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Are Streaming and Other Music Consumption Modes Substitutes or Complements?

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On the Complementarity between Online and Offline Music Consumption: The Case of Free Streaming¹

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Abstract. From a representative survey of 2,000 individuals, we study whether consumption of music through streaming services, like Spotify or YouTube, is a substitute or a complement to physical music consumption modes, such as CDs and live music. Controlling for the taste for music, various socio-demographic characteristics and the usual determinants of music consumption either offline (radio, TV, friends/relatives) or online (online recommendations, social networks), our results show that free music streaming (where the consumer does not possess the music but only has access to it) has no significant effect on CD sales and affects positively live music attendance, but only for national or international artists who are more likely to be available on streaming services.

Key words: Music consumption; Streaming; Substitutability

JEL Codes: L2; L86; Z1

1. Introduction

According to the International Federation of the Phonographic Industry (IFPI), the worldwide recorded music market has halved since 2000. Despite the strong growth they experienced over the period, digital sales have not offset the dramatic fall in physical sales. Yet for several years now, streaming has been seen as a promising business model. Actually, the term streaming covers two different business models. Either users listen to music free of charge but endure commercial breaks between the songs, or they can pay a flat-rate subscription to gain unlimited access to the content of the streaming service without commercial breaks and with higher technical quality. Usually there is also a more expensive premium access that allows users to listen to the music on a mobile device (smartphone, tablet computer). “The innovative and revolutionary character of such business models is visible in accounts allowing for features for

¹ We thank the participants at the 2012 ACEI Conference and the 10th ZEW Conference on the Economics of Information and Communication Technologies for their comments and suggestions.

mobile devices and offline listening which lead to redundancy of the physical storage of digitized music files” (Thomes, 2011).

After initial reluctance, major labels now seem to consider streaming as a real alternative to the traditional pay-download model (like the emblematic iTunes Music Store). In 2006, the four majors, Universal Music, SonyBMG, Warner and EMI (now owned by Universal), reached an agreement with YouTube to be paid for the broadcasting of video clips of music to which they hold the rights. The majors have also signed licensing agreements with Spotify and Deezer, the two main streaming services available in Europe. Early in 2012, Spotify, a Swedish-based company, announced a total active user base of 10 million with about 3 million paying subscribers. According to ABI Research, music-streaming services should experience a rapid expansion in the coming half-decade, thanks to mobile phones. By 2016, subscribers accessing paid music services from mobile phones might exceed 150 million. One last figure illustrates the potential of the streaming business model for the recorded music industry. In France, where Deezer is based, streaming revenues already accounted for 35% of digital sales in 2011 (source: SNEP). In Sweden, boosted by Spotify, streaming by subscription accounted for more than 80% of digital sales in the same period.

While streaming services, and especially You Tube, are becoming an ever-more important means of discovering and listening to music, this could be at the expense of file-sharing. For instance, a 2009 UK survey of 1,000 fans shows that many teenagers are now streaming music regularly online using services such as YouTube and Spotify while, at the same time, 26% of them are illegally downloading music, compared with 42% a year earlier.² Likewise, in January 2012, the shut-down of the illegal streaming services provider Megaupload seems to have boosted illegal file-sharing through p2p networks.³ However, streaming, which only offers temporary access to a song, is more differentiated from music purchase than file-sharing is. Streaming is more than a mere online radio. It extends the capabilities of usual mass media: instead of having music ”imposed” on them, users can also select the music they listen to, manage playlists and share content. The impact of streaming on legal purchases is thus uncertain. On the one hand, it could, like file-sharing seems to, negatively impact music sales. On the other hand, it could act more as a discovery tool than a consumption tool and thus, through a sampling effect, affect music sales positively. This paper aims to assess the relevance

² <http://www.guardian.co.uk/music/2009/jul/12/music-industry-illegal-downloading-streaming>.

³ See the data provided by <http://www.internetobservatory.net>.

of these two hypotheses. Furthermore, as a tool of discovery as well as consumption, streaming should have a positive impact on live music consumption. This paper also aims to verify this positive externality.

To address these issues, we use a representative survey of more than 2,000 individuals who were polled in March 2011 about their habits in terms of music consumption, in particular their purchase of recorded music in conventional stores, their use of streaming services and their consumption of live music. Controlling for the taste for music, various socio-demographic characteristics and the usual determinants of music consumption either offline (radio, TV, friends/relatives) or online (online recommendations, social networks), as well as for the endogeneity issue, often considered in the literature as the main empirical pitfall, we show that consuming music via free streaming (where the consumer does not possess the music but only has access to it) has no significant effect on CD sales. However, the use of streaming services positively affects live music attendance, but only for national or international artists who are more likely to be available on streaming services. This paper thus also contributes to the debate on the impact of online free consumption on the revenue of the music industry.

