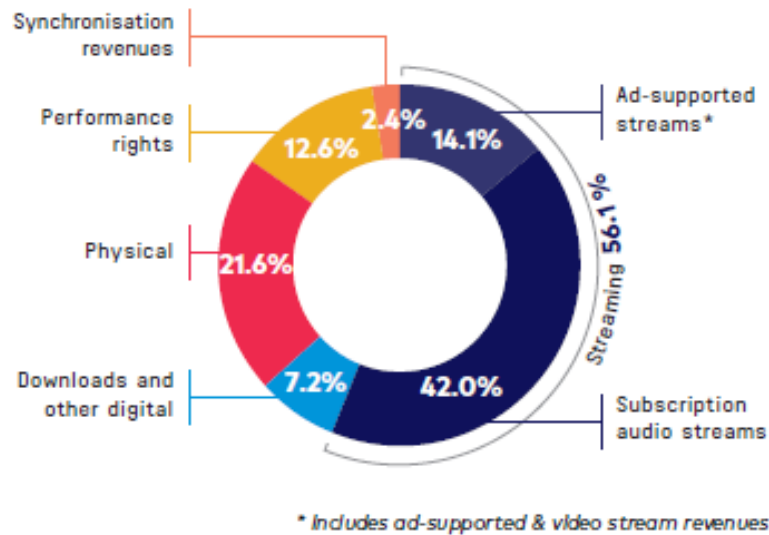
Source: IFPI (2020b)

virtual absence of distance has created an environment where the international trade of digital goods could boom as the usual barriers that are present in the trade of physical goods seem to disappear. The availability of streaming platforms, cultural distance and others could be the new axis in which the trade of these goods be founded. Thus, the author proposes the following hypothesis:

- *H3: The digitization of music and the availability of streaming platforms reduce the importance of traditional variables that govern bilateral trade relationships such as distance.*

In this sense, this thesis objective is to test the hypothesis that have been set, to achieve this, it is divided into four chapters that are tied but can be read and studied independently. Chapter one provides a literature review that allows the author to understand the current state of the research and identify the possible angles of research that have not been treated by the literature until now, furthermore, each chapter presents its specific literature review section that is

Figure I.7: Global Recorded Music Revenues by Segment 2019.



Source: IFPI (2020b)

adapted to the subject treated in each one of them. Chapter two analyzes what is the logic behind artists accepting or rejecting free streaming as a medium for their music to be consumed. The author arguments and proofs that the logic behind it is mainly monetary as the income gained through selling a physical record is much greater than that obtained from the streaming of the individual songs. In chapter three the author analyzes how the business model has been built and the possibility of adapting it to create different trenches of service with specific prices based on the information provided and collected by those platforms. This adaptation of the versioning model created by Belleflamme (2005) creates a problem: It provides for the rise of an orthogonal dimension that displaces all consumers from the higher trenches to the lower ones creating losses for the platform rather than gains unless it is modeled in such a way that this can be contained. Chapter four analyzes the impact that streaming music and the availability of streaming platforms has on the exchange of

Introduction

music between two nations by using the gravity model of international trade to understand how they have been affected. Finally, the author presents in a separate part the conclusions of the thesis.

Chapter 1

The Economics of Streaming: A Review of the Literature

1.1 Introduction

The rise of the digital era and smartphones have dramatically changed the economic landscape of cultural goods. The music industry and record labels were one of the first to be exposed to the consequences of digitization, requiring them to make major changes to their business model in order to survive. At first, streaming was regarded as the “*final nail in the industry’s coffin*” but then it became obvious that it was “*the savior of music*” (Ellis-Petersen, 2017).

Streaming media is a technological practice that changed everyday uses of media, the business model of the major actors in the music industry, and media industry practices. In addition to changing the business model across the industry, music streaming services have also become the most popular method to listen to and to explore music.¹ This change in music consumption is explained by the fact that streaming services offer consumers unlimited access to

¹According to the IFPI report of 2019 (IFPI, 2019b), streaming dominated the industry totaling 46.9% of the overall revenues.

large catalogs of music. However, the users do not own any of the music in the catalog nor do they have access to individual MP3 files. Instead, through a monthly subscription whether paid or free, users are able to stream their favorite artists easily on their own devices. Basically, consumers have moved to rather rent the content than to own it.

While streaming comes with its own series of challenges for the industry, particularly about remuneration of artists, it also drives significant growth for the music industry as a whole. According to the IFPI global music report 2019 (IFPI, 2019b), the music industry is continuing on the growth path that started in 2014. The overall growth was 9.7%, which is “the highest rate of growth since IFPI began tracking the market in 1997.” (IFPI, 2019b). Interactive streaming, such as YouTube, Spotify, is now dominating the industry. According to a year-end report from the RIAA, revenues from streaming services in the US grew nearly 20% in 2019 to \$8.8 billion, accounting for 79.5% of all recorded music revenues. (RIAA, 2020)

Having these numbers in mind, the author presents a survey of the literature on economics of digital goods and streaming. This survey contributes to the understanding of how new technologies have changed the economic landscape of cultural goods’ by reviewing existing literature on five main topics: streaming vs. piracy, the change in cultural landscape and business model, the impact of streaming on music revenue, the consumers behavior perspective and the artists’ perspective. These topics have been chosen because the majority of the existing literature discusses one or more of them. For instance, to assess the change in cultural landscape it is crucial to analyze the impact of streaming on revenue but also to understand the change in consumers’ behavior and the artists perspective. Moreover, while piracy is not part of this research, it was impossible to review the existing research without referring to this topic. It, therefore, identifies the main elements that the literature has covered and the focus of the research until now, sometimes analyzing studies from other related fields. The main goal of this chapter is to advance the knowledge on the topic for this reason it also synthesizes the theoretical and empirical experiences about streaming.

The starting point of this survey is that streaming has changed the business model of artists, record labels, producers and others. Additionally, it has

changed the way in which consumers experience the consumption of music. Consequently, through this chapter, the author first revise the definition of streaming. This short analysis is helpful to understand the perspectives taken by some authors that are not from the economic field. Then, it turns to the prior literature which is divided into the main topics discussed above. Finally, this chapter synthesizes the theoretical and empirical experiences about streaming.

1.2 The Definition of Streaming

While the term streaming is commonly used, it is still important to define such term. Streaming music is a form of distributing sound files without the need to download them from the Internet (Magennis, 2018). The term “stream” is nominally defined as a steady flow or continued progression.

From a technological perspective, online streaming services can broadly be divided into three types: distribution, storage or aggregation (Thomas, 2018). Streaming as a technological process is nominally defined as multimedia continually delivered to a user (Burroughs and Rugg, 2014).

From a marketing point of view, Koiso-Kanttila (2004) describes digital products as an hybrid because they share characteristics of both traditional physical products and services. Like services, digital products are intangible. At the same time, like products, standardization and storage is possible. Additionally, their production can be separated from their consumption. Although this definition was not initially intended for streaming, it can still be applied as streaming is a digital product.

In the RIAA reports, “streaming” is referring to a variety of services, including ad-supported services like Vevo and YouTube, as well as the ad-supported tiers of services like Spotify. It also includes streaming radio services like Pandora and SiriusXM, and premium subscription services like Spotify Premium and Apple Music.

Streaming is also sometimes referred to as download-to-rent or Music as a Service (MaaS) (Dörr et al., 2013). MaaS can be separated into two groups: live streams, only available at specific times, and on-demand streams. On-demand streaming can be split into two types of services: free of charge, supported

by advertising, such as ad-supported Spotify, and a paid subscription service, Spotify Premium. Additionally, various platforms allow consumers to listen to music both online and offline (Weijters et al., 2014). Dörr et al. (2013) also identify two characteristics of MaaS: transmission and pricing model.

1.3 Prior Studies

Since it gained in popularity streaming has been the center of numerous studies using different angles. Literature on this topic is ever expanding. However, the scope of this chapter does not allow for the inclusion of all aspects that the topic covered. Instead, this survey will only focus on the studies and papers that are related to the main research question, namely how new technologies have changed the economic landscape of cultural goods.

Of course, there have been some pioneering studies that have provided valuable findings on the different topics related to Streaming and cultural goods. Although, the findings of these papers have clearly helped to advance the knowledge in economics around the rapid change in the content industry, the author has considered that there are two elements that limit them in one way or another: the time of writing and the angle used. Technology is a field that advances very quickly. In the case of streaming this advances are faster as different platforms fight for supremacy in different mediums. This constant advancement makes that different researches be outdated regarding the current state of affairs in the industry. This means that some of their findings are outdated. The second limitation is the angle used. For instance, studies on the artists' perspective on free streaming are often limited to the compensation amount they received rather than the factors which drive the opinion of artists on free-streaming. Additionally, a relatively large part of the literature is law and economics research.

1.3.1 Streaming vs. Piracy

It is important to present the two different types of streaming:

- **Free Streaming:** The service provided for the consumption of media such as music, videos, games, etc. where the consumer does not have to pay a price to get access to the content. This type of service uses paid adds that are shown to consumers in regular intervals. The companies that use these adds pay the streaming service which, at its time, pays the right-holders of the media their required and contractual royalties. This is not piracy as it generates low royalties and, the right-holders can ask for their content to be withdrawn from the platform if they so choose.
- **Paid Streaming:** The service provided for the consumption of media such as music, videos, games, etc. where the consumer does pay a monthly subscription for unlimited, adds free and uninterrupted access to the content of the platform. The platform pays the contractual royalties to the right-holders and, as in the case of free streaming the right-holders can ask for their content to be removed from the platform.

Then the debate is not if streaming is the same as piracy as it is clear it is not², rather the debate is if streaming helps artists and right-holders to compete with piracy. Nonetheless, many academic texts about music streaming services refer to them as the modern form of piracy, even though this link has never been clearly established. This assumption mainly comes from the fact that a great part of the current research has focused on YouTube, and to a lesser extend Spotify, and examined their (negative) impact on the music industry. It is not the purpose of this chapter to discuss piracy but, because of main academic texts that look at streaming through the lens of piracy, the author felt it was important to briefly discuss the existing material. It is important to explain why in the view of the author, having taken into consideration the existing literature, Spotify displaces music piracy. Additionally, reducing streaming to nothing more than “theft” would result in the discarding of the phenomenon as a major form of media consumption.

Illegal file-sharing, or as it is frequently labeled, piracy, is the process by which *“individuals who do not own and have not purchased a particular song or movie can nevertheless obtain that song or movie from unknown third parties.”* (Liebowitz, 2006). The issue of piracy has existed in the music industry

²It is not as long as it is not used to stream-ripping which is piracy.

since the beginning, and its nature has evolved alongside the industry evolution. Before music was available on CDs, people would record their favorite music on cassette tape when it was playing on the radio and then record it on other tapes to sell them. This was one of the first forms of piracy. With the CDs becoming more popular, consumers found another manner to sell copies. The advance in technology has made it easier to acquire music for free online (Castells, 2013). For instance, Napster in the US which was fought in courtrooms (Nicolaou, 2017). Online music stores, such as iTunes, were seen as the key in the battle against piracy as the consumers were able to buy music cheaper instead of downloading illegally. It offers a legitimate alternative to music piracy because as Steve Jobs said *“You’ll never stop piracy. What you have to do is compete with it.”* (Danaher et al., 2010). Streaming offers the same type of alternative. The attitude towards legal or illegal downloading has also been well-studied. In different articles (Weijters et al., 2014; Weijters and Goedertier, 2016) the authors have found that consumers prefer legal and ethical options when available and depending on the price. Indeed, various studies show that price sensitivity plays a great role.

As far as the impact of streaming on piracy is concerned, empirical evidence is limited and the debate is still ongoing. Sinclair and Green (2016) conclude, from 35 interviews, that streaming services are a more efficient way to tackle the problem than previous methods. Other studies suggest that music streaming acts more as a complement than as a substitute of digital piracy.

Borja et al. (2015), ask if the elements that play a role in music piracy are still important or of great effect in an environment where music streaming services are used. They analyze a survey of 197 college students and found that in general music pirates tend to be young, low income, who fall easily to peer pressure and who boast of overconfidence regarding the rewards and the risks that they can obtain from their actions. Borja and Dieringer (2016) reinforce the previous conclusions of Borja et al. (2015). After analyzing 1052 surveys conducted on undergraduate students in two universities in South Florida they determine that music piracy will not be eliminated by the music streaming services but rather that they are destined to coexist in the market. They make this conclusion because they see streaming services as a discovery tool that would later enable the pirates to download the music illegally. They also conclude that in

general these individuals are young, do not have high incomes, can fall easily to peer pressure and are unaware of the various risks and legal consequences of their actions. Aguiar (2017) also found that free streaming stimulates piracy activity, he used the natural experiment of the introduction of a cap in the number of songs that a free user could consume in the streaming platform Deezer. The author used clickstream data to correctly and precisely identify the behavior of individuals regarding legal as well as illegal music downloading sites. The introduction of the cap in Deezer provided a reduction of the individuals accessing both legal as well as illegal downloading sites with heavy users of the platforms showing the greater decrease in visits compared to lighter users of it. Nonetheless, in another study published by Aguiar and Waldfogel (2017), they concluded that Spotify displaces music piracy. They found that streaming services affect positively the sale of music and that usage overtime reduces both piracy and the sales of music in general when taking into account aggregated data. These findings can be also found in Dörr et al. (2013) who questioned 132 music pirates about their attitude towards free streaming. It shows that pirates use streaming services and that some of them stop using illegal means to consume music as pirates see Streaming as an adequate way to purchase music, resulting in a possible change in cultural landscape and the acceptance of streaming services.

1.3.2 Quality of Cultural Products and Business Model

Streaming has resulted in a change in the cultural landscape which resulted in a change in quality. Indeed, the evolution of music formats has allowed consumers to regain power and freedom of choice. As Emery (2013) noted *“Because of the decrease in record companies’ control over music distribution and access, consumers have disrupted the value chain, along with the technology companies who are increasingly taking over distribution, and are forcing record companies to develop new ways to provide value with their products without relying on physical distributors. Digital music streaming services have been a step forward in once again adding value to music, as they exploit two-sided markets in order to allow some users to listen to licensed content for free.”* Belleflamme and Peitz (2018) offer a good review of the two-sided market. In addition to adding value to music, Waldfogel (2012), analyzing recorded popular music

albums from 1960 to 2007, found that there has not been a reduction in the quality of music released since Napster. The data in fact suggested that the quality of music has improved in the digital age. It can be explained by the fact that it is less costly to release new music, leading to unpredictable successes from artists who might not have produced an album in an earlier era. Aguiar and Waldfogel (2016) analyzed this in a deeper by observing the digital sales of vintage music in different countries. Furthermore, they observe that the quality of vintage music has increased through time, they arrive to it through the analysis of digital sales of 15 countries for an expanse of 5 years. Moreover, they find that the concentration of sales is maintained even when the number of products increases and, that which did not have great success when released seem to be successful some time after their release, this as a consequence of the unpredictability of the quality of the release. In other words, streaming has created the abundance of content, this abundance has not affected the quality of the products and, streaming has brought to be new business models that have passed from owning the products to only renting them. This is one of the ways by which streaming has evolved.

There are various factors that explain the change in the cultural landscape. According to De Rouck (2017) the most important factors are the development of smartphones, which stimulates the use of streaming services, and the ever-increasing competitive streaming market. His thesis analyses the path to financial viability of music streaming services. His research combines financial figures of music streaming companies with the expert insight of key persons involved in the recorded music industry. He, especially, analyses the financial viability of Spotify and concluded that the company is not yet profitable. While his analysis is very interesting, his thesis sometimes lacks focus and in-depth research.

Firms operating in the music industry employ an unusual business model; The product supplied to the market is unique because it is a purely symbolic good (Scott, 1999). Streaming has required the industry to further adapt its already unusual business model. As Hagiú and Wright (2015) explained, Spotify act as both a reseller and a marketplace. Platforms buy content from producers and resell it to consumer. There is, therefore, no interaction between the producers and consumers; However: with regard to advertising, the platforms set the

participation fees for both advertisers and consumers, which then can interact. Flat-rate tariffs that offer unlimited usage for a fixed amount are not new and common practice in many industries, such as car rental. However, as Herweg and Mierendorff (2013) argued *“the prevalence of flat rates is hard to reconcile with orthodox economic theory.”*

The flat rate model and the literature distinguished three potential cause of flat-rate bias (Lambrecht and Skiera, 2006; Train et al., 1991). The first cause of bias is the taxi-meter effect which is mainly discussed in the literature on mental accounting. *“If a measured tariff makes the link between payment and consumption very salient, it reduces the consumer’s pleasure from the service”* (Herweg and Mierendorff, 2013). The second cause is the consumer’s overestimation of future consumption. DellaVigna and Malmendier (2006) demonstrated that many customers of gym clubs over-predicted their future usage. Finally, the third cause is that consumers prefer to be insured against payment variations. As Train et al. (1989) noted that *“customers do not choose tariffs with complete knowledge of their demand, but rather choose tariffs [...] on the basis of the insurance provided by the tariff in the face of uncertain consumption patterns.”* The flat-rate bias can be resumed as driven by consumers’ uncertainty about future consumption (Herweg and Mierendorff, 2013).

The fundamental change of business model can be divided into two phenomena; first, a transition from buying to hiring and second, from many goods to a single bundled good. On the first transition, Balasubramanian et al. (2015) offer a great overview of the economic advantages and disadvantages of both models. On the second transition, as Aguiar (2017) established, from a seller’s perspective, bundling can be very attractive as it allows to better predict demand. Hjelmbrekke (2014) analyses the transition from buying to hiring but also the bundling part. While his paper offers a good overview of economic concept and music consumption, his analysis of the fundamental economic relations is superficial.

Compared to the first generation of streaming services, the new platforms aim to supply all music through their service. As a result, various authors, including Barr (2013), have relied on the ‘celestial jukebox’ to explain the business model of streaming platforms. The term ‘celestial jukebox’ was popularized by Paul Goldstein in 1994 and refers to *“a technology-packed satellite orbiting thousands*

of miles above the earth that could give tens of millions of people access to a vast range of films, sound recordings, and printed material, awaiting only a subscriber's electronic command for it to pop up on his television or computer screen." The acceptance of the celestial jukebox model as the standard for music consumption came along with the rise of Spotify (Hjelmbrekke, 2014). The appeal of the 'celestial jukebox' framework is the straightforwardness of objective, measurable value. Its paradox is that it overwhelmed consumers requiring the industry to implement both market and technological controls (Sun, 2019). In terms of pricing strategies, streaming platforms must decide between subscription, embedded-advertising, or a combination of these two, the so-called freemium. Thomes (2013) addressed this issue by considering a monopoly streaming platform which chooses to offer either a free service, which is ad-financed and of low quality, or a paid service of higher quality. He argued that the platform will optimally choose the free service if consumers are sufficiently tolerant to advertising. This finding is confirmed by Carroni and Paolini (2020) who demonstrated that consumers' attitude towards advertising plays a critical role in the choice of business model. They also concluded that the choice between premium and freemium models is driven by the potential market size of the platform.

Streaming in general and Spotify in particular, is a more sustainable business model for record labels. Streaming offers new opportunities for record labels to reach their consumers and promote their music. This resulted in record labels changing their business model to incorporate streaming as a main distribution channel.

For Spotify, it appears that the ad-funded service is only a recruitment ground of potential subscribers. In fact, free streaming seems to generate more loss than revenue for the company Hjelmbrekke (2014). Nunes (2018) explained this by the fact that nowadays, cell phone operators offer large mobile data plans, meaning that the decision to subscribe to paid streaming is more based on the consumers' preference than on real economic incentives related to expenses on mobile data plans. Additionally, instead of owning and selling physical products, streaming platforms provide access to the "*digital music fortress*" as presented by Nicolaou (2017).

The business model of streaming platform has an important impact on the way

the industry monetizes consumer behavior. From a rightholder's perspective, the focus switch from monetizing buying behavior to monetizing listening behavior. Indeed, the focus was before on maximizing sales around the initial release while, in the streaming era, the focus is on consumer dedication. This, in turn, has an impact on the marketing incentives and music revenue.

1.3.3 The impact of streaming on music revenue

The effects of streaming on music revenue has been extensively studied in recent years. Wlömert and Papies (2016) argued that consumers who adhere to streaming, both free or paid, purchase significantly less recorded music. Datta et al. (2017) demonstrated that even though Spotify increases the overall music consumption, it also cannibalizes the consumption of music on iTunes. In fact, the most fundamental shift in music distribution is not the transition from tangible to intangible formats but, rather the transition from purchasing units to paying for access. Their research is based on a book by Anderson (2006). In it, the long tail is described as the consumption of less popular goods that create profit through long periods of time as more of the populations goes away from the mainstream consumption.

To fully understand the impact of streaming, it is important to analyze free and paid streaming services separately. In general, paid streaming has been regarded as having a positive effect on market revenue. Paid streaming services' subscribers have little or no incentives to consume music online through other channels, which has implications both on digital sales and piracy (Aguiar, 2017). The net effect of free streaming services on revenues is only positive for consumers who were inactive or did not spend money on music before subscribing to streaming platforms (Wlömert and Papies, 2016; Aguiar, 2017).

While the positive effect of paid streaming on the revenue has been demonstrated, the effect of free streaming is still controversial. According to Nguyen et al. (2014), *“free music streaming has no significant effect on CD sales and positively affects live music attendance, but only for national or international artists who are more likely to be available on streaming services”*. This statement directly contradicts the conclusion of Hiller (2016) which stated that free streaming negatively impacts album sales. However, his analysis related to YouTube rather than Spotify. For Aguiar (2017) the restrictions found in free

streaming result in a possible music consumption through different channels and unlicensed downloading. Aguilar and Martens (2016), relying on click-stream data from more than 16,500 European consumers, found a positive relationship between the use of licensed streaming websites and licensed websites selling digital music, suggesting a stimulating effect of music streaming on digital music sales. Examining the important growth of Spotify between 2013 and 2015, Aguiar and Waldfogel (2017) show a significant displacement effect of the streaming service on digital music sales. Wlömert and Papies (2016), adopted an in-between approach by stating that *“the negative effect of free streaming on industry revenue is offset by the positive effect of paid streaming”*. They concluded that the overall effect of streaming on industry revenue is positive. Similar outcome was reached by Kretschmer and Peukert (2020) when analyzing the effect of online videos availability on music sales. They concluded that the promotional effect of online music offsets sales displacement. Additionally, they showed that online availability is complementary to recorded music sales, but have no effect on the sales of individual songs. Hiller established that while streaming displaces sale among best-selling albums, its promotional effect dominates the lower ranked ones. Despite the contrasting results, these authors agree that free streaming displaces sales and that this displacement can be outweighed by the positive effects of paid streaming. While these findings are based on data comparison, there is one component that has been understudied; how the aggregate revenue streams from recorded music have changed with the introduction of streaming services. Indeed, it is still unclear how revenues between the providers of the services, the record companies and the music artists is divided. This uncertainty could partially explain the divergence in opinion.

1.3.4 Consumer Behavior and Discovery

The digital era has brought a shift in the relationship between consumers and music. Through ad-supported or paid subscriptions, consumers had the opportunity to listen to more music for a fraction of the cost of any other format. While there were initially some concerns regarding the lack of ownership transfer, these were quickly outweighed by its qualities including the accessibility to

large libraries, ease of use, inexpensiveness and portability. As a result, streaming became the fastest growing music format (Wlömert and Papies, 2016). Furthermore, streaming platforms evolved with time. *“Initially unlimited access to an inexhaustible catalog of music was the unique selling point of the streaming industry. Today, with a competitive market requiring more differentiation, the industry gradually focuses more on the curation and recommendation of the right music for the right person. It shifted from not only being a place to listen to your favorite music of today but also being a place to discover your favorite music of tomorrow.”* (De Rouck, 2017).

Anderson (2006), argues that the less popular good of any type have a lower demand; these goods create profits because the consumers decide to go away from the mainstream and consume hard to find items. This is applicable in music in the sense that popular releases usually have a pike when they are release but, after their popularity goes away so does their sales but, a part of the population continues to move from the mainstream of popular media to the niche goods that are less popular making it possible for them to generate profits even when their popularity has widely shrank. This is clearly an advantage that is provided by streaming platforms that provide access to a wide catalog so, the new releases still have a pike in the beginning but they keep being consumed in the long term by consumers looking for specific styles or tastes.

Streaming is often perceived as a product discovery tool for sampling or exploring music (Datta et al., 2017; Wlömert and Papies, 2016; Nguyen et al., 2014; Danaher et al., 2010). Aguiar (2017) relies on clickstream data for a sample of 5000 French Internet users and on the introduction of a listening cap by the streaming platform Deezer to identify the causal effect of free streaming on digital music purchasing behavior. He found that free streaming through the French platform stimulates visits to digital music purchasing websites, indicating that music streaming can serve as a channel for the discovery of new products. He demonstrate that the zero-marginal cost of music discovery through streaming, especially for those with high discovery costs, foster the exploration of the catalog of streaming services. Datta et al. (2017) show that streaming leads to an increase in the quantity and the variety of music consumption, as well as to an increase in discovery of new music. Indeed, streaming impacts not

only the quantity but also the variety of content consumed. Because streaming widens the variety of accessible content, it generates additional content consumption instead of displacing it from other channels. It also increase discovery by allowing users to find high-value content more efficiently. Datta et al. (2017) used the data of a set of individual consumers.

Furthermore, Bourreau et al. (2013) creates a production function of French record labels to understand if the ones that have adapted better to digitization are fall more into the strategy of the long tail than others. This is possible to observe as the function distinguishes two very specific elements: the commercial output and the creative one. In the case of the French labels are more efficient in the creative output than in the commercial one by expanding their catalog more to niche markets rather than to mainstream ones.

Ketonen (2018) notes that *“Digitization has introduced the music industry to a few challenges such as declining revenue, but on the positive side it has made it easier for people to discover new music and artists as the search costs have gone down drastically.”* Indeed, the ease to skip among artists can push consumers to explore new artists. This has the potential to reduce the concentration of the very top artists and albums, while also helping music lovers find what economists refer to as the “long tail” of the industry.

These studies mainly focus on illegal downloading rather than on streaming. Smith (2019) argued that in the abundance of choice, *“people become attracted to the character and the person rather than just the music and that is a big change that streaming and social media has brought about”*. Unfortunately, there is not a full study on this topic, as it would be interesting to verify Howe’s statement. If verified, this could be an interesting factor to take into consideration, although challenging to quantify.

Factors that influence consumers’ behavior in streaming, as a stand-alone topic, are less studied. Instead, these factors are often studied with research on piracy. According to Weijters and Goedertier (2016), price consciousness is probably the most significant decision-making variable when deciding whether to subscribe to a paid streaming service. In her study, Nunes (2018) demonstrated that mobile access was more important factor than price. According to her findings, *“the ability to stream offline was the least important attribute which, according to information gathered in the qualitative part of this study, might be*

because cell phone communication plans now include large mobile data plans, so people don't actually have to spend any additional money to have Internet access all day." While (Nunes, 2018) study is extremely helpful, it aims at analyzing the impact of streaming on piracy by mainly focusing on the Portuguese population.

There are few studies which analysis the consumers' behavior from a consumer's perspective. Kretschmer and Peukert (2020) took a somewhat in-between approach between the consumer perspective and the music industry. They demonstrated that the displacement effect dominates when products become more expensive. They surveyed consumers' behavior in ten countries to study the link between sampling on YouTube and purchasing on iTunes. Their main focus is German consumers, where music videos were blocked because of an ongoing royalties dispute between YouTube and the German collecting society. They concluded that the strength of the displacement effect depends on consumers' perceptions about relative quality and cross-price elasticities. Additionally, there are some distinctive characteristics that make studies about YouTube not applicable to Spotify. One of the questions that Aguilar and Martens (2016) tried to answer is the demographic characteristics that drive music consumption. They found no significant difference based on gender or on age. Like previous studies, they concluded that income is positively correlated with online sales of digital music. Their paper has, however, a broader scope because it analyzed all the consumption channels available.

Another thesis that offers some inside regarding the factors that influence consumers' behavior is the thesis by van Kuijeren (2012). His research compared *"the personal traits of users and their preference for music consumption through either MaaS or DtO modes."* He analyses these factors from a marketing point of view which is not the same perspective as used in this chapter. His analysis demonstrated that connectedness and curatorships significantly influence the preference for download to own or music as a service. Bylin (2010) stated, in relation to the iPod, that it *"released fans from the constraints of Top 40 radio playlists, for the first time, gave them complete control over their musical experiences."*

1.3.5 Geographic Origin

In Waldfogel et al. (2019) the authors used Spotify and pop charts for a period of a year, these charts come from a total of 18 countries. Through the use of these charts, geographical and cultural distance data they obtain evidence that the frictions that arise in international trade are reduced through the use of streaming. Furthermore, they found that as the US share of in the global music market decreases the concentration of consumption by origin increases. This together to the to the mix convergence in genres and producers solidifies their conclusion that streaming has not been helpful to major music producers but rather to small countries. The paper by Way et al. (2020) has much more data as it is done by researchers that work for Spotify. They used data on all the countries where Spotify is operational aggregating it each 90 days and considering all age cohorts that were at the disposal of Spotify. Through the use of the gravity model both Waldfogel et al. (2019) and Way et al. (2020) arrive to the same conclusions regarding to the decrease in the frictions of international trade of music as a consequence of digitization and the same ideas regarding th influence of the US in the concentration of music.

Way et al. (2020) shows that the changes that happen in the consumption of music are the result of the change of the underlying preferences of the individual consumers in different geographical areas. This clearly leads to a series of limitless choices as consumers confront the uniquely set of music production models identified with each country. In general, this idea creates a series of complexities based on the fact of how those individuals make choices about what to consume. In this way, they also warned that the abundance of choice would result in users opting of old songs to avoid facing limitless options and to rely on curated playlist instead of deciding.