The rest of the paper proceeds as follows. The existing literature is reviewed in section 2. We describe the empirical methodology and data in section 3. Section 4 exhibits the results of our regressions and section 5 discusses these results. Section 6 concludes.

2. Literature review

A huge literature is now devoted to the influence of digitization on the music market. Numerous papers have investigated the impact of file-sharing on recorded music sales. Academic papers devoted to music piracy usually aim to measure the comparative merits of sampling and substitution effects. According to the sampling effect, digital copies of songs allow consumers to discover them before purchase and thus reduce the risk of mismatch between songs and consumers' tastes. That is because music is an experience good, the utility of which can only be assessed after consumption (Nelson, 1970). In a theoretical framework,⁴ Peitz and Waelbroeck (2006) show that the sampling effect can enhance legitimate sales provided that the digital copy is differentiated enough with regard to the original and that consumers value products close to

⁴ For an empirical approach, see Tu and Lu (2006).

their ideal variety. According to the sampling effect, the impact of digital piracy on music sales should then be limited. Conversely, the substitution effect suggests that digital and legal copies are quasi-perfect substitutes, and thus that music piracy affects music sales with a rate of displacement close to 1:1.

Three approaches can be distinguished in the growing empirical literature devoted to music piracy. Some studies use aggregate data on music sales. To capture the impact of piracy they use a proxy for the development of file-sharing (e.g. Michel, 2006; Peitz and Waelbroeck, 2004; Liebowitz, 2008), or they rely on natural events such as a substantial change in copyright strength (Adermon and Liang, 2010) or the creation of Napster (Mortimer et al., 2012). Other studies use data on sales and file-sharing for individual recordings (Blackburn, 2004; Oberholzer and Strumpf, 2007; Hammond, 2012). Finally, some studies use consumer surveys to assess the links between individuals' purchasing and illegal-downloading activities (Michel, 2006; Bounie et al., 2007; Rob and Waldfogel, 2006; Zentner, 2006; Waldfogel, 2010; Andersen and Frenz, 2010). They usually conclude that piracy hurts legitimate sales, although they diverge on the rate of sales displacement.^{5,6} Each of these three approaches has its own limitations. Approximating file-sharing by the possession of a computer or access to broadband Internet is of course questionable. The reliability of data on file-sharing is also highly dubious. Finally, measuring so-called 'piracy' in consumer surveys could introduce a downward bias as respondents might be reluctant to report illegal activities. Moreover, specialized academic surveys of file-sharing, valuation of authorized copies and purchasing behaviour have been of relatively modest size and even some of the most reputable surveys in the matter are based on convenience samples. These studies may not allow for generalization to consumers at large (Handke, 2011). Last but not least, the results of the few papers suggesting that piracy has no negative impact on legitimate demand are suspected of endogeneity bias. Individuals who illegally download music often also purchase a lot of recorded music. This is not because piracy leads them to purchase more, but merely because they enjoy music. Likewise, the most pirated albums are also the most

⁵ Studies by Oberholzer-Gee and Strumpf (2007), Andersen and Frenz (2010) and Hammond (2012) are the only ones to conclude that piracy has no impact on music sales. However, their conclusions have been called into question by Liebowitz (2010), Barker and Maloney (2012) and Smith and Telang (2012) respectively.

⁶ Note that most of these studies relate to a period before the rise of the online market. Waldfogel (2010) is an exception. From a survey of university students, he shows that in the iTunes era - at the time of the survey digital sales accounted for about a third of US music sales - each additional song illegally obtained reduces paid consumption by between a third and a sixth of a song. This result is close to the results obtained by the previous studies. He also found that consumers value the songs they have illegally obtained less than the songs they have purchased. Waldfogel concludes that "much of the music people consume without paying would otherwise not have been purchased".

purchased, because more consumers like them. The endogeneity issue must therefore be approached very carefully.