The quantity and diversity of content that consumers have in streaming platforms is almost infinite. It is provided by several and distinct producers and in various genres. The multitude and quantity of content available in almost all streaming platforms make it almost impossible to retain their users. In order for them to retain more users these platforms have recommendation systems which can be based on various elements such as the consumption history of the consumers, their likes and dislikes, ratings and others. In this sense, Latzer et al. (2016) analyses how selection algorithms have shaped not only the con-

sumption of cultural goods but also its economic influences in the different sectors of the economy. This is important to categorize as several, if not a great part of our daily life is managed by these algorithms. They explain the theoretical bases of them and their application specially in the media and content industries. They discuss additionally the risks of those algorithms violate the rights of individuals, governance and policy.

Belleflamme et al. (2019) research the question of recommendation systems and how they are tools that entice individuals to consume content. Platforms use various methods that were also analyzed in Bourreau and Gaudin (2018) such as ratings, reviews and recommendation algorithms. They conclude that streaming platforms have become the main intermediary in the cultural markets affecting competition between companies and the diversity in the supply of content. The effects of these algorithms on the tastes of consumers is not to be underestimated. Karakayali et al. (2018) researches the effects that these algorithms have on individuals and how individuals use platforms, and in essence these algorithms, to transform their music taste. They conclude that the recommendation systems are an intimate tool that helps the user to self-cultivate and provide power to platforms for obtaining control over the creative transformation of individuals.

Further advances, more focused in cultural goods are researched by Bourreau and Gaudin (2018); they analyze how platforms that have power on these recommendation systems can not only use them to provide discovery services and greater diversity of consumption to its user but, rather, they used in a strategic way to reduce their costs. They found through the use of a monopoly competition model with heterogeneous consumers that the larger bias is correlated to the larger difference in royalties. Furthermore, as long as the consumers are not able to realize the bias of the platform the recommendation system will be able to steer users to the alternatives with the less costly royalties. This strategies together to the vertical integration of the firms reduces the market power of the content producers and translates it to the platform. Showing clearly how recommendation systems are used to modify consumer behavior and access to quantity and diversity of content.

1.3.6 Artists' perspective

While the consumer benefits of the streaming model are extensive and well researched, there are only a few studies which mainly focus on the artist perspective. In most cases, the artists' perspective on streaming are used in the arguments in favor or against streaming rather than a stand-alone topic. For instance, various studies analyze the Taylor Swift example to back their arguments. The issue of artists' perception about free streaming could be confused with their opinion on piracy as in both case recorded music comes at a zero-marginal cost. For instance, while the study by Bacache-Beauvallet et al. (2015) focuses on the artists' perception, it does so in the piracy context.

One aspect that has been widely discussed, especially in the media, is the question of royalties and whether artists are earning enough money from the streaming business model. Spotify has been criticized, especially by artists, for not paying enough for the streams on the site. Zuberi noted that *"For the musicians themselves, they can't rely in the same way anymore on just obtaining income from recorded music alone in terms of being the rights holders. There is a weird contradiction at the heart of these things. On the one hand you have greater access and potential distribution of your music through streaming, but in terms of making a living, generally speaking it is harder for artists to make a living from recorded music"* (Smith, 2019). Some claimed that this 'unfair' compensation was due to the freemium model (Hjelmbrekke, 2014).

Others have pointed out that streaming platforms pay approximately seventy percent in royalties which mostly goes to the record label or distribute, resulting in lower revenues (Blacc et al., 2015; Aguiar and Waldfogel, 2017; Fly, 2016). Spotify does not pay an artist by the play but rather the artist receives a percentage of the revenues generated during the period. As Fly (2016) explained *"an artist with one hundred plays during a month where Spotify experienced lower levels of usage could receive a larger payout than an artist with one hundred plays in a month where Spotify experienced higher levels of usage, depending on the level of revenue generated during the period."* This lowest revenues result in *"a greater emphasis now on live music, on merchandise, on sync rights for film and TV and video games and so on."* This point is also rose and found in various other articles (Smith, 2019; Thomes, 2013; Dias Dos Santos, 2016).

Several studies answered whether streaming can generate enough value for the copyright holders. These questions have been analyzed from both a paid and free streaming perspective. Indeed, streaming generates revenue for the copyright owners through advertisement income, for free streaming, or through charging users a fixed price per month, paid streaming. Although paid streaming offers better protection, these services are often fairly affordable and might, therefore, not be ideal for the artists (Ketonen, 2018). Free streaming, such as YouTube, is often regarded as an alternative method of consumption which negatively impact music sales. Indeed, free streaming generates a value gap.

The value gap in music represents the difference between the value that the streaming platforms get from the content they offer and the profits generated by those that create and invest in such content. The rise of digitization and the streaming of media has greatly contributed to the expansion of the value gap between content producers, owners and streaming platforms. Beard et al. (2017) provides a reason of why this happens as legislation know as “*Safe Harbor Provisions*.” This provisions basically mean that the platform is not legally responsible of the content that is uploaded by the users of the platform as long as it pays a royalty to the owners or that it removes the transgressing content. This make it possible for platforms such as YouTube to pay much less in royalties than subscription based services and platforms such as Spotify and others. Liebowitz (2018b) takes a deeper look at the economic effects of these provisions and how they affect the content industry. The from Liebowitz (2018b) main conclusions supports the idea that these provisions help in the generation of a value gap in the content industry. The value gap is further explored and presented by Ellis-Petersen (2017); Hiller (2016).

This issue has made some artists remove their work from streaming platforms because they considered that the royalties were excessively low (Aguiar, 2017). Blacc et al. (2015) gave two examples of famous songs, John Legend’s “All of Me” and Pharrell Williams’s “Happy”, which generated according to their findings, respectively \$3,400 and \$2,700 in royalties while the songs were streamed 55 million and 43 million times in the first quarter of 2014.

While various authors criticized the current model, only few have provided a solution to this specific issue. Wlömert and Papies (2016), for instance advocate that since artists’ royalties will diminish with the increase of streaming’s

popularity, these should “*negotiate contracts in which the growing relevance of streaming is adequately reflected.*” Lalonde (2014) discusses the use of fair-trade music similar to the existing fair-trade movement in the cocoa and coffee industries. The idea behind the fair-trade proposal is that while certification may increase the cost of music for a consumer, consumers would be willing to pay this additional cost to ensure that creators are not being exploited. The fair-trade solution was critically analyzed by Hernandez (2016) who discussed some of the shortcomings of the system. As he concluded, following the existing fair-trade movement will not create lasting impact on the industry, instead there is a need to creatively adapt such model.

There are few studies, however, which cover the opinion of the artists and analyze their motivations in approving or rejecting free streaming. It is also important to differentiate between renowned artists and ‘newcomers’ as their views can be diametrically opposed. Indeed, the internet has been credited for improving availability of niche products, which then affects patterns of consumption. Various studies have demonstrated that for new or independent artists, social media and streaming platforms are one of the best manners to quickly obtain fans. For instance, McAuliffe (2016) claims that “*being signed to a record label is not a necessity any more, and independent artists can become successful by doing everything by themselves.*” A short study demonstrates that unsigned artists can earn nearly four times more royalties from streaming compared to signed artists (Manatt, 2016). Similarly, various authors have demonstrated that negotiation for royalties are often between the streaming platforms and the record labels leaving artists without a voice (Lalonde, 2014; Coffey, 2016).

One good thesis on the perspective of independent artists was written by Ketonen (2018). Her thesis studied different aspects in the music industry giving a general overview. Her findings is that as streaming platforms make it less time-consuming to discover and explore new artists, streaming helps less-known artists to be discovered. Ketonen (2018) findings contradict Zuberi and Howe who argued that “*definitely streaming favors companies that have large catalogs and it also favors blockbuster artists, the top one percent. However, for an individual artist that is new and quite niche it does make for a very challenging environment in terms of generating income from recorded music*” (Smith,

2019). This difference in findings might also be caused by the different markets researched.

Most studies focusing on the renowned artists' perspective do so by answering the question as to whether the overall amount of compensation paid is sufficient. Additionally, these studies take often a legal approach to the problem. Blacc et al. (2015), approach the artists' perspective from a different angle by differentiating between interactive streaming services, like Spotify, and non-interactive services, like Pandora. Their main claim is that *“allowing the market to function freely will incentive musicians to invest efforts into providing us with their best work.”* While there is some truth to their claim, this thesis and other papers demonstrated that there are other factors influencing the decision of artists to make their music available via free streaming. Moreover, the authors are not making any distinction between paid and free streaming but rather propose an entirely new system. The major flaw of this paper is that it does not take into consideration existing literature demonstrating that paid streaming has mainly a positive effect for artists. Additionally, this paper looks at the problem from a legal and US perspective.

An interesting paper on the subject is the study by Lalonde (2014) which is *“built on a holistic and global world-view.”* This study focuses on music rights holder only, differentiating it from other sources. He demonstrated that fair compensation for author depends on the labels. Even though his paper is not recent (2014), Lalonde was in favor of streaming but with a change to the existing system to remunerate artists better. While his study is of great interest, it did not analyze the factors which drive the opinion of artists on free-streaming.

1.4 Conclusion

The findings of the survey literature survey presented in this chapter suggest that most of the prior research in the area has examined the phenomenon from the technology, legal and business perspectives, whereas the consumer and artists' perspectives have received relatively little attention. This bias has resulted in proposed solutions to some problems, such as piracy, which do not take into account the consumers' needs or expectations.

The prior research has highlighted that the music value is a difficult concept that not only with regard to artists, but also listeners and the music industry. Despite that, a large amount of research only focuses on the financial side of music streaming, which is why this research has taken a broader look. For instance, the impact of streaming on music revenues has been widely researched with prominent economists having published at least a research on the subject. Similarly, the relationship between piracy and streaming has been well researched. Interestingly, pricing strategy and the choice of business model has mostly been discussed as a secondary aspect in the analysis of the impact of streaming on revenues. While the artists' perspective is becoming more and more studied, very few studies have covered the opinion of the artists and analyzed their motivations in approving or rejecting free streaming. Within the rare studies using such angle, many surveys analyzing non-famous artists have been carried in Scandinavian countries. The rest of the studies related to the artists' perspective do so from a revenue perspective. Finally, while the impact of streaming on consumers' behavior has been more widely studied, it has often been examined from an illegal usage perspective. Studies focusing on the consumer behavior in the context of legal usage have been much rarer and often non-economic research. Indeed, consumer behavior has been well-researched in other field, such as communication technology or sociology.

Through this review we can appreciate that there is a a varied and wide range of literature regarding the subject in economics and other areas of social studies. Nonetheless, the great part of the economic literature regarding streaming and music is focused on the study of revenues and piracy, elements that have been widely studied. But, the author has clearly shown that there are not as many studies regarding the perspective of artists towards free and paid streaming, regarding the effects on the international trade of music and, the effects that platform have on the consumption of local or imported music and, much less regarding the theoretical framework of how the business model of platforms could be upgraded to profit from price discrimination based on information, preferences and consumption history of each user of these platforms.

The present survey has provided a wide view of what the current state of the art is around this subject. Various authors have focus their research around the complementarity of piracy and streaming, the effects of streaming in the

revenues of artists, the expansion of business models and how it has affected different areas of international trade. Nonetheless, there are subjects that have not been deeply researched such as the opinion of the artists and the logic behind those opinions, the possibility of the streaming platforms at price discrimination as they possess immense quantity of information about them and, finally, what are the effects of the availability of streaming platforms on the international trade of music. These are elements that the author of this survey has identified as fertile ground for research.

Chapter 2

The Artist Opinion¹

2.1 Introduction

Through the survey presented in chapter one the author has observed that there are some elements that have not been researched in deep around Streaming. The research has focused around what are the effects of streaming on piracy and how they cannibalize or complement each other. Furthermore it has been clear that the research has focused on the change of business model from a model of ownership to one of renting, where having access to an immense catalog that opens up infinite choice does not only provide consumers with more options but, that makes it more complicated for artists to generate great quantities of sales on albums or songs that do not comply with the high quality tastes of the consumers. This has also been studied as it was supposed that the quality of production would decrease the quality of the good but, as seen in chapter one, this seems not to be the case. This availability of products has an effects on the international trade of music which has been also studied as it was supposed that digitization would decrease the effects of the distance in the trade of cultural contents such as music. Nonetheless, all of this focus around business models, the effects on piracy and it's place when streaming is available, the diversity and quality of the goods produced and the

¹This chapter is a joint work with Maya Bacache-Beauvallet, Marc Bourreau and François Moreau and has been published under the title "Why would artists favor free streaming?" in the Journal of Cultural Economics, vol. 44, num. 2, pp. 255 - 280.

effects of trade have left some issues on the table to be researched. One of these issues is the opinion of artists on streaming. After all, they are the more concerned with the change towards this technology. It has greater effects as new deals have to be signed with the new platforms that enter the arena as a new kind of mass distributors of music. Spotify, Apple Music, YouTube and other streaming platforms are now the dominant gateways for music consumption. In early 2018, they accounted for 75% of total recorded music revenues in the US², 56% in France³, 48% in Germany⁴ and 46% in the UK⁵. From the record labels side, streaming is praised for stopping the seemingly never ending decline that the industry experienced over the last 15 years. Hence, according to John Rees, VP of Warner Music (IFPI, 2017): *“Streaming has the potential to create a golden era for music, with multiple players establishing a truly competitive digital landscape that will benefit artists, consumers and the industry.”* However, the artists’ opinion towards streaming is more controversial. Artists’ criticisms concern specifically the free (ad-supported) music services provided by most audio streaming platforms (e.g. Spotify) or video-sharing platforms (e.g. YouTube). For instance, Taylor Swift opposed her music to be available on the ad-supported service of Spotify: *“Music is art, and art is important and rare. Important, rare things are valuable. Valuable things should be paid for. It’s my opinion that music should not be free [...]”*⁶. Taylor Swift then removed her entire catalog from Spotify in 2014, before the launch of her new album *1989*. Likewise, Radiohead took down all their albums from Spotify in 2013. This position is far from being merely a reflection of individual opinion. Ray Hair, President of the American Federation of Musicians, recently asked YouTube: *“How rich do you need to be before paying musicians fairly?”*⁷. Likewise, Robert Ashcroft, Chief Executive of PRS for Music, the UK society that

²<https://www.riaa.com/wp-content/uploads/2018/09/RIAA-Mid-Year-2018-Revenue-Report.pdf> (retrieved November 13, 2018).

³<http://www.snepmusique.com/wp-content/uploads/2018/09/Bilan-march%C3%A9-musique-enregistr%C3%A9e-1er-semester-2018.pdf> (retrieved November 13, 2018).

⁴<https://www.billboard.com/articles/business/8465986/germany-music-streaming-cds-market-share-bvmi-2018-report> (retrieved November 22, 2018).

⁵<https://www.bpi.co.uk/news-analysis/fastest-growth-in-uk-record-label-income-since-britpop/> (retrieved November 22, 2018).

⁶<https://www.theguardian.com/music/2014/nov/04/taylor-swift-spotify-streaming-album-sales-snob> (retrieved October 25, 2017).

⁷<https://www.musiciansunion.org.uk/Files/Reports/Campaigns/Report-on-Joint-FIM-AFM-International-Conference-o.aspx>

undertakes collective rights management for musical works on behalf of its 130,000 members, declared *“there is a real problem with ad-funded streaming services. By comparison with subscription services, they do not produce values even remotely equivalent to a download sale - we’re talking about hundreds of streams being the equivalent of a download for the songwriter rather than 50 or so. This clearly does not work alone.”*⁸ Admittedly, in 2017, the ad-supported segment accounted for 56% of Spotify’s users but only for 10% of its revenues: a free-user generates through advertising revenues an average yearly income of \$2.6 against \$51.7 for a subscriber⁹. The situation is even more critical with music video streaming platforms such as YouTube. While the bulk of Spotify’s revenue are paid to the recorded music industry (more than 75% in 2018), sheltered behind the “safe harbor provisions”¹⁰ YouTube is exempted from the obligation to negotiate the access to the catalog of music labels and thus usually pay less than the market rate (Liebowitz, 2018a). In 2016, the 900 million users of music video sharing services alike YouTube only generate \$0.55 billion of revenues for the recorded music industry, that is to say only \$0.6 per user (IFPI, 2018).

Artists face a revenue-exposition trade-off with free-streaming. On the one hand, free-streaming generates very low advertising revenues per stream as compared to paid-streaming, and therefore artists derive lower revenues from free-streaming than paid-streaming. An artist relying mainly on revenues from her recorded music would therefore like a faster shift to paid-streaming and may thus have a negative opinion on free streaming. On the other hand, free-streaming allows a larger audience to participate to the platform, which means a larger exposition to a potential audience for music artists. For example, Midia Research states that *“YouTube is the main way that all consumers aged 16 to 44 discover music.”*¹¹ A new artist who wishes to develop her audience may benefit from the larger audience and exposition allowed by free-streaming com-

⁸<https://www.prsformusic.com/what-we-do/protecting-music/our-perspective-on-streaming>

⁹<https://www.sec.gov/Archives/edgar/data/1639920/000119312518063434/d494294df1.htm#rom49429412> (retrieved March 5, 2018)

¹⁰The “safe harbor provisions” is a legislation created to prevent Internet Service Providers being blamed for copyright infringement undertaken by their users as long as they accept to remove infringing works quickly after being notified of such infringement (Liebowitz, 2018a)

¹¹<https://musicindustryblog.wordpress.com/2018/08/28/state-of-the-youtube-music-economy-2-0-a-turning-point-for-all-parties/>

pared to paid-streaming. Due to this trade-off, it is not a surprise that artists are not unanimously against free streaming. In France, for instance, 40% of professional musicians have a positive opinion on free streaming services (see below).

In this chapter, we propose a theoretical framework which emphasizes several factors that could explain the positive opinion of some artists on free streaming. The two first factors pertain to the above mentioned promotional effect argument. First, since free streaming stands as a cost-less discovery tool for consumers, some artists could value the opportunity to widen their audience more than the potential loss in recorded music sales. Second this audience widening should be especially profitable to artists who are touring the most. Our third and fourth factors relate to more specific arguments. Third, an artist who believes that her record label has a strong bargaining power with streaming platforms should be more favorable towards free streaming. We consider that major labels have a stronger bargaining power because of the attractiveness of their music catalog and are thus able to secure a greater share of streaming revenues. Fourth, an artist whose audience is more prone to use free streaming should also be more favorable to this new consumption mode. Since youngest consumers are over represented in the population of free streaming users, artists who target this specific audience should have a better opinion on free streaming.

At a first glance, the issue of artists' perception of free streaming could appear quite close from the debate on artists' opinion towards piracy. Indeed, in both case recorded music comes at a zero marginal cost for consumers with an unlimited catalog. As for free streaming, some artists have also a positive opinion on piracy (Bacache-Beauvallet et al., 2015). However a closer look shows that free streaming and piracy strongly differ. Firstly, free streaming is legal conversely to piracy. This should eliminate ethical considerations and lead to focus on economic concerns. Secondly, conversely to piracy, free streaming generates revenues, although smaller than pay-streaming. Artists can thus directly benefit from free streaming depending on their contracts and on their fans listening behavior.

To address our research questions we use a survey from more than 1100 French professional musicians polled in autumn 2014. We estimate the impact of our

different variables of interest on the probability for an artist to have a positive opinion on free streaming. Our results show that artists whose objective is to expand their audience see free streaming rather positively conversely to artists who already have an established fan base; artists who mainly yield revenues from touring also have a better opinion on free streaming; artists signed by a major label see free streaming more favorably than artists under contract with a small independent label, which is consistent with the hypothesis that major labels have a stronger bargaining power towards streaming platforms; finally the younger the fans of an artist are, the more positive her opinion on free streaming is.

The remainder of this chapter is organized as follows. Section 2 reviews the literature. Section 3 presents the theoretical framework and the research hypotheses. Section 4 is devoted to the data, the empirical strategy and the results. Section 5 deals with the discussion of the results and their implications. Section 6 concludes.

2.2 Literature review

Among the huge literature devoted to the digitization of information goods¹², and especially of the music industry, a growing part deals with the streaming issue. Three flows of papers can be distinguished: those that study if streaming substitutes or complements other music consumption channels (whether legal or illegal); those devoted to the impact of streaming on consumer behavior; and finally papers that deal with the impact on the business model of the music industry and of the streaming platforms, as well as with legal ramifications of the growth of streaming.

The question whether streaming and purchasing music substitute or complement to one other is still open, existing literature providing contrasting results. A first set of papers suggest substitutability. Aguiar and Waldfogel (2017) find that Spotify use displaces permanent downloads. From a panel of 2,500 music consumers repeatedly observed over more than one year, Wlömert and Papies (2016) show that the adoption of a free streaming service as well as the adoption of a paid streaming service cannibalizes consumers' music expenditures. From a

¹²See Belleflamme (2016) for a progress report

quasi-natural experiment¹³, Hiller (2016) shows that free streaming negatively impacts album sales. However, if streaming displaces sales among best-selling albums, a promotional effect dominates among the lower ranked. Conversely, several papers conclude to the complementarity of streaming and music sales. Relying on individual-level click-stream data of a representative sample of 5000 French Internet users and exploiting the introduction of a free streaming cap by the platform Deezer, Aguiar (2017) shows that free streaming stimulates music purchasing, especially for lighter streamers. Aguilar and Martens (2016) also use click-stream data on a panel of more than 16,500 European consumers and find a positive relationship between the use of licensed streaming websites and licensed websites selling digital music, suggesting a stimulating effect of music streaming on digital music sales. From two quasi-experiments in Germany¹⁴, Kretschmer and Peukert (2020) find that online videos availability is complementary to recorded music sales. New artists and mainstream artists benefiting disproportionately from video availability on YouTube. Despite these contrasting results, it should be noticed that a seemingly robust conclusion appears: the impact of free streaming on digital sales is less negative or more positive for new artists than top sellers. The link between streaming and piracy is also not clear. From surveys conducted on 1052 undergraduate students in two universities in South Florida, Borja and Dieringer (2016) find a positive correlation between frequent use of streaming services and illegal downloading. Aguiar (2017) also finds that free streaming stimulates piracy activity. Conversely, Aguiar and Waldfogel (2017) show that Spotify displaces music piracy! The research devoted to the impact of streaming on consumer behavior mainly focuses on the discovery opportunity offered by streaming as compared to purchasing channels. The zero marginal cost of music discovery through streaming should, especially for those with high discovery costs, foster the exploration of the catalog of streaming services. Aguiar (2017) indeed emphasizes that his results are consistent with streaming allowing discovery of products. From a panel data set of individual consumers listening behavior on digital music platforms, Datta et al. (2017) show that consumer adoption of streaming leads to

¹³The removal of Warner Music content from YouTube in January 2009, and its restoration in October 2009.

¹⁴In 2009, virtually all official music videos were blocked from YouTube due to a legal dispute. The situation remained largely unchanged until the dedicated platform VEVO entered the market in 2013, making videos of a large number of artists available over night.

an increase in the quantity and the variety of music consumption, as well as to an increase in discovery of new music.

Finally, a last stream of the literature on streaming deals with the impact on the industry as a whole and on record companies' and streaming platforms' business models. As far as the global revenues of the music industry are concerned, Aguiar and Waldfogel (2017) show that the losses from displaced sales are roughly outweighed by the gains in streaming revenue. In other words, interactive streaming appears to be revenue-neutral for the recorded music industry. Likewise Wlömert and Papies (2016) estimate that the overall effect of streaming on industry revenue is positive (the positive effect of paid streaming outweighs the potentially negative effect of free streaming). In a theoretical setting, Hiller and Walter (2017) identify conditions under which the rise of streaming and the adaptation of music industry will encourage the release of fewer songs, but higher quality songs. Nguyen et al. (2014) show that free streaming has a positive impact on the live music market, suggesting that record companies should seek for diversification outside the recorded music market. Adopting a different perspective, Thomes (2013) and Carroni and Paolini (2020) switch the analysis from the recorded music industry to platforms strategy, especially on the choice among the various possible business models: subscription, advertising, or freemium (a combination of the two previous). In the legal field, the research had been focused on the effects that digitization and streaming have on the copyright laws (Nguyen et al., 2014; Hogan, 2015).

To the best of our knowledge, there is no paper devoted to explain the opinion of artists on streaming, and especially on free streaming. Some of the previous papers just provide a few insights. For instance, by emphasizing that famous artists' music sales should be more negatively, or less positively, affected by free streaming (Hiller, 2016; Kretschmer and Peukert, 2020). The present chapter aims at filling this gap.

2.3 Theoretical framework and research hypotheses

We argue that four features of the recorded music industry are key-determinants of the opinion of artists on free streaming. First, the shift from selling to renting music that allows consumers to increase their discoveries; second, the evolution of the relative importance of recorded music market as compared to ancillary markets (such as live music for instance); third, the relative bargaining power of music labels towards streaming platforms; fourth, the specific demographic composition of free streaming users.

Up to the rise of streaming services, the digitization of the music industry has led to a nearly zero marginal cost of production and delivery of digital file but to a above zero marginal cost for consumers (the usual price to purchase a downloaded song remains around \$0.99). With streaming, the zero marginal production/delivery cost of each copy of a song translates in a zero marginal cost for consumers. Streaming services offer an unlimited access to a huge music catalog for a flat rate (subscription) or for free within the ad-supported service. A consumer has access to any song and not only to those for which her expected utility justifies to pay \$0.99. The potential for music discovery is hence much higher with streaming than with pay-downloads or physical purchase. Datta et al. (2017) highlight that music streaming platforms are indeed a discovery tool for consumers. Hence those artists who already have an audience or are popular enough should be less favorable to free streaming. This is how we can interpret the position of Taylor Swift (see introduction). Conversely, artists still unknown (especially the newbie) need to expand their audience and thus should be more favorable towards free streaming. For example, Ben Berry, a musician member of a band called Moke Hill, sees Spotify as the instrument by which his band has get to be known¹⁵: “*With no marketing, PR or label support, Spotify has exposed to an audience who otherwise have little chance of finding us.*” This discovery tool feature of streaming platforms leads us to posit the following hypothesis:

H1: Artists who need to expand their audience are more favorable towards free streaming.

¹⁵<https://www.wired.com/2014/11/one-band-who-loves-spotify/>(retrieved march 5, 2018).

Moreover, this discovery process does not only foster the increase of future audience in the recorded music market (for the next albums for instance) but can also have a short run effect on ancillary markets for which recorded music generates a positive externality. The most important of these ancillary markets is the live music market which has benefited from the digitization of music (Mortimer et al., 2012; Bacache-Beauvallet et al., 2015), notably through free streaming (Dang-Nguyen et al., 2014). Hence, our second hypothesis:

H2: Artists who yield large revenues from ancillary markets of recorded music are more favorable towards free streaming.

The recorded music market is highly concentrated with three companies (the so-called Majors) accounting for around 70% of worldwide sales. The domination of the majors is even more important in the streaming sub-market (see Table 2.1). Securing the access to the majors music catalog is thus mandatory for the various competing streaming platforms. This provides a huge advantage in bargaining power for the majors towards streaming services that translates into various specific clauses in the contracts that link them. The contract signed in 2011 between Sony Music and Spotify has been made publicly available¹⁶. It shows, among others, that Spotify has accepted to pay huge advances to Sony, which could be cut back if Spotify earns over that amount in the corresponding contract year. Moreover for the ad-supported service Spotify has accepted to pay a minimum of \$0.00225 per stream to Sony¹⁷. Consequently, the actual sharing of streaming revenue benefits more to major music labels than it should. Revenues are indeed supposed to be shared on a basis of 70/30 (70% for music labels and 30% for the platform) for subscription services and 55/45 for ad-supported services. However, the analysis of Spotify's annual financial statement shows that in 2015 the amount paid to the recorded music industry

¹⁶<https://www.theverge.com/2015/5/19/8621581/sony-music-spotify-contract> (retrieved October 25, 2017).

¹⁷Although considered as very low by right holders (see introduction), the revenue per stream yielded from free streaming is probably about ten times larger than the revenue per listener drawn from radio broadcast. In France, in 2017, the average number of listeners per song broadcasted on the radio amounted to 67,057 (source: https://www.cnv.fr/sites/cnv.fr/files/documents/PDF/Ressource/Obs%20eco/DMR_2017_livret.2.pdf). Furthermore, according to the Adami, an artist earns 100 euros each time her music is broadcast 14 times on radio (hence, 200 euros for the music label and the artist since revenues from radio are equally shared between both of them). Thus a back-of-the-envelope calculation shows that 938,805 radio listeners are needed to generate 200 euros for right holders, which amounts to €0.0002 per listening.

reached 84% of Spotify’s revenues. During the first quarter 2018, this figure was still above 75%. A note in the financial statement of Spotify clearly links this difference between the scheduled and actual payment of Spotify to music right holders to the various contractual clauses mentioned above.¹⁸ Conversely,

Table 2.1: Majors’ market share on the worldwide recorded music market in 2016

	<i>Global music market (%)</i>	<i>recorded market (%)</i>	<i>Streaming market (%)</i>	<i>music</i>
Universal Music		28.9	30.4	
Sony Music		22.4	22.7	
Warner Music		17.4	18.6	
Total Majors		68.7	71.7	
Independent labels		31.3	28.3	
Total market		100	100	

Source: Midia Research

small independent labels are not proposed the same profitable clauses in their contract with streaming platforms. They do not even negotiate directly with them but have to contract with a digital aggregator (e.g. Believe) which will make their contents available on streaming platforms against a share of the revenues. The bargaining power towards streaming platforms being much more important for a major label than a small independent label¹⁹, it is reasonable to believe that an artist signed by a major label will be more confident in the ability of her label to secure a good deal than an artist signed with a small independent label. Hence our third hypothesis:

H3: An artist signed by a Major label has a more favorable opinion on free streaming than an artist under contract with a small independent label.

Another feature of the recorded music industry in the streaming age that can

¹⁸“The Group has certain arrangements whereby royalty costs are paid in advance or are subject to minimum guaranteed amounts. An accrual is established when actual royalty costs to be incurred during a contractual year fall short of the advance payments or the minimum guaranteed amounts. The Group also has certain royalty arrangements where it would have to make additional payments if the royalty rates were below those paid to other similar licensors (most favored nation clauses). An accrual is recognized when it is probable that the Group will make additional royalty payments under these terms.”

¹⁹<https://www.musicbusinessworldwide.com/global-market-shares-2016-sony-and-warner-gain-on-universal-as-indies-rule/> (retrieved October 25, 2017).

impact the opinion of artists is the specific demographic composition of streaming users. Streaming services, and above all free streaming services, are especially popular among young consumers. Hence, the 15-29 only accounts for 22% of the French population but for 34% of streaming subscribers and for 36.5% of free streaming users. Put in other words, the penetration rate of music streaming for the whole French population (15+) is 35% but reaches 54% for the 15/29(SNEP, 2015). Hence, a musician who performs a genre especially appreciated by young listeners should be more favorable to free streaming in order to “follow” her audience. We thus propose our fourth hypothesis:

H4: The younger the target audience of an artist is, the more positive her opinion on free streaming should be.

2.4 Empirical strategy

2.4.1 Data

The data set was built from a survey realized by a specialized company GfK-ISL and conducted on late 2014 on the French musicians who were members of Adami, the French organization for the collective administration of performers’ rights. Adami gathers all the French professional musicians. To belong to the Adami a musician has indeed to have already release an album sold in conventional music stores. Furthermore, belonging to the Adami is mandatory to receive payments from radio air-plays, TV broadcasting, etc. About 8,500 musicians received a paper or online questionnaire, and we receive 1,239 answers of which 1,103 were considered valid²⁰.

The dependent variable is created using the following question from the questionnaire: “Are you favorable towards the distribution of your music by free streaming?”. Four answers were proposed: very favorable, rather favorable, rather unfavorable, very unfavorable. Table 2.2 below displays the frequency for each of these opinions. We note that while less than one artist over ten has a very favorable opinion on free streaming, the three other opinions are equally

²⁰We checked that our sample is representative of the whole populations of musicians belonging to the Adami. We also checked that the way the questionnaire has been answered (paper vs. online) has no impact on our results.

distributed over the population.

We first use as dependent variable *FREE_BINARY*, a dichotomous variable

Table 2.2: Question used to build dependent variables

<i>“Are you favorable towards the distribution of your music by free streaming”</i>	<i>Frequency</i>
Very unfavorable	27.3
Rather unfavorable	31.7
Rather favorable	32.5
Very favorable	8.5
Total	100

which equals 1 if the artist declared to be very or rather favorable to free streaming, and 0 otherwise. However, to account for the richness of the information we gathered on the intensity of the preferences of the artists towards free streaming we also use an ordered probit model. *FREE* is a categorical variable which takes the value 0 if the answer was “very unfavorable”, 1 for “rather unfavorable”, 2 for “rather favorable” and 3 if the answer was “very favorable”.

With respect to the first hypothesis we consider the level of prestige or fame of an artist as well as her commercial success. We create a dummy variable *GOLD* taking the value of 1 if the artist has already received either a gold record or a music award, and taking the value of 0 otherwise. Those artists already benefit from a wide audience and should not see streaming as a tool to discover them. We thus expect *GOLD* to have a negative sign. At the opposite of the success spectrum, we consider the case of lesser known musicians. *MUSREV* is a dummy variable that takes the value of 1 in the case that the revenues an artist receives from music are less than 50% of their personal income and 0 otherwise. Actually, *MUSREV* may capture two different aspects of an artist. Besides low-audience artists who have not (yet?) encountered success, *MUSREV* may also be associated to less professional artists who have

chosen to keep a non-musical job while being a musician. However, in both cases, such a musician should be less concerned with free streaming, either because it allows her to expand her audience or because she does not consider music revenues as essential for her. We thus expect this variable to have a positive sign. We also take into account that free streaming offers a greater potential to expand the audience of a newcomer in the artistic career than of an incumbent who is more likely to be already known from her potential fans. The variable *CAREER* classifies the length of the artist career in five categories (less than 5 years, from 6 to 10, from 11 to 20, from 21 to 30, more than 30 years). *CAREER* is expected to have a negative sign²¹. We prefer to use the length of the career instead of the age because not all artists enter the career in their youth²².

As far as the second hypothesis is concerned, we construct the dummy *STAGE* that takes the value of 1 if concerts are identified as the most important source of income of an artist and if she performed more than ten concerts in the last year, the variable takes the value of 0 otherwise. We included *STAGE* to capture those artists who want to widen their audience because their main income comes from touring. We posit that these artists have a more favorable opinion on free streaming because they expect more from their touring revenues than from recorded music sales. We thus expect *STAGE* to have a positive sign.

To test our third hypothesis we create several dummy variables to distinguish the contract status of the artists. First we construct a dummy variable *NO-CONTRACT* to account for those artists not signed by a music label. *MAJOR* (resp. *LARGE* and *SMALL*) is a binary variable that takes the value 1 if an artist has a contract with a major (resp. a large independent and a small independent) label and 0 otherwise. A major label can secure better deals with

²¹The negative impact of the length of the career on the opinion on free streaming might also pertain to a strategic effect. Incumbents, and in particular star artists, could view newcomers as potential competition. They thus may have a negative opinion on free streaming, because streaming allows newcomers to improve their notoriety and increase their audience. Unfortunately, we do not have any variable in our data-set that would allow us to test for the existence of this strategic effect. It could be partially captured, though, with the variables *NOCONTRACT* and *MUSREV*. They indeed allow to distinguish incumbents (who have a contract with a record company or who make their living from music) from low audience artists that could benefit from new promotion tools such as free streaming.

²²Using simultaneously the age and the length of the career generates a collinearity issue. We however checked that using the former instead of the latter does not change our results. We checked that there are no other collinearity issues among our interest variables (VIFs never exceed 2.00).

streaming platforms which generate higher revenues for the label that should translate into higher income for the artists. Conversely, small independent labels usually don't contract directly with streaming services and have to contract an intermediary, a digital distributor, who will make their music available on digital platforms. The digital distributor charges the independent label for this service which reduces the revenues of right holders and thus of artists. Considering *SMALL* as the reference category, we expect *MAJOR* to have a positive sign.

Our fourth hypothesis relates to artists who perform music genres that have young people as their main targeted audience. According to a poll conducted by CSA Research in France in June 2015, young consumers display specific music tastes. As shown on Table 2.3, some musical genres are under-represented among young listeners (French popular music, Classical, Jazz, World music), other genres are slightly over-represented (Pop-rock, Others), but two musical genres turn out to be very significantly over-represented as the most preferred among young listeners: electronic music and urban music. For these two musical genres, the ratio of the share among 18-24 year-old listeners to the share in the whole population reaches 2.6 and 3.3, respectively. Whereas Electronic and Urban are the preferred musical genres for only 12% of the French population, it is the case for 36% of the 18-24 year-old population! We thus created a dummy

Table 2.3: Most preferred musical genre for French adults

<i>% of French adult who consider this genre as their most preferred</i>	<i>Whole population (1)</i>	<i>18-24 -2</i>	<i>(2)/(1)</i>
French popular music	31	9	0.29
Pop-rock	27	37	1.37
Classical	9	2	0.22
Jazz	5	2	0.4
World music	7	3	0.43
Electronic music	5	13	2.6
Urban music (rap, RnB, ...)	7	23	3.29
Others	9	11	1.22
TOTAL	100	100	

Source: CSA Research, Les Français et la musique, June 2015.

ELECTRO_URBAN which takes value 1 if the musical genre of the artist is either urban music or electronic music, and 0 otherwise. Since young listeners are more favorable to free streaming and are also much more prone to listen to electronic or urban music, we expect the coefficient of *ELECTRO_URBAN* to

be positive.

Moreover, we include various control variables. Firstly, we take into account the specific case of artists who do not produce any new music anymore, but still have (old) fans who continue to listen to them. They could be favorable to free streaming because they can earn royalties, even though they do not sell physical or digital albums anymore. In our database, we are not able to accurately identify artists who have not released any album for many years. However, we create a proxy that captures this idea: a dummy variable called *ACTIVE* which takes value 1 if the artist has participated to a recording session within the past 12 months, and 0 otherwise. Secondly, we consider the presence of the artists in the internet through the dummy *WEB* that takes the value of 1 if the artist has a web-page dedicated to her musical activity and 0 otherwise. Our aim is to control for the general inclination of the artists on digitization. It is possible that some artists may not be favorable to streaming just because they are not favorable to digitization at all. Thirdly, to address the concerns about piracy, we added a categorical variable *PIRACY* that takes the value 1 if the artist declared not to be bothered by her music being shared in P2P networks, and 0 otherwise. Our goal is to check that the opinion on free streaming is not perfectly aligned on the opinion about piracy, even if some artists could consider piracy and free streaming as two promotional tools. For a comprehensive discussion on the determinants of the artists' opinion towards piracy, see for instance Bacache-Beauvallet et al. (2015). Fourthly, we include the traditional socio-demographic variables. A dummy variable *GENDER* that takes the value of 1 if the artist is a female. *PARIS* that takes the value of 1 if the artist lives in Paris or in the nearest suburbs. The dummy variable *EDUCATION* takes the value 1 if the artist earned at least a master degree. We also control for artists' personal income. In the questionnaire, the artist was asked to indicate if her individual yearly total income (including musical and non musical activities) was under €9,000, between €9,000 and €15,000, between €15,000 and €30,000, between €30,000 and €60,000, or over €60,000. From these five possible answers we built five dummies: *INCOME1* to *INCOME5*. Table 2.4 displays the descriptive statistics of the artists belonging to our dataset.

Table 2.4: Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
FREE	1103	1.2221	0.9433	0	3
MAJOR	1103	0.0399	0.1958	0	1
LARGE	1103	0.0263	0.1601	0	1
SMALL	1103	0.1677	0.3738	0	1
NOCONTRACT	1103	0.7661	0.4235	0	1
GOLD	1103	0.2919	0.4549	0	1
STAGE	1103	0.4053	0.4912	0	1
MUSREV	1103	0.4497	0.4977	0	1
CAREER	1103	4.0571	0.9485	1	5
ELECTRO_URBAN	1103	0.058	0.2339	0	1
PARIS	1103	0.3962	0.4893	0	1
GENDER	1103	1.1985	0.3991	1	2
INCOME1	1103	0.2103	0.4077	0	1
INCOME2	1103	0.1904	0.3928	0	1
INCOME3	1103	0.34	0.4739	0	1
INCOME4	1103	0.1813	0.3855	0	1
INCOME5	1103	0.078	0.2682	0	1
EDUCATION	1103	0.3554	0.4788	0	1
WEB	1103	0.6917	0.462	0	1
ACTIVE	1103	0.6519	0.4766	0	1
PIRACY	1103	0.3953	0.4891	0	1

2.4.2 Results

We first use a simple probit model and then a classical ordered probit model as presented by Wooldridge (2010). The ordered probit model for y conditional on independent/control variables x is determined by:

$$Y^* = x\beta + \epsilon \text{ with } \epsilon|x \sim \text{Normal}(0, 1)$$

Where β is $K \times 1$ and x does not contain a constant. Let $\alpha_1 < \alpha_2 < \dots < \alpha_j$ be unknown cut points and define:

$$y = 0 \text{ if } y^* \leq \alpha_1 \tag{2.1}$$

$$y = 1 \text{ if } y^* < \alpha_2 \tag{2.2}$$

$$y = J \text{ if } y^* > \alpha_j \quad (2.3)$$

To obtain the conditional distribution it is only necessary to compute each one of the response probabilities for each one of the values of y . Hence we end up with the following conditional distribution:

$$P(y = J|x) = P(y > \alpha_j|x) = 1 - \Phi(\alpha_j - x\beta) \quad (2.4)$$

This model can be estimated by MLE to obtain the β coefficients.

Table 2.5 displays the results of both the simple probit and the ordered probit. First we observe that both models provide very close results. All the independent variables we use to test our four hypotheses (in bold on Table 2.5) are significant in both models, although significance turns out to be higher for the ordered probit than for the simple probit.

The various variables that account for the willingness of artists to expand their audience all have the expected sign. The variable *GOLD* is negative and significant. For artists who already encountered success, the low revenue effect of streaming dominates the audience expansion effect. Conversely, artists who still remain lesser known are more favorable towards free streaming: *MUSREV* is positive and significant. Musicians who are still confidential and earn less than half of their personal income from musical activities indeed seem to see streaming as a way to increase their audience. Likewise newbie artists are also more favorable to free streaming that can help them to develop a fan base: *CAREER* is negative and significant. The longer the artistic career of an artist is, the less favorable to free streaming she is²³. Our first hypothesis is thus supported. Our second hypothesis is supported as well. *STAGE* is positive and significant²⁴. Artists who are touring a lot and earn the largest part of

²³We also test a configuration in which we split the variable *CAREER* in four dummies: “10 years or less”, “11 to 20 years”, “21 to 30 years”, and “more than 30 years”. Only the two last categories turn out to be significantly different from the first one (taken as the reference). This highlights that the negative impact of the length of the career on free streaming is driven by the artists who already spent more than 20 years in the music business (the estimation results are available upon request from the authors).

²⁴The variable *STAGE* is only weakly significant at 10% in the simple probit model (p=0.107).

their income from live music are more prone to accept free streaming²⁵. Free streamers make some discoveries and could decide to go to see them on stage. With respect to the third hypothesis, as expected, *MAJOR* is positive and significant. Artists signed by a major label are much more favorable to free streaming than artists under contract with a small independent label²⁶.

Our explanation is that the former are confident in their major label to negotiate a favorable deal with streaming platforms²⁷. Finally, with respect to our fourth hypothesis, the coefficient of *ELECTRO_URBAN* is positive and significant²⁸. This confirms that artists know what the habits of their fans are and accept easily free streaming if their audience is among the most intensive users of this music consumption channel.

Although the simple probit and the ordered probit provide very close results, Table 2.5 highlights that we should split the dependent variable in four categories rather than two. The three thresholds “cut1”, “cut2” and “cut3” allow us to assess to which of the four categories of the dependent variable a specific combination of covariates leads (Wooldridge, 2010; Greene and Hensher, 2010)²⁹. If two cut points are not statistically different, this suggests that the two adjacent categories of the dependent variable can be collapsed in a single one. We have successively tested cut1=cut2 and cut2=cut3 (tests available upon request). In both cases we reject the null hypothesis that cut points are

²⁵We could expect this effect to be less salient for artists under contract with a major label, since those artists are supposed to already benefit from large promotional efforts (including marketing expenses, radio airplay, . . .). This hypothesis can be tested through the inclusion of an interaction term: *MAJOR*STAGE*. However, our data does not allow us to give support to this conjecture since this interaction term turns out to be insignificant.

²⁶The positive and significant coefficient for *NOCONTRACT* gives also support to hypothesis 1. Artists not under contract are also supposed to look for an audience expansion and worry less on recorded music revenues.

²⁷An alternative explanation could be that musicians on major labels are not unfavorable to free streaming merely because their revenues are already “secured”. Although our dataset does not make it possible to test for this conjecture, we would expect the artists under contract with a major label to be rather indifferent to free streaming rather than strongly favorable. Yet, 15% of artists from majors declare to be “very favorable” to free streaming while this is the case for only 6% of the artists under contract with an independent label and for only 9% of the artists who do not hold any contract.

²⁸Distinguishing electro musicians from urban music artists with two dummies instead of one shows that the positive impact on the opinion on free streaming does exist for both categories with a similar magnitude.

²⁹For each combination, the latent variable, y^* , is calculated from the coefficients of regression (2) on Table 2.5. If $y^* \leq \text{cut1}$, then $y = 0$ (very unfavorable), if $\text{cut1} < y^* \leq \text{cut2}$, then $y = 1$ (rather unfavorable), if $\text{cut2} < y^* \leq \text{cut3}$, then $y = 2$ (rather favorable) and finally if $y^* > \text{cut3}$, then $y = 3$ (very favorable).

equal ($p < 0.000$). This gives support to rely as we will do hereafter on the ordered probit model with four categories.

On Table 2.6 we observe the effects that these variables have on the proba-

Table 2.5: Regression results

	Simple Probit (1)		Ordered	Probit
<i>Dependent variable:</i>	FREE_BINARY		(2)	FREE
<i>GOLD</i>	-0.302***	(0.0923)	-0.204***	(0.0769)
<i>MUSREV</i>	0.122*	(0.0864)	0.189***	(0.0730)
<i>CAREER</i>	-0.0673*	(0.0434)	-0.0701**	(0.0367)
<i>STAGE</i>	0.105*	(0.0845)	0.127**	(0.0711)
<i>MAJOR</i>	0.412**	(0.217)	0.495***	(0.184)
<i>LARGE</i>	-0.0170	(0.272)	0.127	(0.220)
<i>SMALL</i>	Ref.		Ref.	
<i>NOCONTRACT</i>	0.223**	(0.110)	0.184**	(0.0915)
<i>ELECTRO_URBAN</i>	0.231*	(0.168)	0.328***	(0.141)
<i>PARIS</i>	-0.0152	(0.0831)	0.0347	(0.0698)
<i>GENDER</i>	-0.0728	(0.104)	-0.138	(0.0882)
<i>INCOME1</i>	Ref.		Ref.	
<i>INCOME2</i>	-0.0770	(0.125)	-0.0549	(0.106)
<i>INCOME3</i>	-0.0833	(0.114)	-0.0705	(0.0970)
<i>INCOME4</i>	-0.112	(0.135)	-0.127	(0.114)
<i>INCOME5</i>	0.0233	(0.177)	0.0569	(0.148)
<i>EDUCATION</i>	-0.0672	(0.0849)	-0.0529	(0.0714)
<i>WEB</i>	-0.0566	(0.0874)	-0.134*	(0.0735)
<i>ACTIVE</i>	-0.0275	(0.0881)	-0.0226	(0.0744)
<i>PIRACY</i>	-0.253***	(0.0804)	0.318***	(0.0683)
<i>Constant</i>	-0.0394	(0.297)		
<i>cut1</i>			-0.859***	(0.252)
<i>cut2</i>			-0.009	(0.251)
<i>cut3</i>			1.201***	(0.254)
Observations	1,103		1,103	
Pseudo R-squared	0.034		0.029	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; standard error in parentheses

bilities of belonging to each of the four categories of the dependent variable. The marginal effects show clearly how the probabilities of each opinion on free streaming (from very favorable to very unfavorable) change for each of our main covariates variable. For instance, for an artist under contract with a major label (as compared to artists signed by a small independent label) the probability to belong to the “very unfavorable” category decreases by 15.8 percentage points whereas the probability to belong to the “rather favorable” category increases by 11.0 percentage points. Likewise, all other things being equal, for each step forward in her career (from “less than 5 years” to “more than 30 years”, through “6 to 10 years”, “11 to 20 years” and “21 to 30 years”), the probability to fall in the “very unfavorable” increases by 2.2 percentage points. We also notice that being specialized in urban or electronic music decreases the probability to be very unfavorable to free streaming by 10.5 percentage points. For all the variables that have a positive impact on the opinion on free streaming, unsurprisingly, the increase in probability is always more important for

the “rather favorable” than the “very favorable” category. Finally, we also

Table 2.6: Marginal effects

	Very unfavorable	Rather unfavorable	Rather favorable	Very favorable
<i>MAJOR</i>	-.158***	-.026**	.110***	.074 ***
<i>GOLD</i>	.065***	.011**	-.045***	-.031***
<i>STAGE</i>	-.040*	-.007*	.028*	.019*
<i>MUSREV</i>	-.060***	-.010**	.042***	.028**
<i>CAREER</i>	.022*	.004*	-.016*	-.010*
<i>ELECTRO.URBAN</i>	-.105**	-.017**	.073**	.049**

*** p<0.01, ** p<0.05, * p<0.1

Note: the above marginal effects are derived from regression (2) on Table 5 but only marginal effects of interest variables are reported.

notice from Table 2.5, as suggested in introduction, that the opinion on piracy is highly positively correlated with the opinion on free streaming. The less tolerant towards piracy an artist is, the less favorable to free streaming she will be. Probably because both piracy and free streaming share the same feature: a positive promotional effect and a negative impact on revenues. But they also differ since free streaming is a legal consumption channel conversely to piracy. To better understand how the artists’ opinion on these two phenomena are jointly built we ran a bivariate (seemingly unrelated) ordered probit model. It allows us to explain both free streaming and piracy simultaneously with errors possibly correlated. Table 2.A.1 in the appendix shows that the opinions on free streaming and piracy are jointly driven (we reject the null hypothesis of both equations being independent). Hence some patterns are clearly similar: star artists have a negative opinion on both piracy and free streaming while artists who earn less than half of their revenues from music or artists not under contract with a recording company see piracy and free streaming more positively. However, Table 2.6 confirms that taking into account the opinion about piracy has no impact on our previous results and that the determinants of the artists’ opinion on free streaming remain unchanged.

2.5 Discussion

The analysis of the perception of artists on free streaming discloses several key-determinants. Firstly, the widely publicized issue of the opposition between stars and more confidential artists. Free streaming is simultaneously a

discovery tool for consumers and a low-paying consumption channel for artists (as compared to pay-streaming and pay-downloads). The winners of a gold record and/or of a main music award have already been discovered and expect revenues from their recorded music. Consequently they are unsurprisingly much less favorable to free streaming than newcomers in the music industry or incumbent but yet unsuccessful artists. For these two categories of artists, generating revenues from recorded music in the short run is less important than expanding their audience. Artists whose careers have just started or who want to widen their audience see streaming as a discovery tool, for so, they see free streaming as a platform to reach a bigger audience and generate interest in their work.

Secondly, we emphasize that taking into account the business model of an artist is also relevant to understand her opinion on free streaming. Recorded music is known to generate a positive externality on the live music market (Mortimer et al., 2012). Hence, artists who yield the main part of their revenues from touring are more tolerant towards free streaming. The potential loss that stems from consumers using free streaming instead of pay-streaming or pay-downloads is probably compensated by the increase in demand for their live performances. It is worth to notice that in France, between 2005 and 2015, the revenues from live music performances³⁰ have experienced a 8.6% average annual growth. In the meantime, recorded music sales in France decrease at an average annual rate of 8.2%!

Thirdly, the bargaining power of the various types of music labels (Majors vs. Indies) towards streaming services impact the opinion of artists on free streaming. An artist signed by a Major recording company is more tolerant towards free streaming probably because she knows that her label has negotiated very favorable conditions in revenue sharing with streaming platforms. Making available the catalog of Major labels, including the vast majority of star-artists, is mandatory for streaming platforms to guarantee their attractiveness. Conversely, artists under contract with a small independent labels are less satisfy with free streaming since it is notorious that they do not benefit from the same advantages. Even artists without contract are more favorable

³⁰The growth of the revenues generated by live music performances is estimated from the revenues generated by the tax of 3.5% collected on each live music performance organized in France. See: <https://www.cnv.fr/>.

towards free streaming. This can be seen in two ways. The first is that artists with no labels see free streaming as an audience expansion tool and the success they could accomplish in it as a way to help to secure a contract with a label. In second place, it is possible that artists with no contract receive a greater part of the income generated by their work in the streaming platforms which leads them to see free streaming in a positive light.

Finally, our results also highlight a generational divide among artists and among consumers. Youngest and newbie artists are more favorable towards streaming probably because they are more sensitive to both digitization as a new standard for the music industry and to the increase in audience that streaming allows. But above all, artists take into account the behavior of their fan base to form their opinion towards free streaming. Since youngest music listeners are over-represented both in streaming users and in electronic and urban music fans, artists who belong to these two musical genres are much more tolerant towards free streaming. They have to make their music available accordingly to their fans behavior.

A possible weakness of the previous analysis is that we are not sure to capture solely the opinion on free streaming. Our measure of the opinion of artists on free streaming could reflect their opinion on streaming in general (free or paid-for). We thus ran a bivariate (seemingly unrelated) ordered probit model that allows us to explain both free and paid streaming simultaneously with errors possibly correlated³¹. As shown in Table 2.A.1 in the appendix the null hypothesis of independence of the two equations is rejected, but our results remain unchanged for free streaming. As far as the opinion on paid-streaming is concerned, it seems to be rather driven by the personal characteristics of the artist than by professional features captured by the independent variables.

To what extent these results can be generalized? Should they be considered specific to France and/or to a specific period of time? Of course, our theoretical framework has been tested solely in the French case. However, since all the hypotheses from our theoretical framework are supported, there is no reason to believe that our results are specific to the French case. France is among

³¹An alternative would be to rerun our basic regression with only those individuals whose opinion towards pay-streaming is positive (which is the case for 70% of the artists). The results, available upon request, show that there is no significant difference with the results obtained on the whole sample.

the top five recorded music markets worldwide and the French recorded music market is organized very similarly to other Western music markets (US, UK, Germany, . . .): the market shares of major labels are similar, the star system exists everywhere, in all the markets digital music sales experienced a strong growth and streaming is the main driver of this growth, live performances are in every market the main stream of revenues for artists, . . . Furthermore, the lower acceptance of free streaming is not specific to France as testified by the statements of the representatives of musicians' federations in the US or in UK (see introduction). Thus, although we rely on a sample of French artists, there is no reason to believe that our results are specific to France. The only caveat could be that Deezer, one of the world leading music streaming platforms, was created in France in 2007, before the launch of Spotify in October 2008. French musicians had thus been familiar with streaming platforms for many years at the time of the survey. However, whatever the specific impact it could had have on the opinion of French artists on free streaming services, such a specificity has probably vanished since the share of the recorded music market that is due to streaming services is now close in the three main European markets (UK, Germany and France) and is even greater in the US (see the introduction). Of course, though we believe that the same qualitative effects would be at play in other countries, the magnitude of each effect may vary depending on the specificities of each local market.

Another limitation could be that our results are specific to the time period of survey. However, in 2014 the French music streaming market was seven years old and hence was not in infancy anymore. If numerous stars who had been refusing to be on free streaming platforms had finally accepted (Taylor Swift, Thom Yorke, Adele, . . .), the reason was probably that they could not afford to remain out of what is now the core of the recorded music market. That does not necessarily imply that their opinion about free streaming has changed. To study whether the opinion on free streaming depends on the presence on these platforms, we built a dummy (*AVAILABLE*) which takes the value 1 if the music of the artist is available on at least one of the main French streaming platforms at the time of the survey (Spotify, Deezer, Qobuz) and 0 otherwise³². Table 2.A.2 in appendix shows that the presence on platforms has no significant

³²We also test a configuration in which *AVAILABLE* includes the presence on YouTube. The results remain unchanged.

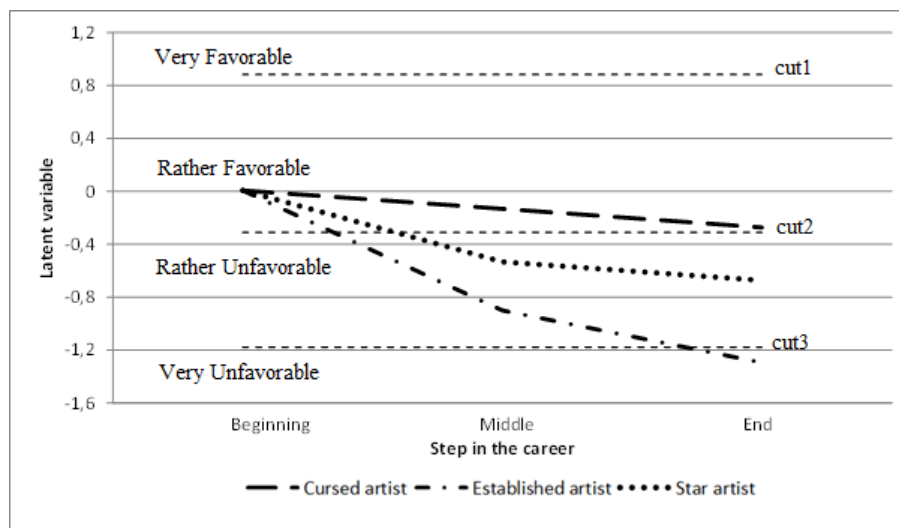
impact on the opinion of the artist on free streaming. So, there is no reason to believe that artists who now rejoin free streaming platforms are more favorable to this distribution channel than previously. According to McIntyre (2017), Taylor Swift rejoined Spotify because “she and her team are smart enough to see how the tides have changed [...]. Spotify is simply too large and far too important these days to ignore, no matter what an artist looking to be No. 1 feels about their financial ethos.” Likewise, although Radiohead’s music has gradually made its way back to Spotify, Thom Yorke still declares to be troubled by the streaming platform’s remuneration structure (Levine, 2017).

Eventually, can we make any forecast on how the opinion on free streaming will evolve, in particular for the lucky and/or talented newbie artists who will encounter success? To answer to this question, we use our econometric model to predict the value of the latent variable, and thus the category of opinion on free streaming, for specific values of the covariates (that define several counterfactual scenarios) and at different steps in the artist’s career³³. We start with the average newbie woman artist and imagine three counterfactual scenarios. In the first one (*Cursed artist*), this newbie artist will never encounter success all over her career. In the second counterfactual (*Established artist*), the newbie will not become a star, but will have some success at the middle of her career which will finish by fading away. Finally, in the third counterfactual (*Star artist*), we consider the case of an artist who quickly encountered a large success which will last all along her career.

Figure 1 displays the predicted value of the latent variable in each of these counterfactuals for the three steps of the career (start, middle, end). Starting with an artist rather favorable to free streaming at the beginning of her career, we observe that in all the scenarios the opinion on free streaming declines. While a cursed artist could still remain rather favorable to free streaming which could be seen as a possible source of promotion all along her career, an established artist would end up with a very unfavorable opinion on free streaming at the end of her career. However, this should not necessarily raise concerns about the sustainability of the free streaming since, as already mentioned, the opinion on free streaming seems to be somewhat disconnected from the actual

³³Of course, a strong underlying assumption in these counterfactual scenarios is that the opinion of an artist in N years will be the same than an artist who is currently N years more advanced in her career.

Figure 2.1: Counterfactual scenarios.



Note: Each of the three points of these trajectories (Beginning, Middle, End) corresponds to the value of the latent variable deduced from the coefficients of the covariates displayed on Table 2.5 (see Table 2.A.4 in appendix for details).

presence on these platforms as illustrated by the still critical opinion of the artists who have rejoined Spotify after a several years period of absence.

2.6 Conclusion

This chapter is one of the first attempts to analyze which factors drive the opinion of artists on free streaming (ad-supported), this opinion being deeply divided among the musicians population. To deal with this issue we use poll-data from a survey about more than 1,100 French professional musicians. Whereas 70% of musicians turn out to have a positive opinion on pay-streaming (subscription), this figure falls to 40% for free streaming. One obvious explanation lies in the low ow of revenues generated by a free streaming user (about 40 times less than revenues generated by a pay-streaming user). Hence what drives the positive opinion on free streaming? Our results highlight four main reasons. Firstly, streaming, and especially free streaming, stands as a discovery tool that may help consumers to explore the music catalog beyond stars and already well-known artists. Young artists, newcomers in the artistic career and artists who still not earn more than half of their personal income from their musical activity are more favorable to free streaming. They value more the opportunity to expand their audience than worry about the low revenues they will obtain. Of course, this is the opposite for star-artists who already won a gold record or a main music award. Secondly, the personal business model of each artist matters. Artists whose revenues mainly come from live performances take into account the positive externality that recorded music generates on the live music market. For them, each free-streamer is an opportunity to sell an additional ticket for a next concert. They are thus also more favorable to free streaming. Thirdly, the contractual situation of the artist also matters. All music labels do not have the same bargaining power towards streaming platforms. With their huge catalog which includes most of the top-selling artists, the three major record companies (Universal Music, Sony Music, Warner Music) are more than essential for any streaming platform. Majors thus obtain very favorable conditions in revenue sharing with streaming services and the artists they have under contract seem to believe that this will be also profitable for them. Conversely,

artists signed by small independent labels, which are considered as much less valuable by streaming platforms, know that the revenues sharing will be much less favorable for them. Fourthly, the opinion of artists is also shaped by the evolution of consumers behavior. Since young music listeners are much more prone to adopt new technologies and hence to use free streaming, musicians who perform musical genres that encounter a huge success among the young audience (i.e. electronic music and urban music) are more prone to accept free streaming. They have no choice but to “follow” their fan base in their new mode of music consumption. This suggest that the acceptance of free streaming could increase in the future with the growing adoption of this new mode of consumption by music listeners.

Appendix

2.A Bivariate, Ordered Probit Results and Counterfactual Definition

Table 2.A.1: Bivariate probit regression results (FREE / PIRACY)

	FREE	PIRACY
GOLD	-0.227*** (0.0767)	-0.216** (0.0923)
MUSREV	0.206*** (0.0728)	0.160* (0.0865)
CAREER	-0.0704** (0.0367)	-0.0126 (0.0439)
STAGE	0.136** (0.0710)	0.0919 (0.0852)
MAJOR	0.500*** (0.184)	0.0719 (0.232)
LARGE	0.0874 (0.220)	-0.461 (0.312)
SMALL	Ref.	Ref.
NOCONTRACT	0.218** (0.0911)	0.313*** (0.11)
ELECTRO_URBAN	0.337*** (0.141)	0.105 (0.17)
PARIS	0.0293 (0.0697)	-0.0436 (0.0836)
GENDER	-0.124 (0.0880)	0.0922 (0.104)
INCOME1	Ref.	Ref.
INCOME2	-0.0270 (0.106)	0.226* (0.125)
INCOME3	-0.0662 (0.0968)	0.0273 (0.114)
INCOME4	-0.136 (0.114)	-0.104 (0.136)
INCOME5	0.0330 (0.148)	-0.223 (0.185)
EDUCATION	-0.0533 (0.0713)	-0.00989 (0.0855)
WEB	-0.152** (0.0733)	-0.164* (0.087)
ACTIVE	-0.0364 (0.0742)	-0.121 (0.0878)
Athrho	0.197***	(0.0422)
cut11	-0.952***	(0.251)
cut12	-0.0945	(0.25)
cut13	1.084***	(0.252)
cut21	0.427	(0.297)
Observations	1,103	
LR test of indep. eqns. : $\chi^2(1) = 21.94$ Prob > $\chi^2 = 0.0000$		
Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01		

Table 2.A.2: Bivariate probit regression results (FREE / PIRACY)

	FREE	PAY
GOLD	-0.204*** (0.0770)	-0.00607 (0.0767)
MUSREV	0.185** (0.0731)	-0.0974 (0.0732)
CAREER	-0.0681* (0.0368)	-0.0105 (0.0368)
STAGE	0.121* (0.0712)	0.00485 (0.0713)
MAJOR	0.496*** (0.184)	0.0340 (0.185)
LARGE	0.124 (0.220)	-0.0593 (0.217)
SMALL	Ref.	Ref.
NOCONTRACT	0.178* (0.0915)	0.0159 (0.0909)
ELECTRO_URBAN	0.333** (0.142)	0.0100 (0.143)
PARIS	0.0351 (0.0698)	0.164** (0.0700)
GENDER	-0.139 (0.0885)	-0.120 (0.0882)
INCOME1	Ref.	Ref.
INCOME2	-0.0538 (0.106)	-0.0602 (0.106)
INCOME3	-0.0658 (0.0971)	-0.00604 (0.0973)
INCOME4	-0.133 (0.115)	-0.0836 (0.115)
INCOME5	0.0515 (0.149)	-0.0307 (0.150)
EDUCATION	-0.0560 (0.0715)	0.00559 (0.0714)
WEB	-0.134* (0.0735)	-0.0255 (0.0737)
ACTIVE	-0.0266 (0.0744)	-0.0883 (0.0745)
PIRACY	0.315*** (0.0684)	-0.00720 (0.0685)
Athrho	0.313***	(0.0367)
cut11	-0.860***	(0.252)
cut12	-0.00161	(0.252)
cut13	1.192***	(0.255)
cut21	-1.569***	(0.256)
cut22	-0.810***	(0.253)
cut23	0.529**	(0.253)
Observations	1101	
LR test of indep. eqns. :	chi2(1) = 72.63	Prob >chi2 = 0.0000
Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01		

Note: PAY is a categorical variable with four categories corresponding to the answers “very unfavorable”, “rather unfavorable”, “rather favorable” and “very favorable” to the question “What is your opinion on the distribution of your music through pay (subscription) streaming platforms?”

Table 2.A.3: Ordered Probit regression results taking into account availability on streaming platforms

Dependent:	FREE	
GOLD	-0.197***	(0.0772)
MUSREV	0.191***	(0.0730)
CAREER	-0.0764**	(0.0372)
STAGE	0.127**	(0.0711)
MAJOR	0.485***	(0.184)
LARGE	0.133	(0.220)
SMALL	ref.	
NOCONTRACT	0.171*	(0.0923)
ELECTRO_URBAN	0.342***	(0.142)
PARIS	0.0397	(0.0700)
GENDER	-0.140	(0.0883)
INCOME1	Ref.	
INCOME2	-0.0539	(0.106)
INCOME3	-0.0656	(0.0971)
INCOME4	-0.120	(0.115)
INCOME5	0.0714	(0.149)
EDUCATION	-0.0520	(0.0715)
WEB	-0.120	(0.0746)
ACTIVE	-0.0158	(0.0747)
PIRACY	0.313***	(0.0684)
AVAILABLE	-0.0782	(0.0728)
cut1	-0.923***	(0.259)
cut2	-0.0542	(0.258)
cut3	1.138***	(0.261)
Observations	1103	
Pseudo R-sq	0.030	

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

Table 2.A.4: Definition of the three counterfactual scenarios

Beginning	Middle	End
Average newbie woman artist: not yet signed by a recorded music label, does not yield the majority of her revenues from music, bulk of her music earnings from touring, tolerant towards piracy, did not already earn a music award.	<i>Cursed Artist</i> : will never encounter success all over her career.	<i>CAREER</i> =5
	<i>Established Artist</i> : will not become a star but will have some success. At the middle of her career, she will make her living from music, she will be touring a lot, will get a contract from a large independent label, will win a music award, and consequently will be less tolerant toward piracy. At the end of her career however, her success will not remain high enough to keep her contract with a large independent label (she will sign with a small independent label) and her live music revenues will decrease a lot.	<i>CAREER</i> =3, <i>GOLD</i> =1, <i>MUSREV</i> =0, <i>LARGE</i> =1, <i>PIRACY</i> =0
<i>CAREER</i> =1, <i>GENDER</i> =2, <i>GOLD</i> =0, <i>MUSREV</i> =1, <i>NOCONTRACT</i> =1, <i>STAGE</i> =1, <i>PIRACY</i> =1; all other covariates at their mean.	<i>Star Artist</i> : will quickly encounter a large success and will benefit all along her career from a contract with a major music label, a steady success on stage and the recognition by the public and her peers through gold records and music awards.	<i>CAREER</i> =5 <i>GOLD</i> =1, <i>MUSREV</i> =0, <i>MAJOR</i> =1, <i>PIRACY</i> =0

Note: Only the variables which value has changed from the previous step are displayed in the "Middle" and "End" steps.

Only the variables which value has changed from the previous step are displayed in the "Middle" and "End" steps

Chapter 3

The business model

3.1 Introduction

As the last chapter shows there is a logic behind why artists like or dislike free streaming. The advantages for new entrants to the music industry are clear as streaming platforms provide access to a wider audience, the free advertisement provided by recommendations from the platform to consumers, the increment of sales or income from ancillary markets that comes with the increase of popularity of the artist between others. Furthermore, it also exposes the disadvantages for older, famous and awarded artists as the income they get from selling an album or single in physical form is much larger than the income that they generate from the streaming of songs in the streaming platforms. This comes from how these platforms have selected their business model which is the Freemium model. This model is based on two types of service: an ad supported service that is free for all but, that presents limited functionalities and continuous ad breaks and, a subscription one that provides the full functionalities of the platform with no ad breaks in between songs. The profit generating power for these platforms comes from the smaller section of consumers that pay the subscription on the platform. Nonetheless, and because of contracts with majors and artists, the income that they perceive from the free section is lesser from the income they get from the subscription one. Based on the quantity of information that these platforms have access to from which type

of music they listen to their demo-graphical information, the question arises: Why these platforms have not used a price discrimination system to create new trenches of service and get more paying subscribers on goods that have zero marginal cost?

Information goods differ from physical goods in the sense that their value depends on the information they hold and not in their material value. They also differ in the sense that their marginal cost is extremely low, this means that the cost to serve one additional consumer is almost zero. But even with this essential characteristic the presence of price discrimination schemes is very rare. By contrast, industries as telecommunications present several combinations of goods and services in different qualities of service¹. They not only bundle their services but also provide the possibility of a ceiling of consumption and then a pay as you consume options². They bundle not only telecommunication services as internet, telephone and mobile communications but also entertainment by providing access to cable television, radio channels and others.

This has been possible because of the continued advance of technologies such as the optic fiber that have made it easy and cheaper to bundle all of this services in a less costly and efficient manner. We can see some similarities between them and the streaming platforms; in the case of the later, the new technology of streaming and internet coupled to the greater access of the population to both has provided a way in which is possible to supply a service by a near if not zero marginal cost. This creates an environment in which price discrimination is the most optimal way to extract the surplus of the consumers but, they do not use this tool. What is the reason of not using the tools provided by price discrimination schemes in a more complete and general way?.

Price discrimination as described by Varian (1989), is a strategy by which a firm sells the same product or service to different costumers at different prices.

¹An example of this is SFR, they present several plans under this trademark where the clients have access to support and other elements that elevate the quality of the services sold. SFR also operates RED, which does not provides personal client service, does not has stores, and the interaction between the client and the enterprise is relegated to the web page of RED. It also delivers a lower quality in the services provided. The difference in quality between both and the markets that they target is a combination of different price discrimination schemes which is present through other firms in the service industry but not in the case of experience goods.

²A quick visit to different telecommunications operators such as SFR, Orange, AT&T and others can provide more examples and proof of this.

In first degree the firm charges a different price for each unit that is consumed, this means that the firm is capable of creating a personalized price. Clearly because of the requirements of information that this process requires and the possible violations towards privacy it is the least applied form of price discrimination. The second degree price discrimination applies different prices for different quantities of a good being consumed and the third degree price discrimination charges different prices for different groups of consumers. Based on the use of a service or good, individuals can be divided between those that use it extensively and those that use it occasionally. This is the simplest and most common way to price discriminate because the individuals are invited to self identified. This means that the firms do not require the information of the consumers because with the information revealed in the price individuals will self identified and take the price that corresponds to the type of consumer that they are. Armstrong (1999) provides a good review related to price discrimination.

The difficulty to apply any price discrimination scheme in the correct way befalls in the fact that firms do not have the relevant information about the individual consumers to know how to divide them and set prices depending on their valuation towards an specific characteristic of the product they sell. Even when applying third degree price discrimination individuals could select the prices that are not in line with the group to which they correspond. To be able to gather this information firms have established ways in which people reveal their preferences such as fidelity programs, cookies in websites, data mining from social networks, etc.

The flat rate as a price scheme is more profitable when the marginal costs are low. In the case of music streaming platforms the price of serving an additional consumer or providing an additional bundle is almost negligible³. Which means that they could offer their catalog plus the specific characteristics of their platform as a bundle for a flat rate in a profitable manner. And in fact we can observe that in general music streaming platforms apply this idea of bundling their services and characteristics with the catalog of music that they possess for a flat rate.

In the case of various music streaming services we can observe that, in gen-

³Aguilar and Waldfogel (2017)

eral, even though they are able to know almost all the required information⁴ to create this personalized price they choose to operate in a freemium business model⁵ or in a pay only subscription service⁶. Usually, they charge a flat rate for their premium service.

The flat rate provides unlimited and uninterrupted access (as long as the internet connection enables it) to the entire catalog of songs that the platform has. It also enables other characteristics as being able to download content to be used off-line, high fidelity sound and the possibility to use it in mobile devices. The freemium model provides two very clear tranches of service: A free restricted⁷ ad based service and a premium unrestricted flat rate paid service. Nonetheless, it is not the best way to capture the entirety of the consumer surplus and generate the highest profits. Through this pricing schedule individuals with a higher reservation price end by paying less than what they are willing. Meanwhile, individuals that can be served at a lower price do not enter because the it is over their reservation price. Clearly the platforms are not using a powerful tool -price discrimination- that would bring more people to enter the paid service and to generate greater profits.

The present article aims to study the effects in profits and the possible misalignment between the providers of the catalogs and the platforms when applying a second degree price discrimination scheme. The analysis is motivated by the current trend in on-line services to provide flat rates not only for information goods such as music but in general to provide several goods and services under the umbrella of a flat rate.

The article proceeds as follows: Section 2 covers the literature review relative to price discrimination and pricing schemes and the advancements in the general area of this article. Section 3 describes the model. Section 4 presents the discussion and section 5 concludes.

⁴They already know some demographics of each individual and all their past consumption of songs, they know how many songs, of which genre, from which artists and for how long they have heard them plus any additional information that can be mined from the connection of the platform to Facebook or other social networks.

⁵Platforms such as Spotify and Deezer operate in this way.

⁶Platforms such as Apple Music, Google Music, Tidal and others operate in this way

⁷When we refer to restricted we mean restricted in functions such as downloadable songs, skipping, high fidelity sound between others.

3.2 Literature Review

Carroni and Paolini (2020) and Thomes (2013) analyzed the strategic choice of the platform regarding business models to either choose an ad supported free subscription service, a paid only service or a combination of both. This decisions have to take into account the different interactions between the different actors. Carroni and Paolini (2020) described the complications that can arise with the different actors and what are the motivations to opt either for a freemium⁸ business model or a paid subscription only describing the size and grade of innovation of the firms as defining characteristics to chose either model. A solution to solve this miss-alignments can include the imposition of a flat rate for the use of the high quality paid trench of service provided by the platform. Shiller and Waldfogel (2011) establish that price is a way to observe the quality of a good when no information about quality has been disclosed. This is specially characteristic of experience goods such as music for which all new releases are priced at the same value so consumers can't observe the quality before using them but, after using them the same price can not be used because consumers know the real quality of the product so they are less willing to pay a pooling price for the good. Another paper (Richardson and Stähler, 2016) supports this idea by showing that a pooling equilibrium for goods with different qualities is reasonable explanation for the application of uniform pricing by the publishers of recorded music.

Miettinen and Stenbacka (2015) considers the effectiveness and profitability of first degree price discrimination when confronting it to the intrinsic value of privacy for the consumers resulting in an increase in inefficient⁹ switching and a decrease in efficient switching. Furthermore, Sundararajan (2004) observes the effects of a non-linear pricing scheme in information goods. It shows that the absence of transaction costs is a necessary condition for second degree price discrimination to work and, that the absence of variable costs leads to usage based pricing being not optimal. Also, he founds that is optimal for the firm to propose both a fixed price and a usage based pricing system.

Self selection is used as a mechanism to evade the problems that arise with the

⁸A freemium model presents 2 different trenches of service, a low quality, ad supported free service and a high quality, ad free paid service.

⁹Inefficient means that consumers that should be in the higher tranche end up in the lower tranche. The contrary can be thought when talking about efficient switching.

lack of information while doing price discrimination schemes, for so it is useful when designing third degree discrimination strategies. The seminal paper of Mussa and Rosen (1978) proposes such a scheme where the firms present different products with different levels of quality and consumers engage in self selection by buying the product that is over their respective value of quality. Salant (1989) shows that for self selection to be optimal the cost function of the firm must be strictly convex if not, Kuhn-Tucker conditions are not satisfied and both self selection and price discrimination are sub-optimal. Other papers (Anderson and Celik, 2015; Dubovik and Janssen, 2012) analyse how firms react when competing in prices and quality and how they decide on the qualities to produce and sell to their consumers when under perfect and imperfect competition. Versioning (Belleflamme, 2005) presents other view to competition in quality where the firm charges different prices for the same product with varying qualities between them. Belleflamme (2005) designates it as a “degraded” version. In this case the consumers have a valuation of a characteristic of which the firm can control its quality; this valuation acts as a self selection variable for consumers.

Other strategies regarding second degree price discrimination are treated by Bakos and Brynjolfsson (2000) who described how bundling can act to improve the profits of the firm when marginal costs are near zero and, in the case of information goods such as music an economy of aggregation has the same effects as an economy of scale in the way of extracting a greater part of profit and consumer surplus but, at the same time they note that this strategy can only work for goods for which their marginal cost is near to zero. Self selection¹⁰ is in display by Mussa and Rosen (1978). Belleflamme (2005) creates different valuations of a characteristic that is under control by the platform and is known to be of value to the consumers. This leads to the creation of different bundles of catalog, characteristics and services provided by the platform that induce consumers to auto-identify themselves by subscribing to obtain one of the bundles

¹⁰In other papers (Bakos and Brynjolfsson, 2000; Adams and Yellen, 1976) piracy can be seen as a way of self selection, users that do not have the entire information about the quality of the band would rather obtain for a zero price the production of the artists so they can experience the quality of their production and decide if they assist to live performances or obtain the legal copies of their work. Gayer and Shy (2006) presents an analysis of the effects of enforcing anti-piracy laws and the effects on the quantity of people that is using the content produced by the artists. This shows that piracy expands the number of user but takes the monopoly power from the firms.

offered.

3.3 A Very Simple Model

To understand what could be the effects of applying a second degree price discrimination scheme we use a very simple model. In this sense we observe the effects on the profit gathered only by the streaming platform. In a first step the platform decides to implement the freemium model. This means that the platform offers either access with publicity/advertisement, with restrictive characteristics and lower quality or a flat rate premium service with no advertisement, high quality and all the characteristics available to the platform. In a second step the platform introduces a second degree price discrimination scheme. In this there exist three tranches of service, the free tranche, the high price tranche that is the same as premium and a low price tranche. The low price tranche has no advertisement, lesser characteristics and less quality than the high price tranche but is better in quality than the free tranche. In a final step the platform decides to limit the access around different elements for the low price tranche of service. In this last step the preference towards the type of music that a consumer listens to comes into play, it is measured by an independent dimension represented by the parameter α .

The present model is an adaptation of Belleflamme (2005). To create a benchmark for the model we consider only paid streaming and its free version. An example of this is Deezer, in it consumers can find a version in which they are able to select lists of songs but are not able to select or search specific songs while having to endure ads in between songs. In the premium version consumers are able to listen to whatever they want with complete access. With this as a benchmark, the author can observe what happens if a third tranche is added where there is a low paid restricted version, for example, if Deezer provided an specific membership half price to listen only to podcasts and two different genres of music. In this way, consumers would have characteristics of the premium service that are included in their use of podcast and 2 genres of music while in the rest they would only have access to the free service offered by Deezer. Finally, we observe the effects of having a grade of predilection to an additional characteristic that affects the self selection of the individuals

based in their valuation of the characteristic controlled by the platforms. First we analyze the standard free vs. paid. For simplicity sake we consider that the costs are zero.

In Belleflamme (2005) the monopolist has identified one dimension which differs in value between consumers, it is also assume that there is a continuum of consumers $[0, 1]$ characterized by their valuation of this dimension which is the parameter θ . In the model proposed by Belleflamme (2005) the monopolist can produce this dimension in two qualities. In our case we assume that this valuation refers to the preference of music, for the appetite on listening to music of each consumer. In this way, the quality of the service is connected to the preference to listen to music of the consumer. A consumer that does not have high preference for listening to music will not care about the quality proposed by the platform but, a consumer with a high preference or appetite on listening to music will care and also give importance to the quality provided by the platform.

3.3.1 Freemium

We assume that the platform can offer two qualities of service a low quality offered in the free tranche and a high quality offered in the premium tranche. The difference between this two qualities is the presence or not of advertisement; in the low quality version advertisement is present and unskipable, this quality is represented by ϕ . Meanwhile, the high quality has no advertisement at all and is represented by ω . With this we define the following utility functions for the freemium case for both the free tranche and the premium one:

$$U = \begin{cases} (1)\beta + \phi\theta, & \text{if free.} \\ (2)1 + \omega\theta - P, & \text{if paid.} \end{cases} \quad (3.1)$$

Where:

1. $\omega > \phi > 0, 0 < \beta < 1$ with ω and ϕ measuring the different qualities between the free and paid versions; β measuring the tolerance of individuals towards advertisement and θ which measures the preference for music.
2. P is the flat rate subscription price to access the paid service.

In a first step we compare equation one to zero as it is our benchmark. In that sense, the consumer will use the service as long as the utility is positive. From equating equation 1 to zero we obtain $\theta_f = -\frac{\beta}{\phi}$. As it is clear, the value of θ_f is negative. By the definition of θ as being value in a continuum of $[0, 1]$ it can't be negative, for so we assume that $\theta_f = 0$. Additionally, the author considers that there is no cost of advertisement hence the market is covered.

In a second step we compare the value of the utility of the free tranche with that of the premium one. The consumer will chose the premium tranche as long as the value of the utility of the premium tranche is at least equal to the free tranche. For this we equate equation 1 to equation 2 obtaining: $\theta_p = \frac{1 - \beta - P}{\phi - \omega}$.

With this two elements we can construct our first profit function. For the firm, profits are defined as the quantity of individuals in the continuum of user of the platform that pay for the premium service¹¹ as streaming platforms earn money not only through the subscriptions to their respective premium services but also by the income generated by advertisement. As a simplification, we assume the income received by advertising is negligible or very small in comparison to that earned by subscription fees. With this in mind we multiply the number of uses in the continuum times the subscription fee payed by each one of them. The profit function is as follow:

$$\Pi_F = (1 - \theta_p)(P) \quad (3.2)$$

After derivation we obtain the following optimal values:

- $P^* = \frac{1 + \omega - \beta - \phi}{2}$
- $\theta_p^* = \frac{-1 + \omega + \beta - \phi}{2(\omega - \phi)}$

¹¹For an example of this see: <https://www.musicbusinessworldwide.com/spotify-uk-subscription-income-worth-10-times-revenue-from-ad-funded/> . Moreover, in 2018 the company had revenues of over 4.7 billion Euros for which 4.717 billion come from premium subscribers and only 54.2 million Euros come from ads. The information about this revenues come from the following source: <https://www.statista.com/statistics/245125/revenue-distribution-of-spotify-by-segment/> .

And the optimal profit function:

$$\Pi_F^* = \left(\frac{(1 + \omega - \beta - \phi)^2}{4(\omega - \phi)} \right) \quad (3.3)$$

In this simple benchmark we can observe two things. The first is that indeed the benchmark and price of the premium service depend on the parameters ω and β . This means that they depend on the quality offered in the premium service and the tolerance of consumers towards advertisement. It is clear then that people whose tolerance is low (β closer to 0) will prefer the premium service as people who value the quality of the service/music that they are consuming will also end up taking the premium service.

We could also think that there are consumers who are in the free subscription that would be willing to pay for version of the platform that has no advertisement but that is of lesser quality than the premium service, for so, we analyze the effects of implementing a third tranche of service with no advertisement and lesser quality than the premium service.

3.3.2 Price Discrimination With Two Price Schemes

The platform decides to discriminate prices by offering a third price in which is differentiated from the free tranche in the same way as the premium tranche in the sense that there is no advertisement and, that is also differentiated from the premium service in the sense of offering a lower quality of sound than the premium tranche. The quality of the low tranche is evaluated by the parameter λ .

As in our benchmark model we propose the different utility equations regarding each one of the tranches of service. These equations are as follows:

$$U = \begin{cases} (1)\beta + \phi\theta, & \text{if free.} \\ (2)1 + \lambda\theta - P_l, & \text{if low paid version.} \\ (3)1 + \omega\theta - P_h, & \text{if premium paid version.} \end{cases} \quad (3.4)$$

As in our benchmark we have that:

1. $\omega > \lambda > \phi > 0, 0 < \beta < 1$ with ω , λ and ϕ measuring the different

qualities between the free and paid versions; β measuring the marginal tolerance of individuals towards advertisement. There is a continuum of potential users and θ is their preference for music.

2. P_h is the price to access the premium service.
3. P_l is the price to access the paid basic service.

As before we equate the first equation to zero as it is our benchmark for the entire model, in this sense, again the consumer will chose to use the free service as long as the utility is positive. From doing this we obtain: $\theta_f = -\frac{\beta}{\phi}$. As in the case of freemium we observe that this value for θ_f is negative and by the definition of θ this is not possible so we assume this value to be zero. Furthermore, for a consumer to choose the lower tranche over premium the utility he gains from it must be at least equal to the utility of the free tranche service. To obtain the value of θ_l we equate the equation number 1 and 2. From doing this we obtain: $\theta_l = \frac{P_l + \beta - 1}{\lambda - \phi}$. Finally, and as in the same vein as before, for a consumer to choose the premium service their utility of choosing the premium service should at least be equal to utility they gain on the low service. In this sense we equal the second and third equation: $\theta_h = \frac{P_h - P_l}{\omega - \lambda}$. With this elements we can define or profit. In this case, the profit of the platform will be the number of individuals that chose the low tranche times the price charged for this tranche plus the number of individuals that are subscribed in the premium tranche times the price in the premium tranche. The profit function is as follows:

$$\Pi_D = (\theta_h - \theta_l)P_l + (1 - \theta_h)P_h \quad (3.5)$$

We can observe that the value of the $\theta_f < 0$ so, again we assume that $\theta_f = 0$ and that there are no non-users. Derivating we obtain the following optimal values:

- $P_l^* = \frac{1 + \lambda - \beta - \phi}{2}$
- $P_h^* = \frac{1 + \omega - \beta - \phi}{2}$

- $\theta_l^* = \frac{-1 + \lambda + \beta - \phi}{2(\lambda - \phi)}$
- $\theta_h^* = \frac{1}{2}$

We obtain the following optimal profit:

$$\Pi_D^* = \left(\frac{1 - \beta}{2(\lambda - \phi)} \right) \left(\frac{\lambda - \phi - \beta + 1}{2} \right) + \left(\frac{\omega - \phi - \beta + 1}{4} \right) \quad (3.6)$$

We can observe that $P^* = P_h^*$. It means that in both case the flat rate price is the optimal price to charge for the premium service offered by the platform. It is clear that two segments are not affected by the new prices; those that have a great tolerance towards advertisement (β closer to zero or a $\theta < \theta_f$) and those whose value of the quality/music they receive is extremely high ($\theta > \theta_h$). For the consumers that are between this values the new option could cause both an expansion effect by attracting consumers that where in the free service to this new quality but, it also could cause a cannibalization effect by taking users that were paying for the premium service because they did not have any other option to access the content or evade advertisement.

To see this we observe if the difference between the profit generated in the price discrimination is greater than the profit generated in the freemium model:

$$\Delta\Pi = \Pi_D^* - \Pi_F^* > 0 \quad (3.7)$$

Replacing the respective equations we obtain the following result:

$$\Delta\Pi_{D-F} = \frac{(1 - \beta)^2(\omega - \lambda)}{4(\lambda - \phi)(\omega - \phi)} > 0 \quad (3.8)$$

This difference will be positive as long as $\omega > \lambda$ which is one of the assumptions of the model. The quality of the premium tranche represented by ω will always be greater than the quality of the lower tranche represented by λ .

One example of this is the streaming service Qobuz. This platform offers three different tranches of music streaming that differ in the quality of the sound they produce. The first tranche is the one offering MP3 quality, the second tranche offers CD quality and the third one offers HI-RES quality. Each one of this tranches in these platform has a different price. The only difference is qual-

ity¹². Nonetheless, this is only one of the ways to price discriminate. There is an spectrum of consumers of music, a great part of them that use their mobile phones, mp3 players or other objects like that are not be able to compare the quality of the sound, for so, we can think that for some consumers of music the quality of the stream is not important. Furthermore we could think that quality is really important for the individuals that are interested in very specific genres of music such as classical, jazz or others but when an individual is using their mobile phone there is no way in which they can differentiated the quality of the sound. In all cases this is a limited way to do price discrimination; we can imagine other ways by which to do price discrimination.

3.3.3 Ways to Apply Price Discrimination?

We can imagine that one of the ways the platform would price discriminate is through the music taste of the individuals. As the consumer's insight report shows (IFPI, 2019a), pop (64%), rock (57%) and electronic (32%) are the more popular genres of music. The platform could offer to this section of consumers a different price only for access to their favorite genre of music. We can also consider that the platform could discriminate through the offering of access to top 200 charts or other charts that can be considered mainstream¹³; usually, mainstream genres have a bigger presence of major labels music¹⁴ meanwhile, independent labels and less popular genres could be considered as niches.

The access to the catalog of the streaming service is the key here. We can visualized it in the example of the telecommunications industry in which they provide calls, messages, roaming and other services in an unlimited fashion when only in an specific territory or place. In the streaming services it can be presented as a premium tranche giving access to the catalog produced all around the world, meanwhile for a lesser price it would be possible to access to the catalog of one or two specific countries. If not by the territory then by the gene of type of music the consumer prefers. In a similar fashion the streaming

¹²<https://www.qobuz.com/fr-fr/music/streaming/offers>

¹³<http://wpmu.mah.se/nmict141group2/2014/03/13/mainstream-vs-underground-music/>

¹⁴The three big majors: Sony BMG, Universal Music Group and Warner Music Group make up almost 80% of the music market. <https://www.thebalancecareers.com/big-three-record-labels-2460743>

service could present a premium tranche that provides unlimited access to all songs, podcasts and elements that the streaming service has meanwhile, a lower priced tranche would provide restricted access the mainstream songs such as the top 200, viral 200 or other charts. It can be done also through the differentiation of access to all music genres for the premium tranche and access to specific genres of music for the lower price tranche.

In this way, individuals that really like all genres of music or that enjoy music in general, will tend to stay in the premium service or the free service given that in this way they will continue to have access to the rest of genres, meanwhile, the small population of individuals that only like this specific genre of music will move from the free tranche to the new low paid tranche.

The consumer insight report (IFPI, 2019a) reveals that individuals mean time of music listening during a week is 17.8 hours. meaning that individuals listen to music for a mean time of 2.54 hours per day. In this sense platforms could use time as a way to discriminate for the low price tranche. This tranche would provide complete and unrestricted access to the catalog of the platform for a limited period of time each day and the same but in an unlimited way in the premium tranche.

With this in mind, we can see that time can be used to discriminate users. We take the example of the telecommunications industry in the sense that the more you use the service the more you pay, in other words; the industry is able to propose different plans with a cap on the time that individuals can call to other phones, the level of data they can use, the number of messages they can send. after reaching this cap consumers in the telecommunications industry have to pay extra for more time, data or messages. Streaming platforms can do the same. They can propose a premium plan with unlimited access and a caped plan with a lower price with a limited time for listening to music. When consumers reach this cap they would have to pay extra for each minute of consumption of music.

In any of this cases, there is an element that is independent between these ways of creating the tranches and their valuation θ . An individual can have a high preference for music but the time they have to listen to it is bounded to a level that is too low to maximize their consumption of music. Moreover, the consumer can have a high value of their preference to music but prefer overall

to listen to mainstream music or maybe a very specific genre of music.

3.3.4 Discrimination With an Independent Dimension

In the last section we consider that the dimension over which individuals choose is the known θ . We did not consider that there may be an additional independent dimension that drives the decision of individuals to be in either the free tranche or the premium tranche. We spoke about two different ways to price discriminate in the last section which were time and access to catalog. As it was stated there are some individuals that have limited time to listen to music although the value they give to their preference of music is high and in the same sense there are individuals that prefer a very specific type of music over the rest even though they have a high value for their preference of music. We represent this as $\alpha \in [0, 1]$ being the share of consumers that have this preference or limitation. Furthermore, we use the present section to observe the effects of this parameter in the valuation of the individuals θ , in the prices of the tranches of the service, the profit functions and the effects it has on the conditions that must occur for the variation of profits to be positive. We use the same utilities as in equation (4). Before consumers with the specific preferences trade-off between (1) and (2) whereas those with no specific preferences trade-off between (1) and (3).

With this in mind we have that:

1. $\omega > \lambda > \phi > 0, 0 < \beta < 1$ with ω , λ and ϕ measuring the different qualities between the free and paid versions; β measuring the marginal tolerance of individuals towards advertisement. There is a continuum of potential users and θ is their preference for music.
2. $\alpha \in (0, 1)$.
3. P_h is the price to access the premium service.
4. P_l is the price to access the paid basic service.

As in previous sections individuals have to chose between the different options. The parameter α kicks into the decision process of individuals making it

the factor by which they make their choice. For so, the proportion α of individuals will choose the low price tranche meanwhile the complement $1 - \alpha$ will choose the premium one. With this in mind we can obtain the respective profit function:

$$\Pi_A = \alpha(1 - \theta_l)(P_l) + (1 - \alpha)(1 - \theta_h)(P_h) \quad (3.9)$$

To obtain the profit maximizing values we derivate our profit function with respect to prices. After derivation we obtain the following optimal values:

- $P_l^* = \frac{1 - \beta + \lambda - \phi}{2}$
- $P_h^* = \frac{1 - \beta + \omega - \phi}{2}$
- $\theta_l^* = \frac{-1 + \beta + \lambda - \phi}{2(\lambda - \phi)}$
- $\theta_h^* = \frac{-1 + \beta + \omega - \phi}{2(\omega - \phi)}$

Replacing this values in our profit function we obtain the following optimal profit:

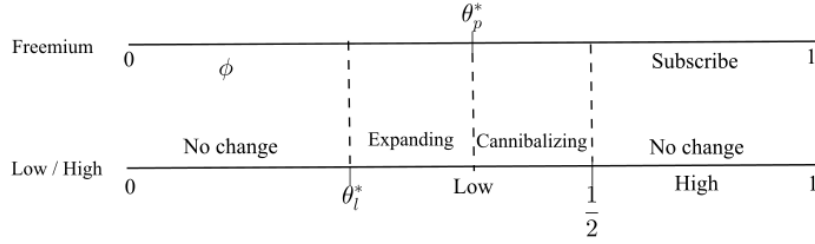
$$\begin{aligned} \Pi_A^* = & \alpha \left(\frac{1 + \lambda - \beta - \phi}{2(\lambda - \phi)} \right) \left(\frac{1 + \lambda - \beta - \phi}{2} \right) \\ & + (1 - \alpha) \left(\frac{1 + \omega - \beta - \phi}{2(\omega - \phi)} \right) \left(\frac{1 + \omega - \beta - \phi}{2} \right) \end{aligned} \quad (3.10)$$

The question arises; is this price scheme more profitable than the freemium model? To see this we consider both expansion and cannibalization effects as presented in the following graphic: With this in mind we can compose the following profit function to determine if there is cannibalization or expansion regarding the existence of premium, low and freemium services. This function is as follows:

$$\Pi_T = \alpha(1 - \theta_l)P_l + (1 - \alpha)[(1 - \theta_h)P_h + (\theta_h - \theta_l)P_l] \quad (3.11)$$

When derivating we obtain the same results as in the previous section. These results are as follows:

Figure 3.3.1: Cannibalization vs. Expansion



- $P_l^* = \frac{1 + \lambda - \beta - \phi}{2}$
- $P_h^* = \frac{1 + \omega - \beta - \phi}{2}$
- $\theta_l^* = \frac{-1 + \lambda + \beta - \phi}{2(\lambda - \phi)}$
- $\theta_h^* = \frac{1}{2}$

With these results at hand we can take the difference of profits generated between the freemium and the premium services and compare it to the profit generated by the three levels of service. This can be categorized as follows:

$$X = \frac{(1 - \beta)^2(\omega - \lambda)}{4(\lambda - \phi)(\omega - \phi)} \quad (3.12)$$

And:

$$Y = \frac{(1 + \lambda - \beta - \phi)^2}{4(\lambda - \phi)} - \frac{(1 + \omega - \beta - \phi)^2}{4(\omega - \phi)} \quad (3.13)$$

$$Y = \frac{(\omega - \lambda)((1 - \beta)^2 - (\lambda - \phi)(\omega - \phi))}{4(\lambda - \phi)(\omega - \phi)} \quad (3.14)$$

With these equations in mind the following can be determine:

- $X > 0$ is always true.
- If $Y > 0$ then versioning with three tranches is profitable $\forall \alpha$.
- If $Y < 0$ then versioning with three tranches is profitable if:

$$(1 - \alpha)X + \alpha Y > 0$$

$$\alpha < \frac{X}{X - Y} \quad (3.15)$$

Furthermore, and thanks to equation 3.12 and some mathematical manipulation we can rewrite equation 3.14 as follows:

$$Y = X - \frac{\omega - \lambda}{4} \quad (3.16)$$

So:

$$Y > 0 \Leftrightarrow X > \frac{\omega - \lambda}{4}$$

$$Y > 0 \Leftrightarrow (1 - \beta)^2 > (\lambda - \phi)(\omega - \phi) \quad (3.17)$$

And:

$$\alpha < \frac{X}{X - Y} \Leftrightarrow \frac{X}{\frac{\omega - \lambda}{4}} \Leftrightarrow \frac{(1 - \beta)^2}{(\lambda - \phi)(\omega - \phi)} \quad (3.18)$$

Under equation 3.18 it is possible to observe that α depends exclusively on the tolerance of consumers towards advertising being a proportion of the difference of quality from the premium to the freemium service and from the low to the freemium service. In other words, the decision of individuals to move in such a quantity that would generate an expansion in profits to the platform depends solely on how they perceive advertisement and the quality they receive in the freemium tranche. If their tolerance is high and they perceive that the quality from the freemium service is enough then they won't move. On the contrary, if individuals have low tolerance to advertisement and the perception of quality from the freemium tranche is low then clearly they'll move in a α value from the freemium tranche generating profit for the firm.

3.4 Discussion

It is clear that the versioning model (Belleflamme, 2005) and price discrimination are profit enhancing under the assumption that individuals will not only self-identified but they will also incur in exchanges that are efficient. In a normal setup this should be a very attractive way to price discriminate in a platform but, as seen in the last section when there is a characteristic such as time limitation or a predilection for a genre of type of music that are independent of θ price discrimination stops being profit-enhancing.

This characteristic drives a great part of individuals to move from the premium tranche to the new, cheaper tranche as soon as it is available, the parameter α , represents at the same time the market share of individuals that to whom this characteristic apply or care about it. In this section, we discuss the results obtained by analyzing the logic behind the independent characteristic.

The new tranche of service which would be a downgrade from the premium one would be offered at a lower price. The principal idea is to attract the individuals that are in the free tranche of the service to subscribe and go to the newly created paid tranche generating additional revenue. The problem then lies in the fact that individuals will incur in inefficient exchanges. Several individuals that are in the premium tranche only like the genre that is offered in the low paid tranche but, they are in the premium one because, of their high valuation or preference towards music. Clearly, there are certain aspects that are not measured explicitly that motivate these individuals to be in the premium tranche. When the new low price tranche appears they will prefer it to the premium one as long as the genre of music offered by this tranche is the genre of music they prefer the most. Before the creation of this tranche, individuals would flock to either the free tranche or the premium one based on their θ . At the moment that music taste enters as a new dimension to consider the individuals will put it as the value to evaluate to self select a tranche of service meaning that the profit or the fact or an expansion or cannibalization will depend on α . As shown in equation 3.15, by comparing the gain in revenue from people who switches from freemium to low and the loss due to people that is over-served under the premium tranche that move to the low trench which is dependent on α .

Individuals in this situation will take the first opportunity to still have access

to a popular section of the catalog or to the genre they prefer without the constant interruption of commercial breaks. They will exchange their high price subscription to the cheaper one.

This lead us to the conclusion that as long as the value of α , which is the share of individuals that have this preference, is more than 0 as well as Y then expansion is possible, otherwise, the only way for there to be expansion of profits and no cannibalization the inequality 3.15 must be true, otherwise, this price schedule will produce loses as it will irreparably cannibalize the premium tranche.

In the same vein, individuals from the free tranche that have very low or no tolerance towards publicity but that are not avid music listeners or have a limited time to listen to music would self select to the lower price tranche generating an expansion effect; this under the assumption that individuals will correctly self identify. Moreover, no inefficient exchanges would take place.

The independence between the time an individual has available to listen to music and their preference or appetite for music provides clues of why this does not happen. The self selection assumption is under the parameter θ which is the preference or appetite for music. As α is independent of θ ¹⁵, the individuals do not tie their valuation of their preference towards music to the time they have to listen to music. In this sense, individuals that have few hours of time to listen to music but have zero tolerance for the publicity would be subscribed to premium and vice versa. When the platform proposes the new tranche this individuals would flock to it.

Individuals that listen to music only when they commute (54%) (IFPI, 2019a), or when they drive (66%) (IFPI, 2019a) or during certain activities as working, studying, exercising or others are possible candidates that would move to the low price tranche from both the free service and the premium one.

By the use of these different examples we can see that as soon as a characteristic not tied to their preference for music enters into play the valuation of individuals of their preference to music or their appetite for music is not longer the driving factor to why they choose to be in the premium or free service that is offered. This destroys any possible advantage they can obtain from self selection and price discrimination.

¹⁵Basically that the time available for a certain action is not dependent of our preference towards that action.

3.5 Conclusions

Through the present chapter we wanted to understand the reason of why the different platforms that offer music streaming services do not use price discrimination given that they have a vast source of information that could be used to create different plans, price schedules and others that would attract a great number of individuals to become paying subscribers and create fresh income not only for the platform but for the artists and labels that offer their content through them.

We have shown through our simple model how second degree price discrimination with self selection generates more profit than the simple freemium model. At the same time, we analyzed the different ways in which the platform may execute this price schedule and we were able to see how the existence of an independent characteristic shared by the consumers makes the price schedule to fail as it generates inefficient exchanges inside the platform.

Versioning and second degree price discrimination depend on the individual being able to self-identified based in characteristics that are controllable and knowable by the firm. A characteristic such as music taste or disposable time to listen to music that are independent of the preference or appetite for music of the consumers is capable of affecting the consumption decisions of the individuals taking over as the driving factors that control the decision of the consumers to choose a tranche of service. For expansion to be possible when executing this price schedule several specific elements must happen in tandem, otherwise, the loss of revenue coming from over-served people in the premium tranche will be superior to the earnings from those moving from free to low tranches of services creating a problem of cannibalization of profits for the platform.

Chapter 4

Streaming and international Trade

4.1 Introduction

Last chapter exposes how the freemium model works, and how, when applying a price discrimination strategy through the use from the platforms of the information they possess on the users to do this discrimination there is an orthogonal dimension that, when a new price scheme cheaper than the premium one is offered makes that all consumers move to it. The author of this thesis did not go more in depth around this dimension but, a new question arose supported by the the first chapter of this thesis. Which are the implications of the application of a freemium model by the part of the platforms on other sides of the economic interactions between agents. More specifically, what are the effects of this model on the international trade of music?. Distance, in the case of international trade, is one of factor that decreases trade between two nations. Countries that are far away have less trade between them because the costs associated to the export and import of goods, their transportation and the cultural distance that exist between nations are simply too high. But, in the case of goods that have zero transportation cost, almost zero marginal cost and can be consumed the same instant that the consumer wants to should not be affected by several of those barriers, in special, by distance. Nonetheless,

cultural goods as any other goods were usually traded between countries been presented in some physical format in which they could be embedded, transported and sold. Nowadays this has changed. Various, if not all are able to be sold, consumed, appreciated and tasted without the need to embed them in any physical form. A good example of this is music. The way in which it has been delivered to consumers has changed along side with technology. What has brought up the rapid change is internet, its speed and accessibility. Moreover, streaming has led to various platforms offering unlimited access to music for a low and sometimes no price which is usually less costly than a normal CD that would provide a very limited quantity of content as compared to streaming platforms¹.

The trend is clear. The global music report (IFPI, 2019b) shows that 54% of the global music revenue comes from digital distribution and that 41.1% of it came directly from streaming. Meanwhile, the physical revenue decreased in 5.4% and download revenues were down a 20.5%. The industry is clearly moving to streaming as their main distribution channel. The industry has selected a path towards new revenues by taking part in the technological revolution but, it is still unclear how this change affects the bilateral flows of music between countries. The question arises, do the assumptions of the Gravity model still apply in the case of music streaming? Does cultural affinity have a bigger role to play in the trade of such goods or does the size, cultural influence and other factors of richer and bigger nations modify how trade behaves between countries?

The present chapter has the objective to analyze the effects of this technological transformation in the trade flows of music. For this we want to understand what is the role of physical distances in a digital world and if it is different from the case in which trade happens with physical goods. Moreover, we want to understand what is the role of cultural affinity in the case of the international trade of music.

Streaming as a technology is supposed to create friction-less trade as it does not depend on transportation or logistics to provide the goods transmitted through it to consumers. Basically, this means that it has zero marginal cost. The price for another user to listen, watch, read, etc. is none. Ferreira and Waldfogel

¹Usually CD would have between 12 and 15 songs which is almost nothing to the 30 million songs that are available in Spotify.

(2013) has touched on a similar idea as well as George and Peukert (2014) but, they have been more focused on how local music has been displaced by their international counterparts and how connectivity and instantaneous access to all the world music has established a path for it to be standardized or similar in all countries with no differentiation between them. Moreover, the effects of digitization and the legal barriers between countries affect the music trade. Still, these elements do not capture the complete picture of how streaming has impacted the general views of physical distance and cultural affinity in trade. To achieve this we will use the workhorse of international trade, the gravity model which was proposed by Isard (1954) but it has been widely exposed by the seminal papers of Helpman and Krugman (1985) and Krugman (1991). This specification has various advantages, the one that is more interesting for us is the tractability in multi-countries which is a notable difference to Heckscher–Ohlin and normal bilateral trade flow models (Anderson, 2011). We will apply them and other variations through different econometric methodologies to a data base composed of the top 200 songs charts streamed on Spotify for 47 countries during a total of 106 weeks. This data is complement by the use of other data sources as the CEPII GeoDist Database (Mayer and Zignago, 2011), economic indicators and values of GDP, trade balances, unemployment, population and other for the years of 2015 to 2017 of the DataBank of the World Bank² and, a data set to correctly identified the nationality or origin of the distinct artists provided by MusicBrainz³. We expect to find that indeed, there are other elements that explain the bilateral trade flows of music in the streaming era that are not related only to cultural affinity or transactions cost but, related to the influence that major producer of culture have over the global stage. Furthermore, several robustness checks considering if the music came from a major player or from a minor player in the music market, the availability of Spotify for the countries in the sample together With Different calculation methodologies to obtain that corroborate initial findings were ran. The article proceeds as follows: Section 2 covers the literature review. Section 3 describes the data set. Section 4 presents the empirical strategy. Section 5 explains the results and Section 6 concludes.

²<https://databank.worldbank.org/data/source/world-development-indicators#>

³<https://musicbrainz.org>

4.2 Literature Review

Literature comprising the international trade of cultural goods is scarce. Moreover, literature regarding the international trade of music is even more less frequent. In this sense we can regard very few papers that treat with this subject. Disdier et al. (2010) arrive to the same conclusions in the key trade variables for cultural goods as in the case of non cultural goods. These goods still present several specificities, for example, the sharing of a language fosters trade flows of as books and newspapers. Meanwhile, colonial links foster heritage trading. They use different methodologies and data sets from various sources that, even though limited in scope, provide robustness to their results.

Marvasti (1994) observes the effects of different barriers proposed by governments with the end of protecting their respective cultural industries. The application of different quotas, subsidies and others help to limit the flow of cultural products. The size of the home market surges as a determinant of trade flows specially in the case of the film and recorded music industry. Moreover, Marvasti (1994) shows that the cultural markets of books, films, newspapers and recorded music are dominated by products coming from English speaking countries.

Schulze (1999) establishes that trade theory can not be applied to the trade of unique art⁴ as it is usually between consumers, a fact that is usually neglected in the use of trade theory but, it can explain trade in reproducible art⁵. It shows how the trade of art is mostly between large countries and that it increases more than proportionally with respect to GDP and that cultural proximity measured in their case by the use of similar language quadruples the trade in art showing the special dynamic of cultural ties and the trade of art. Furthermore Bialynicka-Birula (2015) uses a variation of the gravity equation to explain the trade of art in the European Union, in their case they use the total art market turnover as a measure of the mass of a country. Even with this changes they arrive to the classic conclusions of trade theory meaning that distance is significant and negative and that there is positive correlation between the local and international art markets.

⁴Unique art is characterized as paintings, sculptures or others that are not produced using economies of scale.

⁵It makes reference to music, books, and others that are characterized by economies of scale and differentiation in products.

Marvasti and Canterbery (2005) examine the motion picture industry in the U.S. to observe what are the factors that explain their exports and how has protectionism affected them. By the use of the classic Samuelson iceberg model they find that both distance as cultural proximity matter as long as the countries that trade with have put a greater importance in their cultural sovereignty. Moreover, the gravity-iceberg export model adequately performs using the data available to the authors while the cultural variables prove to be important for the continued dominance of the American films. Meanwhile, Hanson and Xiang (2009) also analyses the trade in motion pictures in the U.S. They arrive to the conclusions that market size and related trade and transaction costs affect the level of trade of motion pictures between two countries. These conclusions are close to those expected from the use of a gravity model to analyze international trade flows. Moreover, Masood (2019) analyses how income, in her case GDP per capita, affects the diversity of content in a geographical area. The article concludes that the rise of purchasing power of individuals in the country that imports affects the diversity of the exporter countries. These conclusions are closely related to those observed in the application of the gravity model and, more precisely, to the model developed by Helpman et al. (2008).

A paper that is closest to the present is being done by Waldfogel et al. (2019). They use pop charts⁶ and Spotify charts from 18 countries from 2014 to 2015. Through the use of this elements and other data regarding cultural distance they found that there is evidence of a decrease in the trade frictions of music. Nonetheless, the reduction of friction has not been specially helpful for the increase of the consumed repertoire that comes from greater exporters such as the US or the UK. Smaller countries have found greater opportunities to expand the export of their repertoires thanks to streaming. Furthermore, it focuses in the consumption aspect of digitization and how streaming has affected the convergence of the consumption in different countries. This convergence is not concentrated into a single genre of music or a producer but rather to a mix. Moreover, they find that concentration of the consumption by origin has happened as a result of the decrease of the share that US music has in the consumption of music.

Another article that is similar to the present is Way et al. (2020), this study is

⁶The pop charts they use are from 2004 to 2015.

being done by Spotify which, by clear reasons, has much more data than the author. They take into consideration all of the streams in 90 days periods from all countries where Spotify is available plus, they take into consideration all age cohorts which are not available to the author and other information recollected from the data that Spotify has on each individual consumer. Nonetheless, they seem to use a classical approach, taking into consideration the variables of distance, common language, country size age cohort and others presented by Melitz (2008). Moreover, they seem to approach their research through the same lenses as Waldfogel et al. (2019) as they also analyse the effects of the United States and the effects of the different genres of music. The current chapter is clearly different to Way et al. (2020) as it takes into account not only common language but also the intrinsic home bias, the sharing of a border, the GDP size of both importer and exporter effects, etc. Additionally, this article analyses the different interactions between the availability of Spotify and distance, if the country is a major exporter of music and if the home country is the origin of the music being consumed.

Clear differences can be arose between Waldfogel et al. (2019) and the present document. In this chapter we use 48 different countries using data from Spotify top 200 charts from 2017 to 2018. This chapter analyses not only if trade has become friction-less between these countries but also how it has been affected by the availability of Spotify in them. How the availability of this platform has affected the home share of consumption of music, the effects that it has had on major exporters and the effect generated on the implication of distance. In this sense, the paper by Waldfogel et al. (2019) focuses more on the consumption and the convergence of it while we are more interested in the effects that the presence of Spotify has had in all facets of trade.

Other authors have considered the effect that cultural factors have in international trade. White and Tadesse (2008) observe how immigrants act as conduits that open trade between the host and home nations. The ability of these conduits to cover the trade gap between them two depends in the normal factors affecting trade such as distance, language GDP and others. Furthermore, they find that the increases in trade generated by the immigrant population is attributed to a preference for home country products, this tied to the networks and information capacities of immigrant populations generates a greater flow

of trade between the U.S. and the immigrants home country. Eichengreen and Irwin (1998) analyses the role of history in trade flows between different countries. Past agreements, cultural closeness, historical trade relations between other factors are seen by evidence collected in the paper as great predictors of trade which seem to enhance trade between countries as predicted by their mass (GDP). Countries that have traded in the past seem to inherently continue to trade between them even in quantities that defy the estimates provided by the distance between them and other variables as their firms and consumer have shifted their production and exports to suit the necessities of this increased trade. The authors show how classic gravity models have disregard the need to include lagged trade flows as determinant variable of current trade flows and how historical ties play a great part in determining current trade flows.

In the use of the gravity equation as a way to understand trade flows is customary to use a general set of variables, more prominently, geographical distance. Melitz (2008) identifies how in various of the studies about international trade language has been used as an explanatory variable of the bilateral trade in disregard of how many individuals are able to use or communicate in such language. The author show how common language promotes trade and how direct communication as well as translation are important elements for the existence of trade flows. Moreover, the author observes the different impacts and costs related to using direct communication and translation noting that in the case of homogeneous goods such as oil or primary products translation is a cost-less solution, meanwhile, heterogeneous goods require a level of personal relation and direct communication making translation a costly solution.

Disdier and Mayer (2007) observe through several studies that indeed proximity between the countries is significant but, this impact can be separated in two elements: the reduction of transaction costs and bilateral affinity. The later is created by different historical events that are exogenous to the essence of trade. Nonetheless the authors suggest that distance as a proxy for both elements is not ideal. Transaction costs can differ because of different reasons beyond the distance between two countries and it clearly can not explain the cultural affinity between two countries that share similar cultures, tastes, language and others. Even though distance can capture this as countries that are close usually tend to have a greater cultural affinity but, distance still capture

the effects of share culture and history in an imperfect way. In an addition to the now usually cultural links used in the gravity model they propose the use of the bilateral opinions to understand the impact of cultural affinity in international trade. They found that indeed bilateral opinions have a significant effect on bilateral trade even when using different controls and proxies for distance. Opinions affect in great part the bilateral imports rather than exports. Felbermayr and Toubal (2010) construct a measure of cultural affinity as its quantification is complicated and often non-existent. They use the data set of the Eurovision Song Contest as a source of information to quantify the cultural affinity of countries. They have detected how countries from certain areas in Europe vote for each other in greater number than for other countries. Moreover, these scores relate and have an effect on the bilateral trade of differentiated goods but not in homogeneous ones. In the case of the latter they observe that classical variables such as common language, law systems and others promote bilateral trade indicating their effect in transaction costs rather than cultural affinity. Furthermore they show through different estimation methods how, for their opinion, cultural affinity is underestimated through the use of the variables that are usually available to measure this dimension. This work is an expansion of the work by Guiso et al. (2009) who also analyses which is the effect that opinions have on trade between countries but with a different data set and no indicator built from raw voting data of contests but, by observing what is the effect of trust of the citizens of one country towards the citizens of other countries.

A great number of articles have been written about different parts and applications of international trade and the gravity model. Different articles observe the effects of cultural affinity and the transmission of cultural taste, opinions, and others on the gravity model estimates and the general idea of bilateral trade flows (Bisin and Verdier, 2001, 2000, 1998, 2011; Olivier et al., 2008). Other articles (Anderson and Van Wincoop, 2003; Feenstra et al., 1998) analyze how different variables usually used in the literature of international trade and Gravity models have different effects and bias bilateral trade flows. Cultural goods can also be thought as services, in this sense the literature covers different topics related to the application and observance of the Gravity model and the Heckscher-Ohlin model to international trade of services (Miroudot

et al., 2009; Walsh, 2008; Kimura and Lee, 2006; Freund and Weinhold, 2002; Amiti and Wei, 2005; Feenstra, 2015) although the data in the case of services is not abundant as they are usually peroxided by the good they use to transmit or produce their respective service. Other articles have analyzed how trade has been affected by the creation of cultural affinity through immigration (White and Tadesse, 2008; Wagner et al., 2002). Other articles analyses regulations, treaties and if different goods should be treated in different ways in this legislation and multilateral accords based in their hierarchy and importance in the identity of nations (Mas-Colell, 1999; Francois and Van Ypersele, 2002) and Freund and Weinhold (2004) analyses the different effects that technology has on international trade through the access and availability provided by the internet.

4.3 Data

A data set has been composed by the top 200 weekly chart of Spotify for a total of 48 countries for a length of 101 weeks covering the years of 2017 and 2018; this gives us a total of 998,400 tracks collected in this period. Different difficulties rose while collecting these charts. In different weeks certain countries would not be available or, in the case of smaller countries they would not contain 200 tracks but less than that. Moreover, the charts do not contain the nationality of the artists but only the position of the track and the number of streams collected by that track in the chart of the country. To obtain the nationality of the artists we decided to use the a data set provided by Musicbrainz⁷ which is “an open music encyclopedia that collects music meta-data and makes it available to the public.”. Between other elements, the data set provided contains the nationality of artists that may or may not be in the Spotify charts; by pairing it to our tracks data set we obtained the nationality of each one of the artists that are in the different tracks of the different charts of each country for each week. Nonetheless, before doing this matching, a long process of clean-up hat to be undertaken to prepare the open-source data. We

⁷<https://musicbrainz.org/> accessed on 18/12/2018. The author wishes to thank PhD. Aly Tovar Abdelrahman for his help into accessing the database of Musicbrainz.

had to standardized the names of the countries, the codes, the names of the artists and found the correct way in which to associate the artists to the area assigned to them in the data set.

Furthermore, after completing these tasks we preceded to match the individual tracks to the clean data set of Musicbrainz to obtain the nationality of the artists that made each of the tracks. The number of matched tracks goes down to a total of 777,113 tracks in our database which represents a loss of 22%. Different sources (Aguiar and Waldfogel, 2014; Ferreira and Waldfogel, 2013) provide enough reason to consider that it is an acceptable loss given the information that has been gained by using this methodology. The data set was collapsed to obtain the number of streams that are consumed in country i that come from country j . In this sense, the data set is composed of 98,200 different observations of each pairing of countries for each different week.

Additionally we used the CEPII data set⁸ for the gravity model (Mayer and Zignago, 2011) which provides various geographical variables, using different city level data they are able to calculate distances between countries, in this way accounting for the population densities of the different territories and, in addition to geographical variables they provide a series of cultural distance measures that are useful for the estimation of the gravity model. Moreover, to obtain information about the size of the economy and other demographic data we used the datasets provided by the World Bank through the World Development Indicators⁹ and to maintain standard time measures, the data set is expressed in annual values. Moreover, as the dimension of the values in these indicators are extremely big we used the logarithmic transformation for the variables of GDP, population, distance of both importers and exporters and, the dependent variable of the number of streams. This has been done to not have issues regarding the estimation process in which, by the great amounts that are contained in these variables the betas would have been overestimated. After matching the respective datasets we obtain a unique data set containing the respective bilateral flow of music trade in the sense of number of streams, the necessary geographical and cultural variables plus, the variables represent-

⁸http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6 accessed on the 18/12/2018.

⁹<https://databank.worldbank.org/data/source/world-development-indicators> accessed on 29/12/2019.

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ing the market size and several demo-graphical dimensions of each of the countries in our collection giving us the necessary raw materials to estimate the gravity model.

The descriptive statistics of the main variables of the data set are provided in the Table 4.3.1.

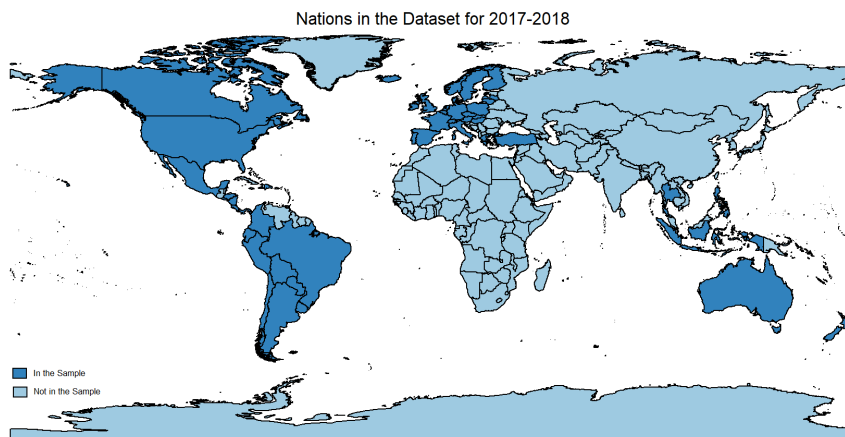
Table 4.3.1: Descriptive Statistics

	Streams*				GDP**				Population***				Internet****			
	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max
Argentina	33.9	87.0	0.0	412.0	433000.0	5720.0	447000.0	458000.0	44.3	0.2	44.0	44.5	0.7	0.0	0.7	0.7
Australia	64.0	224.0	0.0	1550.0	437000.0	5260.0	432000.0	443000.0	8.8	0.0	8.8	8.8	0.9	0.0	0.9	0.9
Austria	6.4	17.3	0.0	92.6	1400000.0	20400.0	1380000.0	1420000.0	24.8	0.2	24.6	25.0	0.9	0.0	0.9	0.9
Belgium	10.3	29.6	0.0	184.0	535000.0	3890.0	531000.0	539000.0	11.4	0.0	11.4	11.4	0.9	0.0	0.9	0.9
Bolivia	2.2	5.5	0.0	31.8	28500.0	592.0	27900.0	29100.0	11.3	0.1	11.2	11.4	0.4	0.0	0.4	0.4
Brazil	107.0	492.0	0.0	3960.0	2300000.0	12800.0	2280000.0	2310000.0	209.0	0.8	208.0	209.0	0.7	0.0	0.7	0.7
Canada	55.2	215.0	0.0	1560.0	1890000.0	17800.0	1870000.0	1900000.0	36.8	0.3	36.5	37.1	0.9	0.0	0.9	0.9
Chile	29.5	75.2	0.0	389.0	666000.0	9080.0	657000.0	675000.0	8.5	0.0	8.5	8.5	0.9	0.0	0.9	0.9
Colombia	12.6	38.8	0.0	271.0	278000.0	5510.0	272000.0	283000.0	18.6	0.1	18.5	18.7	0.8	0.0	0.8	0.8
Costa Rica	5.2	14.4	0.0	92.4	377000.0	4810.0	372000.0	382000.0	49.3	0.4	48.9	49.6	0.6	0.0	0.6	0.6
Czech Republic	4.1	13.4	0.0	89.9	48800.0	638.0	48200.0	49400.0	5.0	0.0	4.9	5.0	0.7	0.0	0.7	0.7
Denmark	23.8	69.8	0.0	348.0	245000.0	3580.0	241000.0	248000.0	10.6	0.0	10.6	10.6	0.8	0.0	0.8	0.8
Dominican Republic	2.0	5.4	0.0	34.6	301000.0	2980.0	388000.0	394000.0	82.8	0.1	82.7	82.9	0.9	0.0	0.8	0.9
Ecuador	5.2	14.5	0.0	91.1	366000.0	4350.0	362000.0	370000.0	5.8	0.0	5.8	5.8	1.0	0.0	1.0	1.0
El Salvador	1.7	4.6	0.0	28.9	79100.0	2680.0	76500.0	81800.0	10.6	0.1	10.5	10.6	0.7	0.0	0.7	0.7
Finland	20.0	65.3	0.0	454.0	88000.0	605.0	87400.0	88600.0	16.9	0.2	16.8	17.1	0.6	0.0	0.6	0.6
France	51.7	184.0	0.0	1370.0	1520000.0	17800.0	1500000.0	1545000.0	46.7	0.1	46.6	46.7	0.9	0.0	0.8	0.9
Germany	102.0	286.0	0.0	1510.0	267000.0	2220.0	265000.0	269000.0	5.5	0.0	5.5	5.5	0.9	0.0	0.9	0.9
Greece	1.8	6.4	0.0	43.9	2900000.0	24900.0	2880000.0	2920000.0	66.9	0.1	66.9	67.0	0.8	0.0	0.8	0.8
Honduras	0.0	0.1	0.0	0.8	250000.0	2410.0	248000.0	253000.0	10.7	0.0	10.7	10.8	0.7	0.0	0.7	0.7
Hungary	3.1	10.2	0.0	66.6	20900.0	386.0	20500.0	21300.0	9.5	0.1	9.4	9.6	0.3	0.0	0.3	0.3
Iceland	1.8	5.5	0.0	29.2	155000.0	3960.0	155000.0	163000.0	9.8	0.0	9.8	9.8	0.8	0.0	0.8	0.8
Indonesia	24.4	75.3	0.0	438.0	1120000.0	28300.0	1090000.0	1150000.0	266.0	1.5	265.0	268.0	0.4	0.0	0.3	0.4
Ireland	12.2	41.2	0.0	244.0	359000.0	14200.0	345000.0	373000.0	4.8	0.0	4.8	4.9	0.8	0.0	0.8	0.8
Italy	56.4	216.0	0.0	1840.0	18000.0	408.0	17600.0	18400.0	0.3	0.0	0.3	0.4	1.0	0.0	1.0	1.0
Latvia	1.3	4.4	0.0	29.5	213000.0	8270.0	212000.0	214000.0	60.5	0.1	60.4	60.5	0.7	0.1	0.6	0.7
Lithuania	1.3	4.3	0.0	28.8	48500.0	873.0	47700.0	49400.0	2.8	0.0	2.8	2.8	0.8	0.0	0.8	0.8
Malta	1.0	3.1	0.0	21.3	30700.0	696.0	30000.0	31300.0	1.9	0.0	1.9	1.9	0.8	0.0	0.8	0.8
Mexico	95.4	247.0	0.0	1210.0	13400.0	441.0	12900.0	13800.0	0.5	0.0	0.5	0.5	0.8	0.0	0.8	0.8
Netherlands	51.5	149.0	0.0	765.0	1200000.0	13800.0	1290000.0	1310000.0	125.0	0.7	125.0	126.0	0.6	0.0	0.6	0.7
New Zealand	14.7	53.0	0.0	341.0	12300.0	240.0	12000.0	12500.0	6.4	0.0	6.4	6.5	0.3	0.0	0.3	0.3
Nicaragua	0.0	0.0	0.0	0.2	936000.0	12100.0	924000.0	948000.0	17.2	0.1	17.1	17.2	0.9	0.0	0.9	0.9
Norway	29.5	87.1	0.0	487.0	486000.0	3130.0	483000.0	489000.0	5.3	0.0	5.3	5.3	1.0	0.0	1.0	1.0
Panama	2.2	5.7	0.0	35.5	183000.0	2520.0	181000.0	186000.0	4.8	0.0	4.8	4.9	0.9	0.0	0.9	0.9
Paraguay	2.7	7.1	0.0	38.1	48100.0	873.0	47200.0	49000.0	4.1	0.0	4.1	4.2	0.6	0.0	0.6	0.6
Peru	15.3	43.2	0.0	263.0	202000.0	3970.0	199000.0	206000.0	31.7	0.3	31.4	32.0	0.5	0.0	0.5	0.5
Philippines	58.6	195.0	0.0	1260.0	313000.0	9520.0	303000.0	322000.0	106.0	0.7	105.0	107.0	0.6	0.0	0.6	0.6
Poland	15.1	45.5	0.0	241.0	617000.0	15600.0	602000.0	633000.0	38.0	0.0	38.0	38.0	0.8	0.0	0.8	0.8
Portugal	6.9	22.1	0.0	145.0	244000.0	2950.0	241000.0	247000.0	10.3	0.0	10.3	10.3	0.7	0.0	0.7	0.7
Slovakia	1.6	5.2	0.0	35.0	36900.0	669.0	36200.0	37500.0	6.9	0.0	6.9	7.0	0.6	0.0	0.6	0.6
Spain	57.3	160.0	0.0	909.0	583000.0	6450.0	577000.0	590000.0	10.1	0.1	10.1	10.2	0.9	0.0	0.9	0.9
Sweden	49.4	144.0	0.0	756.0	110800.0	2190.0	108000.0	113000.0	5.4	0.0	5.4	5.4	0.8	0.0	0.8	0.8
Switzerland	9.7	26.4	0.0	165.0	22300.0	281.0	22000.0	22500.0	6.4	0.0	6.4	6.4	0.3	0.0	0.3	0.3
Thailand	1.2	5.3	0.0	46.5	433000.0	8800.0	424000.0	442000.0	69.3	0.1	69.2	69.4	0.5	0.0	0.5	0.6
Turkey	15.9	60.2	0.0	477.0	1220000.0	17100.0	1210000.0	1240000.0	81.7	0.6	81.1	82.3	0.7	0.0	0.6	0.7
United Kingdom	129.0	438.0	0.0	2480.0	2860000.0	19800.0	2840000.0	2880000.0	66.3	0.2	66.1	66.5	0.9	0.0	0.9	0.9
United States	426.0	1870.0	0.0	13500.0	1760000.0	25500.0	1730000.0	1790000.0	326.0	1.0	325.0	327.0	0.9	0.0	0.9	0.9
Uruguay	2.6	6.4	0.0	34.8	50000.0	404.0	49600.0	50400.0	3.4	0.0	3.4	3.4	0.7	0.0	0.7	0.7
Total Observations	33.8	309.0	0.0	13500.0	1020000.0	2570000.0	12000.0	17900000.0	40.9	66.4	0.3	327.0	0.8	0.2	0.3	1.0

Note: * in millions of streams, ** in millions of dollars, *** in millions of people, **** in percentage

The data is composed by a sample of countries that are present in Spotify. These countries are presented in the following figure:

Figure 4.3.1: Countries Present in the Data-set



4.4 Empirical Strategy

The Gravity model is the workhorse of international trade. It was firstly introduced by Isard (1954). Nonetheless, a model where the trade between countries is related to the market sizes is pragmatically proposed by Anderson (1979) and it establishes the relationship between the model and the general economic theory. One of the advantages of this model that is again proposed by Anderson (2011) is the tractability through multiple country case. The works related to the gravity model and its use in empirical settings have been surveyed in different articles (Anderson and Van Wincoop, 2003; Bergstrand and Egger, 2013; Baldwin and Taglioni, 2006; Silva and Tenreyro, 2006).

From a theoretical perspective Ferreira and Waldfogel (2013) presents a useful approach for our case. It provides a benchmark proportional model that is meant to translate our problem in very simple terms to be studied. For our case this is:

$$M_{ij} = \frac{Y_i Y_j}{Y} \quad (4.1)$$

Where M_{ij} is the sales of repertoire of country i in country j and Y_i is the GDP of country i , with Y being the world GDP. This equation can be rearranged in such a way that the market share of the repertoire from country i from the

total sales on country j equals the share of world GDP of country i as it is clearly stated in Ferreira and Waldfogel (2013):

$$\frac{M_{ij}}{Y_j} = \frac{Y_i}{Y} \quad (4.2)$$

The simple equation presented before is a great start for a simple model, nonetheless, this leads us to the understanding of a typical gravity equation as described by Silva and Tenreyro (2006) which is multiplicative and, that is later linearised through logarithms. Moreover, Silva and Tenreyro (2006) show different problems that arise from these linearisation process in conjunction with the heterogeneity in the data sets that are used for estimating the equation. It shows how Jensen's inequality affects the estimators that are generated through a logarithm linearisation of a multiplicative equation and that are estimated through a simple OLS. They present a poisson pseudo maximum likelihood estimator which solves the issue. Furthermore, they tested the estimator using the most acknowledge methodology for the estimation of a gravity equation presented by Anderson and Van Wincoop (2003). Moreover, Baldwin and Taglioni (2006) shows that the econometric model of Anderson and Van Wincoop (2003) can only be used in cross-section data as the fixed effects applied by it can be done under panel data. Nonetheless, the model proposed is an adequate methodological and theoretically grounded approach that helps us to understand how and with which conditions the gravity equation has to be estimated and it is the basis by which we will construct our empirical equation. All of this elements help us to create our preferred empirical model. For this, we use elements born from the article of Anderson (2011), of the more applicable model and more used empiric estimation made by Anderson and Van Wincoop (2003) and, of a current iteration regarding the music trade that has been specified by Ferreira and Waldfogel (2013). In this sense we present the following empirical model:

$$\begin{aligned} \ln(y_{ij,t}) = & \alpha + \beta \ln(\text{Distance})_{ij} + \theta \ln(\text{GDP})_{i,t} + \ln(\text{GDP})_{j,t} \\ & + \phi \ln(X)_{ij,t-1} + \tau Z_{ij} + \delta W_{ij,t} + \epsilon_{ij} \end{aligned} \quad (4.3)$$

with $y_{ij,t}$ being the amount of streamings between country i and j for time t , to not have the problem of not obtaining the value of the logarithms as we

have 0 trade interactions between countries we use the $\ln(x + 1)$. In this sense, if the value is zero the $\ln(0 + 1) = \ln(1) = 0$ which solves the problem. α is the constant of the regression. $Distance_{ij}$ being the logarithm of the distance between country i and j, $GDP_{i,t}$ and $GDP_{j,t}$ being the gross domestic product of country i and j for the time t. $X_{ij,t}$ are a series of variables corresponding to demo-graphical and economic data provided by the World Bank Development Indicators¹⁰ for country i and j for the period t, Z_{ij} are cultural and geographical variables¹¹ corresponding to country i and j, $W_{ij,t}$ are several dummies¹² and fixed effects for the estimation corresponding to country i and j. Finally, ϵ_{ij} being the error factor assumed to be statistically independent from our regressors.

A clear absence from our model are the price indexes. In our case, as Spotify charges the same nominal price in each country currencies so there is no need to take into account the prices of the origin or destination country as they are for our case strictly the same or at least there is no difference for consumers. Furthermore, as the goods we are treating are not tied to a transport cost nor they have a problem in crossing borders parts of the different models that have been quickly described can be simple left behind. Nonetheless, we could consider that as a substitution to the problems of transport costs and border barriers the music streaming has the problem of internet access that limits the consumption of this goods and media.

Understanding the possible limitations we will use several robustness checks.

¹⁰From this source the author creates two variables: *Ln Population Importer* that is the logarithm of the total population of the importer country and *Internet Access Importer* that is the percentage of internet access on the importer country.

¹¹These variables are as follows: *contig* that takes the value of 1 if country i and j share a border, *comlang_off* that takes the value of 1 if country i and j share the same language, *colony* that takes the value of 1 if country i was a colony of country j, *comcol* that takes the value of 1 if the country i and j share the same colonial power. All of these variables take the value of zero otherwise.

¹²The author has created two specific dummies: *Home* that takes the value of 1 if country i is the same as country j otherwise 0, *major_exp* that takes the value of 1 if country i is a major exporter otherwise 0. Furthermore, the author has created interaction variables between distance and the availability of spotify, home and if they are major exporters.

4.5 Results

The present section is divided in two parts. A benchmark section dedicated to present our results in the way similar papers have done it (Ferreira and Waldfogel, 2013; Takara, 2018) and, an empirical results section which is dedicated to present the results obtained through our empirical strategy.

4.5.1 Benchmark

The present chapter uses two articles as benchmark. The article by Ferreira and Waldfogel (2013), in it the authors objective is to determine if new communication channels make it less likely for domestic music to be consumed. For this, they present a data set composed of the music charts of 22 countries. They determine that the trade in music bears some resemblance to the trade of goods as shorter distances and having a common language promote a higher trade quantities between countries. Moreover, their data enables them to use market shares and money values for the respective imports and exports of music. This is a great difference between the present article and that of Ferreira and Waldfogel (2013) as we use the real consumption of music in the way of number of streams made. Taking this into account the author replicated their model with the data he had such as trade volumes between countries, geographical distance, if they share a common language and, the home bias. The results are presented in Table 2, column (1).

Takara (2018) analyses the effects of cultural distances on the trade of music. This study uses the data of traded music compact discs for a total of 188 countries, the data comes from the United Nations Trade Statistics Database. As the present chapter they use the geographical and cultural distances data from the “*Centre d’Études Prospectives et d’Informations Internationales*” (CEPII). The paper uses the volume of sales of CD’s and not the value of the music sold. They use more cultural distance variables in comparison to Ferreira and Waldfogel (2013). They add several variables such as Border¹³, Colony¹⁴, Re-

¹³Border is a dummy variable that takes the value of 1 if the 2 countries share a border.

¹⁴Colony is a dummy variable that takes the value of 1 if the two countries have colonial links.

ligion¹⁵, Culture1¹⁶, Culture2¹⁷. Table 4.5.1¹⁸, column (2) present the results of our regressions although, the present chapter do not use the religion, culture1 and culture2 variables as we do not posses the data to create them. To obtain the probit estimates we created a variable I which takes the value 1 if there was trade between the two nations and 0 otherwise as does Takara (2018).

Table 4.5.1: Benchmark Ferreira and Waldfogel (2013) and Takara (2018)

Dependent Variable:	Log of Streams	Dummy: Have they traded? Yes/No
	(1)	(2)
Log Distance	-0.659*** (0.0840)	-0.466*** (0.0391)
Dummy: Common Language	2.953*** (0.244)	0.693*** (0.118)
Dummy: Home	6.002*** (0.527)	
Dummy: Common Border		-0.232 (0.159)
Dummy: Colony		0.347 (0.197)
Constant	21.57*** (0.971)	3.854*** (0.460)
Exporter fe	Yes	Yes
Importer fe	Yes	Yes
N	4608	4224
R-sq.	0.713	
adj. R-sq.	0.707	

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

Our results reflect the same conclusions for distance (significant and negative), having a common language (significant and positive) and the existence of home bias (significant and positive) as in the case of the studies made by Ferreira and Waldfogel (2013) and Takara (2018). The results of the previous

¹⁵Religion is a variable that takes into account the interactions of the of the different religions between two countries.

¹⁶Culture1 is a binary variable that takes the value of 1 if both countries are in the same region according to the ethnomusicology classification.

¹⁷Culture2 is a binary variable that takes the value of 1 if the two countries are in the same cultural region using the civilization classification.

¹⁸The shapley values for this regression can be found in table 4.A.1 in the Annex.

table provides this study with a base of comparison for the results that have been obtained through the proposed empirical strategy.

Moreover, these elements provides us with a comparison between different ways to consume music. Ferreira and Waldfogel (2013) observes how the consumption of local music has been affected by mass media. The way they measure this is by using the charts of the different countries that they have in their sample. They also analyze the effects of MTV in the consumption of local music. Takara (2018) analyses the music trade by measuring it through the value of the media they are sold on. In other words, it measures the how many CD's have been sold and how much it represented in monetary values. In this way it considers the physical trade of music.

4.5.2 Regression Results

For our the regression in this article it was decided to do four different models whose results are presented in the following tables. Each model is presented in each column. Model 1 is done without fixed effects, model 2 takes into account only importer fixed effects, model 3 takes into account only exporter fixed effects and model 4 takes into account both importer and exporter fixed effects. We expect different results from this models as they capture different faces of trade resistance that exists between two nations which are not observable so, the inclusion of country fixed effects denoting the importer and the exporter can capture them. The principal results can be found in table 4.5.2.

Table 4.5.2: Panel Gravity Model Results With Different Fixed Effects

	(1)	(2)	(3)	(4)
Ln of GDP Importer	-0.348 (0.509)	0.514 (9.284)	-0.309 (0.166)	-4.780 (9.951)
Ln of GDP Exporter	1.295*** (0.0600)	1.294*** (0.0595)	-4.415 (8.975)	10.25 (5.508)
Ln of Distance	-1.836*** (0.161)	-1.953*** (0.161)	-0.868*** (0.203)	-0.679*** (0.113)
Ln Population Importer	0.265 (0.555)	-32.62 (23.43)	0.204 (0.159)	-33.36 (23.98)
Dummy: Contiguous	0.0427 (0.850)	-0.204 (0.876)	0.472 (0.550)	0.287 (0.512)
Dummy: Common Language	-1.094 (0.666)	-1.270 (0.727)	1.489 (0.990)	2.555*** (0.418)
Dummy: Colony	4.909*** (1.473)	4.988** (1.520)	1.580* (0.612)	0.530 (0.523)
Dummy: Common Colonizer	-7.521*** (1.579)	-7.365*** (1.544)	0.884 (2.705)	1.705 (2.659)
Dummy: Home	1.483 (1.000)	1.062 (0.945)	4.959*** (0.922)	5.652*** (0.848)
Internet Access Importer	0.652 (3.065)	2.592 (7.283)	1.236 (0.916)	1.223 (7.636)
Constant	-6.839 (4.314)	512.0* (245.5)	134.5 (236.6)	411.9 (256.2)
Importer fe	No	Yes	No	Yes
Exporter fe	No	No	Yes	Yes
Observations	3792	3792	3792	3792
R-sq	0,165	0.171	0.117	0.705
Adjusted. R-sq	0,163	0.169	0.115	0.700

Standard errors in parentheses

* p<0.05 ** p<0.01 *** p<0.001

As it is clear, the model that captures the most information is model 4, where both fixed effects are taken into account.

As the literature describes, distance is significant and negative, clearly showing that the furthest two countries are the lesser they will trade. Also, it is

possible to observe that the fact a common language between two countries favors the trade of music between them. Finally, the home bias represented by the variable “Dummy: Home” is positive and significant. It shows that people living in a certain country have a greater preference for the music produced in their own country making it possible to be more traded. The other variables of cultural distance that are also present in the literature such as having a common colonizer, sharing a border, having colonial ties and the GDP of both nations are not significant although their signs are as expected in theory. This result regarding the not significance of the GDP is corroborated by Ferreira and Waldfogel (2013) in which the substantial bias of consumption of the domestic music tied to the less than proportional shares in music of big economies make it quite reasonable to see that the GDP may not be statistically important to explain the trade of music between two countries. To check the robustness of the model the author uses the PPML and the Heckman approaches that provide similar results to those presented here, this results can be seen in table 4.A.3 in the annex.

With this results at hand, the author considers that the availability of Spotify in importer nations and for different times could affect the trade of music between two nations. The access to a platform that provides a catalog of music from everywhere in the world that is at fingers length could be a reason for music to be traded more easily between nations with no matter of their distance, nonetheless, these effects could be tied to the length of time that the platform has been present in the territory. At the beginning a more eclectic crowd with widely diverse and ample tastes could be interested in the platform, for so, their tastes would be more represented in the consumption and the trade of music but, it is clear that they do not represent the taste of the majority of the population. The longer the platform is available in the territory and more individuals come to use it then, the more common taste would be reflected in the consumption of music in the platform. This evolution in tastes, the maturity that it represents, has an effect in the trading of music that the author tries to capture by presenting three different flavors of the main regression. The author wants to capture the effects that the availability of Spotify has on international trade such as a lesser impact of distance between two nation in their trade relationships, the increased importance of the cultural affinity vari-

ables such as language and historical connection and, the positive effects on the international trade of music that the presence of Spotify can carry with it. Additionally to the effects that the availability of Spotify has when interacted with the distance between both nations, the fact that the importer nation is also a major exporter of music and the home bias. These results are presented in table 4.A.3 through 4.A.5 in an availability dis-aggregated manner while in tables 4.A.6 to 4.A.8 the availability is aggregated in different groups to understand if the aggregation of information could provide further clarity and robustness to the results in this chapter. These tables are commented next but they are presented in the annex.

As before, it is model 4 in all tables that provides the more complete view of the results as it considers both fixed effects and has the greater R^2 of all models in all specifications.

When the availability of Spotify is included in the regression together to the interaction of it with the distance in table 4.A.3 the following results come to be. As in table 4.5.2, having a common language between both countries and the home bias are positive and significant while the distance is also significant but positive, the geographical distance between two countries affects positively the trade relationship between them, the GDP of the exporter becomes positive and also statistically significant, this signals that the greater the economy of the exporter nation the more music it is going to export. Additionally, when observing the years of availability it is possible to see that the first and second year are positive and significant while the sixth and ninth year are bot slightly significant and negative. It seems that music is traded in greater quantity between two countries during the first years of availability and less when the platform has been available for longer. But, when they are interacted with the distance then all of the interactions between years of availability and distance turn significant and negative for the exception of the third year. Clearly, when the platform is available and the further away the countries are the less they will trade music between them.

In table 4.A.4 the author interacts the fact that the importer country is a major exporter with the availability of Spotify, the results are compared to the regression in table 4.5.2. In this case, the signs and significance of the results are similar to them. Having a common language as the home bias are both

positive and the distance is negative while all three of them are very significant. Nonetheless, the author finds that the GDP of the exporter is positive and barely significant; it shows that the greater the GDP of the exporter the more that country is going to trade with others. Only the first and second year of availability of Spotify are statistically significant while no elements of the interactions are statistically significant. The longer Spotify is available in a country that, besides being an importer of music is also a major exporter of music has no statistically significant effect in the trade of music.

Thus, when we consider the interactions between the availability of Spotify and the home bias in table 4.A.5 with respect to table 4.5.2 the author found that the same variables are statistically significant and with the same signs for the exception of the GDP of the exporter which as in tables 4.A.3 and 4.A.4 is barely significant and positive. the availability of the platform is significant during the first and second year in the country and then on the sixth and eighth year. In all of those years the effect is positive although the magnitude of the coefficient decreases the longer the platform is available in the importer country. When observing the interaction results it is clear that the first and second year are positive and very significant while the interaction between the eighth year of availability and the home bias is negative and very significant. It is clear that in the platform has recently been available the more home music that will be consumed but, as time passes and more individuals use the platform the less home music is traded. This supports the idea that there are more early adopters that have a greater preference for home music than the late adopters of Spotify. This can be seen as a change of tastes of the whole population that uses the platform, a change of tastes that takes place in time after the implantation of Spotify in a new country.

To test the robustness of this results the author aggregated the different years of availability in 4 groups, years 1 to 3 of availability are grouped in one year while year 4 is standing alone as year five and, the year 6 to 10 are set in another group. This division was set up as various years have a small number of observations so, to take out the influence of it's small number the groups were set up. Additionally, they represent the the results found in the dis-aggregated presentation. Specially regarding the effects of the early, middle of the road and the late years of availability of the platform in the importer country keep-

ing up with the logic of the results obtained before. Moreover, and in the same vein of the analysis of those tables we concentrate in the model 4 as it is the more complete model.

In this sense, the results of the model 4 on tables 4.A.6 to 11 of the main part of the regressions mirror the results of the tables 4.A.3 to 4.A.5 respectively with the exception of the exporter GDP which loses significance but, it is the GDP of the importer that is statistically significant when the information is aggregated. Confirming that even when the information is aggregated the results are robust and consistent at least in the first sections of the regressions. Furthermore, when observing the coefficients of the availability of years in table 4.A.6 it is possible to note that only the group of 1 to 3 years is significant and positive which means that the early years of availability of Spotify generates more music trade between nations but, all the coefficients of the interactions between the groups and distance are negative and significant meaning that the longer the platform is available and the greater the distance between countries then less music they will trade between them. These results are robust to the disaggregated specification in table 4.A.3.

Regarding the coefficients in table 4.A.7 for the availability in years of Spotify only the early years (1-3 years of availability) are positive and statistically significant but, besides that no other year groups have any significance of positive sign. Also, none of the interactions present any significance and, there are several sections of omitted variables as it seems that the exporter fixed effects captures some characteristics of the importer countries giving as a result variables that are dropped.

Finally, when you consider the result of availability in table 4.A.8 the author observes that, as before, only the early years are positive and very significant and that, when interacting these groups with the home bias only the early years interaction and the 5 years interaction are positive and significant. These results reflect the results of table 4.A.5, in the early years of availability the home music is the most consumed in the importer country and, as the platform has been available for more and more time the home music is less and less consumed in it. Supporting again the idea that there is certain evolution in the tastes of consumers through time.

4.6 Discussion

Trade of tangible goods suffers of various frictions, the most important one is distance. Distance, both geographical and cultural, decreases the chances that two countries would trade. When dealing with goods that are intangible and traded through intangible means distance should not have the same effect as in tangible goods. This should be the case of music. New developments in technology have made it possible to access music from anywhere in the world as long as the individual has an internet connection. In this sense, the author would have expected that distance in geographical terms would not be significant and that access to internet would have been statistically significant and positive. Clearly, Waldfogel et al. (2019) and the results presented prove this to be wrong. There has been a decrease in the frictions that cultural and geographical distance generate into the trade of music but, digitization and the existence of platforms such as Spotify have not been able to eliminate them.

Nonetheless, streaming has provided new mediums by which music can be traded and listen to. The availability of platforms that use streaming have created trade structure that is different and specific for the early years of availability of the platform. When the platform is available it attracts a very specific class of consumers that have eclectic tastes. Their tastes are mainly reflected in the consumption of music from countries that are far away and that are not major exporters of music. Additionally a great part of their consumption is on their own production increasing the effect of the home bias in trade. These elements are specific for the first years of availability of Spotify and are different to the classical idea of how trade develops between two nations. After a while, the trade structure in the platform becomes more normal as using Spotify is not longer an experiment but, becomes common. The longer and the more consumers the platform has, the more mainstream the consumption of music tends to be and, the more common the trade structure behind it. even with these early trade structure the friction in the trade of goods is still present.

In the case of cultural goods such as music these frictions relate not only to the physical distance between two nations but also to the cultural distance between them. Our results as those of our benchmark corroborate this. Sharing a common language and being an ex colony are clear ways in which two countries share a culture. The fact that they share a culture makes it easier for artist

from one country to be able to sell their music in another as the musical tastes of both would be similar. Moreover, legal systems would tend to be common or similar facilitating the legal processes needed to trade goods. Being an ex colony is positive and significant in all the regressions although, it stops being significant when taking into account both importer and fixed effects.

Furthermore, it has been feared that the easy access to cultural goods from major countries that are economic powerhouses would replace local music production and its consumption. Nonetheless, our estimations prove that if the platform has been available for a relatively short time (around one to two years) Home music is consumed in greater quantities than the music from other countries. In other words, local music is greatly appreciated and consumed by the early users of the platform that have eclectic tastes liking better their own cultural products and those coming from far away and non-major producers of music. This reveals that the home bias is not affected when major countries are considered both in the importer or exporter side as long as the platform has not been available for a very long time. The fears that local music would be destroyed to wider access to global powerhouses has not come to be and, in fact, streaming has provided a better way for people to discover, enjoy and consume local music. Nonetheless, our results also prove that in the long term home bias decreases as long as the platform is available for more than two years in the importer country.

4.7 Conclusion

When considering the GDP of both importer and exporter the theory is proved right in our analysis. Indeed, the greater the GDP of a country the more it trades in music as long as it is the exporting country. Distance is negative and very significant in all specifications being theoretically coherent but, when taking the availability of Spotify it turns positive and significant. Distance is positive in countries where Spotify has been recently available (because of eclectic tastes), but in countries where Spotify is available for a long time distance has a negative impact on trade. Moreover, the effects of having a shared border with another country are mainly positive but not significant

and they take a negative sign in the case of applying importer fixed effects. Usually, sharing a border increases the trade between two nations, this happens in our sample although as it is not statistically significant and we're not able to generalize them. These results show that even when treating with goods that have no physical presentation distance is still a draw back for trade at least in what concerns the consumption of music on the platform of Spotify. The frictions generated by distance do not disappear and only decrease with digitization.

Additionally to this result, the author concludes that in the early years of availability of Spotify in the importer country specific consumers use it as a tool to consume local cultural products and products coming from far away countries that are not necessarily countries that are considered as big exporters. Nonetheless, the longer the platform has been available in a country the more that these tastes will change to more mainstream cultural products, such as those that are produced by major exporter countries. This change happens because through the years more common consumers join the use of the platform which erases the specificities created by the first users of it. In other words, it seems that in the first years of Spotify specific consumers join the platform who have both preferences for local content (home bias) and for music from very far non-major exporters countries. Then after several years regular consumers join the pioneers on Spotify and this specificities disappear. Taking into account the maturity of Spotify in each country is important in the determination of the international trade of music.

Appendix

4.A Robustness Checks

The present annex shows the results of the shapley values for the benchmark regression in table 4 .A.1 and the tables with the results of our robustness tests, which are basically the principal regression calculated using the methods of PPML and Heckman, these results are presented in Table 4.A.2. Moreover, Tables 4.A.3, 4.A.4 and 4.A.5 present the specifications of the main regressions with the added interaction terms and, tables 4.A.6, 4.A.7, 4.A.8 the same interactions but with the aggregation of information in the availability of Spotify. The results of this tables were presented in the results section of this chapter.

Table 4.A.1: Benchmark Shapley Values: Ferreira and Waldfogel (2013) and Takara (2018)

Dependant Variable:	Log of Streams	Dummy: Have they traded? Yes/No
	(1)	(2)
Log Distance	4.71%	6.67%
Dummy: Common Language	0.82%	0.90%
Dummy: Home	1.82%	
Dummy: Common Border		0.53%
Dummy: Colony		0.67%
Importer fe	5.18%	7.52%
Exporter fe	87.47%	83.72%
R-sq.	0.71	0.59

Table 4.A.1 presents the Shapley¹⁹ values of the benchmark regression in table 4.5.1 to understand the contributions of each variable in the model to the R^2 . The principal problem with this approach is that the author requires the data set used by Ferreira and Waldfogel (2013) and Takara (2018) to calculate the shapley values corresponding to their data. In this sense, the author can only calculate this values tied to the results obtained from the data he had for the present chapter and uses these same values as a reference to which compare the results obtained through the main empirical approaches. These two articles and, their respective models and replications with our data provide us with a base to which compare the trade of music through streaming to the physical and televised media.

¹⁹Shorrocks (2013) and Grömping (2007) provide further information on the Shapley values.

Table 4.A.2: Panel Gravity Model Results With Heckman and PPML approach

	Heckman (1)		PPML	
	Regression	Selection	(2)	(3)
Ln of GDP Importer				-0.0539* (0.0233)
Ln of GDP Exporter			0.181*** (0.00990)	
Ln of Distance			-0.265*** (0.0189)	-0.132*** (0.0114)
Ln Population Importer				0.0382 (0.0259)
Dummy: Contiguous	-0.445 (0.295)	0.479*** (0.0868)	-0.123 (0.0631)	-0.0497 (0.0417)
Dummy: Common Language	0.919*** (0.162)		-0.127* (0.0566)	0.296*** (0.0375)
Dummy: Colony	0.112 (0.367)	0.691*** (0.113)	0.489*** (0.0654)	0.0957 (0.0493)
Dummy: Common Colonizer	-6.615*** (1.886)		-0.991** (0.310)	0.894** (0.327)
Dummy: Home	0.933* (0.412)	1.035*** (0.142)	-0.120 (0.0783)	0.373*** (0.0710)
Internet Access Importer			-0.0272 (0.948)	0.159 (0.143)
Constant	17.75*** (0.134)	-0.0908*** (0.0193)	-0.577 (0.780)	4.118*** (0.205)
Importer fe	No	No	Yes	No
Exporter fe	No	No	No	Yes
N	4608	4608	3792	3476

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

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Table 4.A.3: Panel Gravity Model Results With Availability of Spotify and Interaction With Distance

	(1)	(2)	(3)	(4)
Ln of GDP Importer	-0.196 (0.444)	-13.86 (13.13)	-0.400* (0.190)	-8.273 (13.20)
Ln of GDP Exporter	1.284*** (0.0604)	1.285*** (0.0600)	-11.12 (16.78)	13.62* (5.798)
Ln of Distance	0.504** (0.155)	0.464** (0.152)	0.543 (0.935)	0.610** (0.191)
Ln Population Importer	0.0251 (0.489)	-15.67 (22.76)	0.186 (0.191)	-19.56 (22.68)
Dummy: Contiguous	-0.0898 (0.745)	-0.244 (0.769)	0.478 (0.528)	0.273 (0.569)
Dummy: Common Language	-6.752 (0.615)	-0.812 (0.680)	1.743 (0.967)	2.575** (0.415)
Dummy: Colony	5.249*** (1.275)	5.221*** (1.324)	1.300* (0.646)	0.632 (0.512)
Dummy: Common Colonizer	-5.867*** (1.477)	-5.796*** (1.454)	1.536 (2.605)	1.809 (2.635)
Dummy: Home	2.150* (0.990)	1.890 (0.968)	5.252*** (0.888)	5.576*** (0.830)
Internet Access Importer	-0.206 (2.671)	-7.680 (8.153)	0.712 (1.167)	-6.483 (7.762)
Availability of spotify				
0 year				
1 year	32.43*** (1.180)	33.51*** (1.619)	33.04*** (10.67)	32.79*** (1.469)
2 years	35.16*** (0.183)	36.61*** (1.908)	38.23*** (13.33)	35.24*** (2.042)
3 years	18.95 (11.85)		19.12* (8.010)	
4 years	20.60*** (2.968)	-15.14*** (3.654)	17.98* (8.588)	0.521 (3.239)
5 years	23.56*** (2.386)	-11.41** (3.406)	18.56* (8.631)	0.909 (2.808)
6 years	27.59*** (1.328)	-7.678*** (1.945)	14.52 (8.843)	-4.269* (1.687)
7 years	35.04*** (2.086)	-0.968 (2.464)	20.57* (8.919)	-0.318 (2.595)
8 years	36.14*** (1.215)		21.69* (8.898)	
9 years	34.21*** (1.655)	-1.888 (1.516)	19.65* (9.054)	-2.439* (1.030)
10 years	39.88*** (1.286)	2.592 (1.432)	23.69* (8.892)	0.566 (1.592)
Interaction: Availability x Distance				
0 years Times Distance				
1 year Times Distance	-2.801*** (0.163)	-2.871*** (0.156)	-2.757* (1.145)	-2.859*** (0.126)
2 years Times Distance	-3.185*** (0.0149)	-3.188*** (0.0146)	-3.296* (1.499)	-3.181*** (0.0669)
3 years Times Distance	-1.265 (1.308)	-1.308 (1.384)	-1.248 (0.859)	-1.567 (1.085)
4 years Times Distance	-1.607*** (0.262)	-1.651*** (0.267)	-1.279 (0.948)	-1.249*** (0.216)
5 years Times Distance	-1.970*** (0.268)	-2.069*** (0.282)	-1.324 (0.951)	-1.270*** (0.243)
6 years Times Distance	-2.399*** (0.156)	-2.442*** (0.172)	-0.715 (0.982)	-0.767*** (0.191)
7 years Times Distance	-3.381*** (0.217)	-3.364*** (0.216)	-1.448 (0.996)	-1.395*** (0.270)
8 years Times Distance	-3.504*** (0.174)	-3.496*** (0.170)	-1.530 (1.001)	-1.502*** (0.196)
9 years Times Distance	-3.369*** (0.198)	-3.355*** (0.197)	-1.356 (1.011)	-1.344*** (0.188)
10 years Times Distance	-3.934*** (0.166)	-3.923*** (0.166)	-1.796 (1.004)	-1.779*** (0.212)
Constant	-32.85*** (4.361)	626.0 (511.3)	294.8 (442.0)	191.1 (633.3)
Importer fe	No	Yes	No	Yes
Exporter fe	No	No	Yes	Yes
Observations	3792	3792	3792	3792
R-sq	0.190	0.188	0.159	0.712
Adjusted R-sq	0.184	0.182	0.152	0.706

Standard errors in parentheses

* p<0.05 ** p<0.01 *** p<0.001

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Table 4.A.4: Panel Gravity Model Results With Availability of Spotify and Interaction With Major Exporter

	(1)	(2)	(3)	(4)
Ln of GDP Importer	0.00340 (0.451)	-18.12 (16.65)	-0.333 (0.178)	-18.32 (16.15)
Ln of GDP Exporter	1.295*** (0.0601)	1.294*** (0.0597)	-1.486 (18.42)	14.42* (5.728)
Ln of Distance	-1.874*** (0.159)	-1.953*** (0.161)	-0.821*** (0.203)	-0.678*** (0.113)
Ln Population Importer	-0.155 (0.483)	-10.87 (30.01)	0.184 (0.183)	-10.87 (30.19)
Dummy: Contiguous	-0.0420 (0.832)	-0.204 (0.877)	0.342 (0.588)	0.286 (0.513)
Dummy: Common Language	-1.119 (0.670)	-1.270 (0.725)	1.759 (0.973)	2.558*** (0.417)
Dummy: Colony	4.952*** (1.487)	4.988** (1.922)	1.204 (0.632)	0.527 (0.524)
Dummy: Common Colonizer	-7.464*** (1.606)	-7.365*** (1.546)	1.759 (2.704)	1.712 (2.668)
Dummy: Home	1.350 (0.938)	1.062 (0.946)	5.128*** (0.917)	5.628*** (0.850)
Dummy: Major exporter	-0.492 (0.646)		-0.646 (0.694)	
Internet Access Importer	-1.918 (2.766)	-8.007 (8.353)	-0.178 (1.072)	-8.067 (8.406)
Availability of spotify				
0 years				
1 year	6.693*** (0.298)	7.284*** (0.849)	7.394*** (1.058)	6.907*** (0.905)
2 years	5.931*** (0.115)	7.600*** (2.086)	7.272*** (1.439)	6.815** (2.188)
3 years	8.301*** (0.765)		8.165*** (1.201)	
4 years	5.392*** (0.687)	-0.147 (3.648)	6.108*** (0.908)	
5 years	5.244*** (0.607)	0.760 (2.730)	6.117*** (0.974)	0.530 (1.068)
6 years	5.377*** (0.696)	1.585 (1.312)	7.246*** (1.405)	0.977 (2.345)
7 years	4.569*** (0.691)	1.044 (1.131)	6.826*** (1.168)	0.0587 (2.851)
8 years	6.582*** (0.590)	1.022 (0.710)	8.521*** (1.266)	-0.341 (3.279)
9 years	5.683*** (0.675)	-0.173 (0.544)	7.337*** (1.174)	0.204 (0.624)
10 years	5.363*** (0.791)		7.278*** (1.265)	
Interaction: Availability x Major exporter				
0 years Times Major Exporter				
1 years Times Major Exporter				
2 years Times Major Exporter				
3 years Times Major Exporter	-1.042 (0.880)			
4 years Times Major Exporter	2.739** (1.048)		2.566** (0.754)	
5 years Times Major Exporter	2.368* (0.955)	-0.229 (0.896)	2.447** (0.729)	-0.229 (0.901)
6 years Times Major Exporter	2.040** (0.687)	-1.063 (1.288)	1.204* (0.758)	-1.063 (1.296)
7 years Times Major Exporter	2.420** (0.822)		2.092 (1.100)	
8 years Times Major Exporter				
9 years Times Major Exporter	0.306 (0.282)	0.470 (0.473)	0.828 (0.722)	-1.647 (1.082)
10 years Times Major Exporter			0.453 (0.773)	-2.117 (3.975)
Constant	-12.60** (4.494)	652.9 (610.9)	131.3 (485.9)	287.9 (637.9)
Importer fe	No	Yes	No	Yes
Exporter fe	No	No	Yes	Yes
Observations	3792	3792	3792	3792
R-sq	0.182	0.178	0.166	0.170
Adjusted R-sq	0.177	0.172	0.162	0.165

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

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Table 4.A.5: Panel Gravity Model Results With Availability of Spotify and Interaction With Home Bias

	(1)	(2)	(3)	(4)
Ln of GDP Importer	-0.211 (0.484)	-11.31 (12.36)	-0.418* (0.174)	-11.31 (12.44)
Ln of GDP Exporter	1.281*** (0.0607)	1.281*** (0.0602)	-9.286 (17.13)	14.15* (5.730)
Ln of Distance	-1.867*** (0.161)	-1.985*** (0.156)	-0.712*** (0.198)	-0.635*** (0.112)
Ln Population Importer	0.0294 (0.535)	-18.88 (21.41)	0.213 (0.174)	-18.88 (21.54)
Dummy: Contiguous	-0.0130 (0.859)	-0.251 (0.882)	0.522 (0.579)	0.323 (0.509)
Dummy: Common Language	-1.166 (0.669)	-1.334 (0.735)	1.810 (0.972)	2.633*** (0.428)
Dummy: Colony	5.052*** (1.456)	5.097** (1.567)	1.111 (0.632)	0.436 (0.532)
Dummy: Common Colonizer	-7.815*** (1.603)	-7.448*** (1.568)	1.630 (2.377)	1.798 (2.668)
Dummy: Home	-7.439*** (0.592)	-7.570*** (0.577)	3.903** (1.283)	4.268*** (0.600)
Internet Access Importer	-0.183 (2.943)	-8.805 (7.776)	0.896 (1.089)	-8.805 (7.825)
Availability of spotify				
0 year				
1 years	6.552*** (0.379)	6.780*** (0.687)	7.375*** (1.093)	6.426*** (0.746)
2 year	5.741*** (0.116)	6.698*** (1.731)	7.346*** (1.451)	5.993** (1.839)
3 years	6.745*** (0.773)		7.528*** (1.238)	
4 years	5.326*** (0.686)	1.465 (2.688)	6.187*** (0.940)	3.429 (3.066)
5 years	5.166*** (0.631)	2.076 (1.862)	6.331*** (0.998)	3.700 (2.171)
6 years	5.517*** (0.674)	1.828 (1.226)	7.449*** (1.085)	3.218* (1.486)
7 years	5.129*** (0.702)	1.124 (0.934)	7.492*** (1.093)	2.182 (1.108)
8 years	5.243*** (0.730)	0.862 (0.541)	7.946*** (1.162)	1.703* (0.690)
9 years	4.968*** (0.757)	0.183 (0.355)	7.277*** (1.145)	0.531 (0.424)
10 years	4.512*** (0.770)		7.125*** (1.240)	
Interaction: Availability x Home				
0 year Times Home				
1 years Times Home	9.928*** (0.480)	9.961*** (0.503)	9.332*** (1.348)	9.204*** (0.265)
2 year Times Home	12.51*** (0.113)	12.57*** (0.110)	11.42*** (1.175)	10.93*** (0.525)
3 years Times Home	13.60*** (0.997)	13.70*** (1.058)	3.833 (3.221)	3.770 (2.694)
4 years Times Home	5.791*** (1.433)	5.767*** (1.469)	1.837 (1.526)	1.928 (1.064)
5 years Times Home	7.563*** (1.718)	7.543*** (1.729)	2.365 (1.641)	2.281 (1.165)
6 years Times Home	10.71*** (1.028)	10.74*** (1.062)	-0.795 (1.321)	-1.021 (0.888)
7 years Times Home	11.94*** (0.743)	11.94*** (0.764)	-1.455 (1.186)	-1.665 (1.002)
8 years Times Home	13.03*** (0.894)	13.08*** (0.912)	-1.861 (1.165)	-2.071*** (0.590)
9 years Times Home	14.37*** (0.471)	14.46*** (0.474)	-0.245 (1.807)	-0.534 (1.253)
10 years Times Home	14.90*** (0.363)	15.00*** (0.369)	-0.807 (1.195)	-1.030 (0.756)
Constant	-10.77* (4.430)	603.7 (465.6)	267.9 (451.8)	243.6 (510.2)
Importer fe	No	Yes	No	Yes
Exporter fe	No	No	Yes	Yes
Observations	3792	3792	3792	3792
R-sq	0.180	0.180	0.158	0.712
Adjusted_R-sq	0.173	0.174	0.151	0.706

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

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Table 4.A.6: Panel Gravity Model Results With Dummy for Availability of Spotify in Groups and Interaction With Distance

	(1)	(2)	(3)	(4)
Ln of GDP Importer	-0.219 (0.421)	-19.63* (7.747)	-0.426** (0.158)	-19.09* (8.355)
Ln of GDP Exporter	1.286*** (0.0603)	1.286*** (0.0599)	-9.201 (12.93)	8.427 (5.073)
Ln of Distance	0.512** (0.157)	0.455** (0.150)	0.595 (0.951)	0.650** (0.191)
Ln Population Importer	0.0485 (0.468)	-14.72 (21.77)	0.233 (0.154)	-20.24 (21.28)
Dummy: Contiguous	-0.0598 (0.762)	-0.280 (0.792)	0.494 (0.583)	0.255 (0.515)
Dummy: Common Language	-0.739 (0.605)	-0.842 (0.679)	1.799 (0.958)	2.596*** (0.420)
Dummy: Colony	5.048*** (1.334)	5.092*** (1.382)	1.101 (0.603)	0.518 (0.518)
Dummy: Common Colonizer	-5.887*** (1.487)	-5.801*** (1.458)	1.531 (2.617)	1.798 (2.627)
Dummy: Home	2.201* (1.001)	1.829 (0.959)	5.351*** (0.886)	5.584*** (0.834)
Internet Access Importer	-0.122 (2.402)	-7.534 (5.960)	0.805 (0.912)	-8.042 (5.797)
Availability of spotify				
0 years				
1-3 years	26.11*** (6.674)	27.37*** (7.009)	26.17** (7.788)	28.19*** (5.277)
4 years	20.58*** (2.323)	-14.68*** (2.684)	18.42* (8.744)	-0.943 (1.215)
5 years	23.62*** (2.313)	-10.72*** (2.584)	18.86* (8.756)	
6 and more years	33.75*** (1.367)		19.35* (8.908)	0.0777 (1.692)
Interaction: Availability x Distance				
0 years Times Distance				
1-3 years Times Distance	-2.100** (0.727)	-2.178** (0.764)	-2.027* (0.853)	-2.288*** (0.574)
4 years Times Distance	-1.598*** (0.262)	-1.654*** (0.267)	-1.321 (0.963)	-1.288*** (0.213)
5 years Times Distance	-1.977*** (0.263)	-2.017*** (0.279)	-1.355 (0.964)	-1.310*** (0.242)
6 and more years Times Distance	-3.174*** (0.161)	-3.211*** (0.159)	-1.291 (0.987)	-1.316*** (0.161)
Constant	-32.92*** (4.568)	760.8* (336.7)	243.5 (340.6)	627.6 (313.8)
Importer fe	No	Yes	No	Yes
Exporter fe	No	No	Yes	Yes
Observations	3792	3792	3792	3792
R-sq	0.179	0.186	0.154	0.710
Adjusted. R-sq	0.175	0.182	0.150	0.705

Standard errors in parentheses

* p<0.05 ** p<0.01 *** p<0.001

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Table 4.A.7: Panel Gravity Model Results With Dummy for Availability of Spotify in groups and Interaction With Major Exporter

	(1)	(2)	(3)	(4)
Ln of GDP Importer	-0.124 (0.402)	-19.61* (9.207)	-0.385* (0.158)	-24.06* (9.833)
Ln of GDP Exporter	1.295*** (0.0601)	1.294*** (0.0596)	-8.073 (13.55)	9.879 (5.195)
Ln of Distance	-1.845*** (0.160)	-1.953*** (0.161)	-0.805*** (0.201)	-0.679*** (0.113)
Ln Population Importer	-0.0293 (0.437)	-14.26 (28.66)	0.239 (0.161)	-17.51 (29.69)
Dummy: Contiguous	0.0108 (0.847)	-0.204 (0.876)	0.383 (0.587)	0.288 (0.512)
Dummy: Common Language	-1.071 (0.662)	-1.270 (0.727)	1.778 (0.960)	2.555*** (0.417)
Dummy: Colony	4.853** (1.489)	4.988** (1.521)	1.041 (0.600)	0.530 (0.523)
Dummy: Common Colonizer	-7.442*** (1.608)	-7.365*** (1.545)	1.785 (2.680)	1.705 (2.661)
Dummy: Home	1.454 (0.969)	1.062 (0.946)	5.185*** (0.901)	5.652*** (0.840)
Dummy: Major exporter	0.710 (0.423)		-0.0775 (0.762)	
Internet Access Importer	-1.340 (2.423)	-7.350 (5.960)	0.0859 (0.930)	-8.005 (6.297)
<u>Availability of spotify</u>				
0 years				
1-3 years	6.912*** (0.267)	7.330*** (0.369)	7.603*** (1.088)	7.299*** (0.389)
4 years	5.221*** (0.576)	-1.914 (1.112)	6.124*** (0.906)	-1.975 (1.140)
5 years	5.125*** (0.557)	-0.972 (0.595)	6.224*** (0.927)	-1.108 (0.633)
6 and more years	5.322*** (0.582)		7.281*** (1.037)	
<u>Interaction: Availability x Major exporter</u>				
0 years Times Major exporter				
1-3 years Times Major exporter	-0.927 (0.756)			
4 years Times Major exporter	1.440 (0.822)		2.013** (0.740)	
5 years Times Major exporter	1.048 (0.591)	-0.125 (0.867)	1.868* (0.805)	0.00739 (0.877)
6 and more years Times Major exporter		-1.650 (1.109)	0.654 (0.725)	-1.777 (1.114)
Constant	-11.95** (4.350)	748.9 (378.2)	225.8 (357.3)	677.0 (386.8)
Importer fe	No	Yes	No	Yes
Exporter fe	No	No	Yes	Yes
Observations	3792	3792	3792	3792
R-sq	0.173	0.176	0.166	0.710
Adjusted R-sq	0.169	0.173	0.162	0.705
Standard errors in parentheses				
* p<0.05 ** p<0.01 *** p<0.001				

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Table 4.A.8: Panel Gravity Model Results With Dummy for Availability of Spotify in Groups and Interaction With Home Bias

	(1)	(2)	(3)	(4)
Ln of GDP Importer	-0.193 (0.456)	-15.66* (7.645)	-0.430** (0.152)	-19.13* (8.334)
Ln of GDP Exporter	1.282*** (0.0604)	1.281*** (0.0598)	-9.455 (13.12)	8.565 (4.993)
Ln of Distance	-1.848*** (0.162)	-1.980*** (0.156)	-0.717*** (0.197)	-0.639*** (0.111)
Ln Population Importer	0.0190 (0.503)	-19.67 (20.77)	0.237 (0.148)	-20.39 (21.04)
Dummy: Contiguous	0.0289 (0.854)	-0.241 (0.881)	0.534 (0.579)	0.324 (0.509)
Dummy: Common Language	-1.131 (0.664)	-1.329 (0.734)	1.815 (0.961)	2.631*** (0.426)
Dummy: Colony	4.983*** (1.460)	5.078** (1.510)	1.057 (0.600)	0.438 (0.532)
Dummy: Common Colonizer	-7.622*** (1.605)	-7.445*** (1.566)	1.607 (2.586)	1.782 (2.657)
Dummy: Home	-7.369*** (0.598)	-7.851*** (0.574)	3.938** (1.257)	4.290*** (0.596)
Internet Access Importer	-0.319 (2.602)	-7.369 (5.498)	0.936 (0.863)	-8.038 (5.793)
<u>Availability of spotify</u>				
0 years				
1-3 years	6.586*** (0.208)	6.932*** (0.316)	7.441*** (1.116)	7.005*** (0.337)
4 years	5.332*** (0.507)	-0.721 (0.947)	6.210*** (0.922)	-0.842 (0.994)
5 years	5.155*** (0.461)	0.0630 (0.587)	6.360*** (0.965)	-0.0938 (0.656)
6 and more years	5.205*** (0.441)		7.443*** (1.069)	
<u>Interaction: Availability x Home</u>				
0 years Times Home				
1-3 years Times Home	12.18*** (0.830)	12.26*** (0.864)	6.951** (2.545)	6.832** (1.948)
4 years Times Home	5.795*** (1.459)	5.768*** (1.466)	1.875 (1.510)	1.985 (1.063)
5 years Times Home	7.567*** (1.713)	7.543*** (1.726)	2.402 (1.623)	2.362* (1.164)
6 and more years Times Home	12.81*** (0.604)	12.87*** (0.623)	-0.864 (1.209)	-1.067 (0.724)
Constant	-11.01* (4.485)	733.2* (306.4)	262.3 (346.0)	628.4* (307.7)
Importer fe	No	Yes	No	Yes
Exporter fe	No	No	Yes	Yes
Observations	3792	3792	3792	3792
R-sq	0.169	0.180	0.157	0.711
Adjusted. R-sq	0.165	0.176	0.153	0.706

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

Conclusions

Through this thesis the author has questioned the effects that streaming has had in the cultural industry. It is clear to see that several products that are created in this industry are more susceptible to be digitized than others. Video games, books, music movies and series between others can be easily put in digital format and sell or rent to a wide variety of consumers for every part in the world with almost zero marginal cost and no transportation costs. This has produced an incredible revolution in how people consume these products and in how the industry as a whole has responded to the challenges and opportunities offered by the migration to new technologies.

In this sense that the present thesis has taken to prove a series of hypothesis regarding the possible effects that streaming and the digitization of music have on this industry. To achieve it, the author has presented through the introduction of the current situation of the industry both at a local scale as a global scale. Furthermore, through the literature survey the author has identified that there are areas of research that have not been thoroughly exploited. These areas regard the opinion of artists towards free streaming, the business model and price discrimination strategies and, the effects of streaming digitization and the availability of streaming platforms on international trade. These are fertile ground for research and, they are tightly related to the hypothesis of this thesis.

The author studies what is the logic behind an artist favorable or unfavorable opinion towards free streaming. The author uses a data set composed of French artists that recollects not only their opinion regarding the free tranches of service from streaming platforms but, also data regarding their musical production, their revenue sources, their trajectory and prestige between others.

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Through this data the author finds that the disposition to be favorable or unfavorable depends of different elements. If the artist has won prizes, if their production is quite old, if they have past success and great revenues from their catalog they are more unfavorable towards free streaming as the revenues it generates are lesser than the normal revenues they would get from selling physical copies of their music. In the other hand, new artists, with current production, that have not earned any prizes and whose main source of income comes from ancillary markets such as concerts and memorabilia tend to be more favorable towards free streaming as they see it as a tool of free marketing that can be used to be known, to expand their audience, to expand their revenues from ancillary sources and gain the prestige that famous artists already have. This reveals that there is a logic behind why artists may or may not be favorable towards streaming and, that this decision is not based only in gut feeling or state of mind. Further research on this topic should focus around the opinion of artist towards streaming in all flavors when subjected to a shock. It could be possible that the opinion of artists towards streaming may change when they are unable to gain ancillary income such as the revenue from concerts or appearances. This situation has been seen during the covid-19 pandemic in which for almost two years artists have been unable to perform and had to either perform online or content themselves with the fact that their music was still listen to through streaming services and digital downloads.

Furthermore, using the theoretical framework of versioning by Belleflamme (2005) the author analyzes how the business model of streaming platforms work and, if there is a way to implement first degree price discrimination. In this case, the author shows that indeed streaming platforms have the capacity to discriminate users regarding their tastes in music, consumption or any other dimension and, that they are capable of creating different tranches of services with different prices to attract individuals using the free service of the platform and transform them into paying subscribers. Nonetheless, consumers seems to have an orthogonal dimension regarding this strategy that, as soon as it is implemented, makes that over-served subscribers that were in the premium and, more expensive service, move towards the less expensive but still payed service proposed by the platform and so, creates a loss of revenue unless very specific conditions be achieved. It is clear that there is a way in which this strategy

could be modeled so the people that move towards the new tranches of service are the individuals that use the free service and not the ones already paying for the premium service creating the expansion effect that is researched through the application of a new price schedule. The next step to determine the efficacy of this price schedule should be to make the quantity of individuals that move to the lower tranche endogenous to the utility function, making it possible to manage the the exchanges so they come only from the individuals using the add supported service. Eliminating or reducing the inefficient exchanges that could happen as individuals from the premium tranche move to the less expensive tranche opening the door to further research.

Finally, as chapter 4 shows, streaming has affected the bilateral trade relations between nations. Even though the geographical distance is still important the author observes that it is positive in countries where Spotify has been recently available (because of eclectic tastes), but in countries where Spotify is available for a long time it has a negative impact on trade. It is clear that in the early stages of availability of platform the structure of trade as consumers with eclectic tastes are more prone to use the platform in the early years. Additionally, in the early stages of availability of the platform consumers tend to have a greater consumption of their own music. This tends to disappear the longer the platform is available.

Nonetheless, streaming has provided new mediums by which music can be traded and listen to. The availability of streaming platforms have created trade structure that is different and specific for the early years of availability of the platform. When the platform is available it attracts a very specific class of consumers that have eclectic tastes. Their tastes are mainly reflected in the consumption of music from countries that are far away and that are not major exporters of music.

Furthermore, it has been feared that the easy access to cultural goods from major countries that are economic powerhouses would replace local music production and it's consumption. Nonetheless, this thesis proves that if the platform has been available for a relatively short time (around one to two years) Home music is consumed in greater quantities than the music from other countries. In other words, local music is greatly appreciated and consumed by the early users of the platform that have eclectic tastes liking better their own cultural

Conclusions

products and those coming from far away and non-major producers of music. In all senses, through this thesis it is clear to see that digitization and streaming have a great impact in the cultural industries. Each new technology has the power to transform the consumption, the production, the trade and the business model. The effects of these technologies can be a root for the success or the downfall for an industry. It is clear that with each new technology research has to be done to better understand how to profit from it and create the greater good for everyone.

Bibliography

Adams, William James and Yellen, Janet L. Commodity bundling and the burden of monopoly. *The quarterly journal of economics*, pages 475–498, 1976.

Aguiar, Luis. Let the music play? free streaming, product discovery, and digital music consumption. *Information Economics and Policy*, forthcoming, 2017.

Aguiar, Luis and Waldfogel, Joel. Digitization, copyright, and the welfare effects of music trade. *Copyright, and the Welfare Effects of Music Trade (December 3, 2014)*, 2014.

Aguiar, Luis and Waldfogel, Joel. Even the losers get lucky sometimes: New products and the evolution of music quality since napster. *Information Economics and Policy*, 34:1–15, 2016.

Aguiar, Luis and Waldfogel, Joel. As streaming reaches flood stage, does it stimulate or depress music sales? *International Journal of Industrial Organization*, 2017.

Aguilar, Luis and Martens, Bertin. Digital music consumption on the internet: evidence from clickstream data. *Information Economics and Policy*, 34:27–43, 2016.

Amiti, Mary and Wei, Shang-Jin. Fear of service outsourcing: is it justified?, 2005.

Anderson, Chris. *The long tail: Why the future of business is selling less of more*. Hachette Books, 2006.

- Anderson, James E. A theoretical foundation for the gravity equation. *The American Economic Review*, 69(1):106–116, 1979.
- Anderson, James E. The gravity model. *Annu. Rev. Econ.*, 3(1):133–160, 2011.
- Anderson, James E and Van Wincoop, Eric. Gravity with gravitas: a solution to the border puzzle. *American economic review*, 93(1):170–192, 2003.
- Anderson, Simon P and Celik, Levent. Product line design. *Journal of Economic Theory*, 157:517–526, 2015.
- Armstrong, Mark. Price discrimination by a many-product firm. *The Review of Economic Studies*, 66(1):151–168, 1999.
- Bacache-Beauvallet, Maya, Bourreau, Marc, and Moreau, François. Piracy and creation: The case of the music industry. *European Journal of Law and Economics*, 39(2):245–262, 2015.
- Bakos, Yannis and Brynjolfsson, Erik. Bundling and competition on the internet. *Marketing science*, 19(1):63–82, 2000.
- Balasubramanian, Sridhar, Bhattacharya, Shantanu, and Krishnan, Vish V. Pricing information goods: A strategic analysis of the selling and pay-per-use mechanisms. *Marketing Science*, 34(2):218–234, 2015.
- Baldwin, Richard and Taglioni, Daria. Gravity for dummies and dummies for gravity equations. Technical report, National Bureau of Economic Research, 2006.
- Barr, Kenneth. Theorizing music streaming: Preliminary investigations. *Scottish Music Review*, 3(2), 2013.
- Beard, T Randolph, Ford, George S, and Stern, Michael L. Safe harbors and the evolution of music retailing. *Phoenix Center Policy Bulletin*, (41), 2017.
- Belleflamme, Paul. Versioning in the information economy: theory and applications. *CESifo Economic Studies*, 51(2-3):329–358, 2005.
- Belleflamme, Paul. The economics of digital goods: a progress report. *Review of Economic Research on Copyright Issues*, 13(2):1 – 24, 2016.

- Belleflamme, Paul and Peitz, Martin. Platforms and network effects. In *Handbook of Game Theory and Industrial Organization, Volume II*. Edward Elgar Publishing, 2018.
- Belleflamme, Paul, Peitz, Martin, et al. Ratings, reviews, recommendations and the consumption of cultural goods. Technical report, University of Bonn and University of Mannheim, Germany, 2019.
- Bergstrand, Jeffrey H and Egger, Peter. Gravity equations and economic frictions in the world economy. In *Palgrave handbook of international trade*, pages 532–570. Springer, 2013.
- Bialynicka-Birula, Joanna. Modelling international trade in art—modified gravity approach. *Procedia Economics and Finance*, 30:91–99, 2015.
- Bisin, Alberto and Verdier, Thierry. On the cultural transmission of preferences for social status. *Journal of Public Economics*, 70(1):75–97, 1998.
- Bisin, Alberto and Verdier, Thierry. A model of cultural transmission, voting and political ideology. *European Journal of Political Economy*, 16(1):5–29, 2000.
- Bisin, Alberto and Verdier, Thierry. The economics of cultural transmission and the dynamics of preferences. *Journal of Economic theory*, 97(2):298–319, 2001.
- Bisin, Alberto and Verdier, Thierry. The economics of cultural transmission and socialization. In *Handbook of social economics*, volume 1, pages 339–416. Elsevier, 2011.
- Blacc, Aloe, Manta, Irina D, and Olson, David S. A sustainable music industry for the 21st century. *Cornell L. Rev. Online*, 101:39, 2015.
- Borja, Karla and Dieringer, Suzanne. Streaming or stealing? the complementary features between music streaming and music piracy. *Journal of Retailing and Consumer Services*, 32:86–95, 2016.
- Borja, Karla, Dieringer, Suzanne, and Daw, Jesse. The effect of music streaming services on music piracy among college students. *Computers in Human Behavior*, 45:69–76, 2015.

- Bourreau, Marc and Gaudin, Germain. Streaming platform and strategic recommendation bias. 2018.
- Bourreau, Marc, Gensollen, Michel, Moreau, François, and Waelbroeck, Patrick. “selling less of more?” the impact of digitization on record companies. *Journal of cultural economics*, 37(3):327–346, 2013.
- Burroughs, Benjamin and Rugg, Adam. Extending the broadcast: Streaming culture and the problems of digital geographies. *Journal of Broadcasting & Electronic Media*, 58(3):365–380, 2014.
- Bylin, Kyle. Savor your music: The effect of abundance in culture, August 2010. URL <http://www.musicthinktank.com/blog/savor-your-music-the-effect-of-abundance-in-culture.html>.
- Carroni, Elias and Paolini, Dimitri. Business models for streaming platforms: Content acquisition, advertising and users. *Information Economics and Policy*, 52, 2020.
- Castells, Manuel. *Piracy cultures: How a growing portion of the global population is building media relationships through alternate channels of obtaining content*. Xlibris Corporation, 2013.
- Coffey, Aoife. The impact that music streaming services such as spotify, tidal and apple music have had on consumers, artists and the music industry itself. *School of Computer Science and Statistics*, 2016.
- Danaher, Brett, Dhanasobhon, Samita, Smith, Michael D, and Telang, Rahul. Converting pirates without cannibalizing purchasers: The impact of digital distribution on physical sales and internet piracy. *Marketing science*, 29(6): 1138–1151, 2010.
- Dang-Nguyen, Godefroy, Dejean, Sylvain, and Moreau, François. On the complementarity between online and offline music consumption: the case of free streaming. *Journal of Cultural Economics*, 38(4):315–330, 2014.
- Datta, Hannes, Knox, George, and Bronnenberg, Bart J. Changing their tune: How consumers’ adoption of online streaming affects music consumption and discovery. *Marketing Science*, 2017.

- De Rouck, M. Music streaming services and their path to financial viability, 2017. URL [https://vibeserver.net/scripties/2017/MatthiasDeRouck-Musicstreamingservicesandtheirpathtofinancialviability\(non-confidentialversion\).pdf](https://vibeserver.net/scripties/2017/MatthiasDeRouck-Musicstreamingservicesandtheirpathtofinancialviability(non-confidentialversion).pdf).
- DellaVigna, Stefano and Malmendier, Ulrike. Paying not to go to the gym. *american economic Review*, 96(3):694–719, 2006.
- Dias Dos Santos, Iara. Music industry’s business models in the digital era focused on indie artists: a study case. 2016.
- Disdier, Anne-Célia and Mayer, Thierry. Je t’aime, moi non plus: Bilateral opinions and international trade. *European Journal of Political Economy*, 23(4):1140–1159, 2007.
- Disdier, Anne-Célia, Tai, Silvio HT, Fontagné, Lionel, and Mayer, Thierry. Bilateral trade of cultural goods. *Review of World Economics*, 145(4):575–595, 2010.
- Dörr, Jonathan, Wagner, Thomas, Benlian, Alexander, and Hess, Thomas. Music as a service as an alternative to music piracy? an empirical investigation of the intention to use music streaming services. *Business & Information Systems Engineering*, 5(6):383–396, 2013.
- Dubovik, Andrei and Janssen, Maarten CW. Oligopolistic competition in price and quality. *Games and Economic Behavior*, 75(1):120–138, 2012.
- Eichengreen, Barry and Irwin, Douglas A. The role of history in bilateral trade flows. In *The regionalization of the world economy*, pages 33–62. University of Chicago Press, 1998.
- Ellis-Petersen, Hannah. How streaming saved the music: global industry revenues hit £12bn. *The Guardian*, 2017. URL <https://www.theguardian.com/business/2017/apr/25/2016-marks-tipping-point-for-music-industry-with-revenues-of-15bn>.
- Emery, C. Digital music business models in the us and europe: The emergence of streaming services and the subsidization of music, July 2013. URL <https://vibeserver.net/scripties/Chad%20Emery%20Master%20Thesis.pdf>.

- Feenstra, Robert C. *Advanced international trade: theory and evidence*. Princeton university press, 2015.
- Feenstra, Robert C, Markusen, James A, and Rose, Andrew K. Understanding the home market effect and the gravity equation: The role of differentiating goods. Technical report, National Bureau of Economic Research, 1998.
- Felbermayr, Gabriel J and Toubal, Farid. Cultural proximity and trade. *European Economic Review*, 54(2):279–293, 2010.
- Ferreira, Fernando and Waldfogel, Joel. Pop internationalism: has half a century of world music trade displaced local culture? *The Economic Journal*, 123(569):634–664, 2013.
- Fly, Benjamin. How does music consumption impact the music industry and benefit artists? 2016.
- Francois, Patrick and Van Ypersele, Tanguy. On the protection of cultural goods. *Journal of International Economics*, 56(2):359–369, 2002.
- Freund, Caroline and Weinhold, Diana. The internet and international trade in services. *American Economic Review*, 92(2):236–240, 2002.
- Freund, Caroline L and Weinhold, Diana. The effect of the internet on international trade. *Journal of international economics*, 62(1):171–189, 2004.
- Gayer, Amit and Shy, Oz. Publishers, artists, and copyright enforcement. *Information Economics and policy*, 18(4):374–384, 2006.
- George, Lisa Megargle and Peukert, Christian. Youtube decade: cultural convergence in recorded music. *Available at SSRN 2506357*, 2014.
- Greene, William H and Hensher, David A. *Modeling ordered choices: A primer*. Cambridge University Press, 2010.
- Grömping, Ulrike. Estimators of relative importance in linear regression based on variance decomposition. *The American Statistician*, 61(2):139–147, 2007.
- Guiso, Luigi, Sapienza, Paola, and Zingales, Luigi. Cultural biases in economic exchange? *The Quarterly Journal of Economics*, 124(3):1095–1131, 2009.

- Hagiu, Andrei and Wright, Julian. Marketplace or reseller? *Management Science*, 61(1):184–203, 2015.
- Hanson, Gordon H and Xiang, Chong. International trade in motion picture services. In *International trade in services and intangibles in the era of globalization*, pages 203–222. University of Chicago Press, 2009.
- Helpman, Elhanan and Krugman, Paul R. *Market structure and foreign trade: Increasing returns, imperfect competition, and the international economy*. MIT press, 1985.
- Helpman, Elhanan, Melitz, Marc, and Rubinstein, Yona. Estimating trade flows: Trading partners and trading volumes. *The quarterly journal of economics*, 123(2):441–487, 2008.
- Hernandez, Ricardo. A fair stream: Recommendations for the future of fair trade music. *Vand. J. Ent. & Tech. L.*, 19:747, 2016.
- Herweg, Fabian and Mierendorff, Konrad. Uncertain demand, consumer loss aversion, and flat-rate tariffs. *Journal of the European Economic Association*, 11(2):399–432, 2013.
- Hiller, R Scott. Sales displacement and streaming music: Evidence from youtube. *Information Economics and Policy*, 34:16–26, 2016.
- Hiller, R Scott and Walter, Jason M. The rise of streaming music and implications for music production. *Review of Network Economics*, 16(4):351–385, 2017.
- Hjelmbrekke, S. Economic concepts and implications of music subscriptions. 2014. URL https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=ACEI2014&paper_id=198.
- Hogan, Molly. Upstream effects of the streaming revolution: A look into the law and economics of a spotify-dominated music industry. *Colo. Tech. LJ*, 14:131, 2015.
- IFPI. Global music report 2016. Market report, 7 Air Street Piccadilly, London, United Kingdom, 2017. URL <http://www.ifpi.org/downloads/GMR2017.pdf>.

- IFPI. Global music report 2017. Technical report, IFPI, 2018. URL <https://www.ifpi.org/downloads/GMR2017.pdf>.
- IFPI. Music consumer insight report 2018. Technical report, IFPI, 2019a. URL <https://www.ifpi.org/downloads/Music-Consumer-Insight-Report-2018.pdf>.
- IFPI. Global music report 2018. Technical report, IFPI, 2019b. URL <https://www.ifpi.org/downloads/GMR2018.pdf>.
- IFPI. Music listening 2019. Technical report, IFPI, 2020a. URL https://www.ifpi.org/wp-content/uploads/2020/12/IFPI_music_in_Europe.pdf.
- IFPI. Global music report 2019. Technical report, IFPI, 2020b. URL https://www.ifpi.org/wp-content/uploads/2020/07/Global_Music_Report-the_Industry_in_2019-en.pdf.
- Illing, Gerhard, Peitz, Martin, Belleflamme, Paul, et al. *Industrial organization and the digital economy*. Mit Press, 2006.
- Isard, Walter. Location theory and trade theory: short-run analysis. *The Quarterly Journal of Economics*, pages 305–320, 1954.
- Karakayali, Nedim, Kostem, Burc, and Galip, Idil. Recommendation systems as technologies of the self: Algorithmic control and the formation of music taste. *Theory, Culture & Society*, 35(2):3–24, 2018.
- Ketonen, Tiia. Independent artists in the music industry: What drives them and how they market themselves. 2018.
- Kimura, Fukunari and Lee, Hyun-Hoon. The gravity equation in international trade in services. *Review of world economics*, 142(1):92–121, 2006.
- Koiso-Kanttila, Nina. Digital content marketing: a literature synthesis. *Journal of Marketing Management*, 20(1-2):45–65, 2004.
- Kretschmer, Tobias and Peukert, Christian. Video killed the radio star? online music videos and recorded music sales. *Information Systems Research*, 31(3):653–1036, September 2020.

- Krugman, Paul. Increasing returns and economic geography. *Journal of political economy*, 99(3):483–499, 1991.
- Lalonde, Pierre-É. Study concerning fair compensation for music creators in the digital age. *CIAM, International Council of Creators of Music. Nashville, USA*, 22(10):2014–23, 2014.
- Lambrecht, Anja and Skiera, Bernd. Paying too much and being happy about it: Existence, causes, and consequences of tariff-choice biases. *Journal of marketing Research*, 43(2):212–223, 2006.
- Latzer, Michael, Hollnbuchner, Katharina, Just, Natascha, and Saurwein, Florian. The economics of algorithmic selection on the internet. In *Handbook on the Economics of the Internet*. Edward Elgar Publishing, 2016.
- Levine, N. Radiohead’s thom yorke still isn’t a fan of spotify., 2017.
- Liebowitz, S. Economic analysis of the safe harbor provisions. Research report, CISAC, 2018a.
- Liebowitz, Stan J. File sharing: creative destruction or just plain destruction? *The Journal of Law and Economics*, 49(1):1–28, 2006.
- Liebowitz, Stan J. Economic analysis of safe harbor provisions. *CISAC, February*, 27, 2018b.
- Magennis, Niall. Streaming video and music explained - what is it and how does it work? *BT*, 2018. URL <http://home.bt.com/tech-gadgets/internet/streaming-explained-what-is-it-and-how-does-it-work-11363860639261>.
- Manatt, Phelps & Phillips, LLP. U.s. music streaming royalties explained a/k/a how do artists get \$\$\$ from spotify and itunes. Technical report, Manatt, Phelps & Phillips, LLP, 2016. URL <https://www.manatt.com/Manatt/media/Media/PDF/US-Streaming-Royalties-Explained.pdf>.
- Marvasti, Akbar. International trade in cultural goods: A cross-sectional analysis. *Journal of Cultural Economics*, 18(2):135–148, 1994.
- Marvasti, Akbar and Canterbery, E Ray. Cultural and other barriers to motion pictures trade. *Economic Inquiry*, 43(1):39–54, 2005.

- Mas-Colell, Andreu. Should cultural goods be treated differently? *Journal of Cultural Economics*, 23(1-2):87–93, 1999.
- Masood, Maria. New evidence on income and the geographical distribution of imports: The case of audiovisuals. *Journal of Comparative Economics*, 2019.
- Mayer, Thierry and Zignago, Soledad. Notes on cepii’s distances measures: The geodist database. Working Papers 2011-25, CEPII, 2011. URL <http://www.cepii.fr/CEPII/en/publications/wp/abstract.asp?NoDoc=3877>.
- McAuliffe, Caitlin. Digitalisation and the music industry. *Medium*, May 2016. URL <https://medium.com/@caityy162/digitalisation-and-the-music-industry-24ee374b213e>.
- McIntyre, H. Why did taylor swift really rejoin spotify?, 2017. URL <https://www.forbes.com/sites/hughmcintyre/2017/06/27/why-did-taylor-swift-really-rejoin-spotify/>.
- Melitz, Jacques. Language and foreign trade. *European Economic Review*, 52 (4):667–699, 2008.
- Miettinen, Topi and Stenbacka, Rune. Personalized pricing versus history-based pricing: implications for privacy policy. *Information Economics and Policy*, 33:56–68, 2015.
- Miroudot, Sébastien, Lanz, Rainer, and Ragoussis, Alexandros. Trade in intermediate goods and services. *OECD*, 2009.
- Mortimer, Julie Holland, Nosko, Chris, and Sorensen, Alan. Supply responses to digital distribution: Recorded music and live performances. *Information Economics and Policy*, 24(1):3–14, 2012.
- Mussa, Michael and Rosen, Sherwin. Monopoly and product quality. *Journal of Economic theory*, 18(2):301–317, 1978.
- Nguyen, Godefroy Dang, Dejean, Sylvain, and Moreau, François. On the complementarity between online and offline music consumption: the case of free streaming. *Journal of Cultural Economics*, 38(4):315–330, 2014.

- Nicolaou, A. How streaming saved the music industry. *Financial Times*, pages 1–5, January 2017.
- Nunes, Mariana de Almeida Gaspar Freixo. *On-demand music streaming and its effects on music piracy*. PhD thesis, 2018.
- Olivier, Jacques, Thoenig, Mathias, and Verdier, Thierry. Globalization and the dynamics of cultural identity. *Journal of international Economics*, 76(2): 356–370, 2008.
- RIAA. 2019 year-end music industry revenue report. Technical report, RIAA, 2020. URL <https://www.riaa.com/reports/riaa-releases-2019-year-end-music-industry-revenue-report/>.
- Richardson, Martin and Stähler, Frank. On the “uniform pricing puzzle” in recorded music. *Information Economics and Policy*, 34:58–66, 2016.
- Salant, Stephen W. When is inducing self-selection suboptimal for a monopolist? *The Quarterly Journal of Economics*, 104(2):391–397, 1989.
- Schulze, Günther G. International trade in art. *Journal of Cultural Economics*, 23(1-2):109–136, 1999.
- Scott, Allen J. The us recorded music industry: on the relations between organization, location, and creativity in the cultural economy. *Environment and Planning A*, 31(11):1965–1984, 1999.
- Shapiro, Carl, Varian, Hal R, and Becker, WE. Information rules: a strategic guide to the network economy. *Journal of Economic Education*, 30:189–190, 1999.
- Shiller, Ben and Waldfogel, Joel. Music for a song: an empirical look at uniform pricing and its alternatives. *The Journal of Industrial Economics*, 59(4):630–660, 2011.
- Shorrocks, Anthony F. Decomposition procedures for distributional analysis: a unified framework based on the shapley value. *Journal of Economic Inequality*, 11(1):99, 2013.

- Silva, JMC Santos and Tenreiro, Silvana. The log of gravity. *The Review of Economics and statistics*, 88(4):641–658, 2006.
- Sinclair, Gary and Green, Todd. Download or stream? steal or buy? developing a typology of today’s music consumer. *Journal of Consumer Behaviour*, 15(1):3–14, 2016.
- Smith, S. Spotify killed the cd star: How has streaming impacted the music industry?, August 2019. URL <https://www.thebigq.org/2019/08/19/spotify-killed-the-cd-star-how-has-streaming-impacted-the-music-industry/>.
- SNEP. Economie de la production musicale 2015. Technical report, Syndicat National de l’Edition Phonographique, 2015.
- SNEP. Musique enregistrée: Les performances du 1^{er} semestre 2020. Technical report, SNEP, 2020. URL <https://snepmusique.com/wp-content/uploads/2020/09/DP-1er-semestre-2020-HD.pdf>.
- Sun, Hyojung. Paradox of celestial jukebox: Resurgence of market control. *Creative Industries Journal*, 12(1):105–124, 2019.
- Sundararajan, Arun. Nonlinear pricing of information goods. *Management Science*, 50(12):1660–1673, 2004.
- Takara, Yuki. Do cultural differences affect the trade of cultural goods? a study in trade of music. *Journal of Cultural Economics*, 42(3):393–417, 2018.
- Thomas, L. Understanding streaming and copyright: A comparison of the united states and european regimes. *Journal of Business and Technology Law*, pages 185–216, 2018.
- Thomes, Tim Paul. An economic analysis of online streaming music services. *Information Economics and Policy*, 25(2):81–91, 2013.
- Train, Kenneth E, Ben-Akiva, Moshe, and Atherton, Terry. Consumption patterns and self-selecting tariffs. *The Review of Economics and Statistics*, pages 62–73, 1989.
- Train, Kenneth E et al. Optimal regulation: the economic theory of natural monopoly. *MIT Press Books*, 1, 1991.

- van Kuijeren, Hennie. The preference for music as a service opposed to download to own. mathesis, Vrije Universiteit Amsterdam, September 2012. URL <https://www.inholland.nl/media/10674/masterthesis-hennie-van-kuijeren-the-preference-for-music-as-a-service-a.pdf>.
- Varian, Hal R. Price discrimination. *Handbook of industrial organization*, 1: 597–654, 1989.
- Wagner, Don, Head, Keith, and Ries, John. Immigration and the trade of provinces. *Scottish Journal of Political Economy*, 49(5):507–525, 2002.
- Waldfoegel, Joel. Copyright protection, technological change, and the quality of new products: Evidence from recorded music since napster. *The journal of law and economics*, 55(4):715–740, 2012.
- Waldfoegel, Joel, Aguiar, Luis, and Gomez-Herrera, Estrella. Does digitization threaten local culture? music in the transirion from itunes to spotify. 2019.
- Walsh, Keith. Trade in services: Does gravity hold. *J. World Trade*, 42:315, 2008.
- Way, Samuel F, Garcia-Gathright, Jean, and Cramer, Henriette. Local trends in global music streaming. In *Proceedings of the International AAAI Conference on Web and Social Media*, volume 14, pages 705–714, 2020.
- Weijters, Bert and Goedertier, Frank. Understanding today’s music acquisition mix: a latent class analysis of consumers’ combined use of music platforms. *Marketing Letters*, 27(3):603–610, 2016.
- Weijters, Bert, Goedertier, Frank, and Verstreken, Sofie. Online music consumption in today’s technological context: Putting the influence of ethics in perspective. *Journal of Business Ethics*, 124(4):537–550, 2014.
- White, Roger and Tadesse, Bedassa. Cultural distance and the us immigrant–trade link. *World Economy*, 31(8):1078–1096, 2008.
- Wlömert, Nils and Papies, Dominik. On-demand streaming services and music industry revenues—insights from spotify’s market entry. *International Journal of Research in Marketing*, 33(2):314–327, 2016.

Wooldridge, Jeffrey M. *Econometric analysis of cross section and panel data*.
MIT press, 2010.