Another stream of literature deals with the impact of music piracy on ancillary markets, especially the live music market. Gayer and Shy (2006), Curien and Moreau (2009), and Dewenter et al. (2012) show theoretically that, due to the existence of a positive externality from the recorded music market to the live music market,⁷ file-sharing, while possibly hurting record sales, should enhance the live music market by increasing artists' audiences. Mortimer et al. (2012) empirically show that file-sharing reduces album sales but increases live music revenue, at least for lesser-known artists (for "stars" the impact is negligible). Krueger (2005) goes the same way, arguing that the increase in concert ticket prices is a consequence of the decline in record sales. Based on a survey of artists, Bacache et al. (2012) show that for artists with record company contracts, the more they perform on stage, the more tolerant towards file-sharing they are. There is also reason to believe that suppliers of mp3-players and Internet service providers benefit from file-sharing (Handke, 2011). From a student survey at the University of Minnesota, Leung (2009) finds that unauthorized copying is responsible for 22% of iPod sales. Adermon and Liang (2010) show that the extension of copyright protection in Sweden reduced Internet traffic by 18% and therefore suggest that the ISP market is boosted by file-sharing.

Conversely, very few papers have addressed the question of streaming. One exception is Thomes (2011), who mainly studies the link between piracy and streaming services. He shows in a theoretical framework that free online streaming services can be highly profitable if advertising imposes a weak nuisance on music consumers. He also shows that an increase in copyright enforcement shifts rents from music consumers to the monopolistic provider, and that maximal punishment for piracy will be welfare-maximizing.

Our paper adds to the existing literature in several ways. Firstly, to the best of our knowledge, it is one of the first to deal with the streaming business model in an empirical framework. Instead of addressing the link between streaming and piracy, we assess whether streaming as free online consumption and as a substitute for piracy has an effect on the recorded music market and on ancillary markets. Secondly, unlike most previous studies based on consumer surveys, we use a representative sample of French internet users rather than a convenience sample. Thirdly,

⁷ Montoro-Pons and Cuadrado-Garcia (2011) empirically confirm the existence of a positive externality from recorded music consumption to concert attendance.

studying the impact of streaming on the music industry, rather than the impact of piracy, presents a great advantage when the study is based on a survey. There is no reason to believe that respondents might give strategic answers or be reluctant to report their actual behaviour. The streaming activity we study in this survey (using YouTube, Spotify, Deezer, etc.) is perfectly legal.

3. Empirical strategy and data

We use a survey carried out among 2,007 French Internet users. 1,008 of them are representative of the French population and 999 are representative of the population of Brittany, a French region with 3 million inhabitants (5% of the whole French population). We will use the whole sample in the following empirical estimations. A dummy variable (*BRITTANY*) taking the value of one if the respondent belongs to the Brittany sample will be implemented in the model. This binary variable is intended to capture behaviour and characteristics unique to Brittany. To ensure that our results are not biased, we systematically compare with the sub-sample of 1,008 individuals representative of the French population.

3.1 Dependent variables

To estimate music consumption and the impact of online streaming, we questioned Internet users about their music consumption patterns. We thus know how many CDs each respondent has purchased in the past twelve months (*CD* variable) and how many live concerts they attended over the same time span. We distinguish between three categories of concerts, representing three different preferences for music. The first is classical music (*CLASSICAL*), which is very socially-oriented consumption and a category of music that requires considerable “cultural capital”. Concerts by international or national stars (*INTER*) can be considered as the opposite, they need less musical knowledge and they are subject to more significant mass media promotion. We also evaluate the demand for concerts of local music (*LOCAL*), referring to less popular artists or bands, whatever the type of music, who are mainly promoted by word-of-mouth and local networks (local newspapers, flyers, etc.), and have a spatially-limited audience. Table 1 provides descriptive statistics about these dependent variables. Note that these variables take the value 0 to 5, representing the quantity of items purchased (5 signifies five or more items purchased).

3.2 Independent variables

Our main independent variable is a dummy (*STREAMING*) that takes the value 1 for respondents declaring that they usually listen to music online through streaming services (YouTube, Spotify, Deezer, etc.). Our regressions also include variables representing the way music is usually promoted by music labels and accounting for consumer-to-consumer promotion (word-of-mouth). Advice from relatives and friends, radio and TV, are the three main sources of influence on music consumers purchasing recorded music (Peitz and Waelbroeck, 2005). In addition to the frequency with which the respondents listen to music on the radio (*MUSIC_RADIO*), watch musical TV programs (*MUSIC_TV*), or follow offline advice from friends and relatives (*RECOM_FRIENDS*), we also consider online recommendations that consumers receive through social networks, blogs, etc. (*RECOM_INTERNET*). Starting notably with Chevalier and Mayzlin (2006), a growing literature shows that online recommendations have a positive impact on the purchase of cultural goods.

We also include a variable reflecting the consumers' attachment to music (*MUSIC_TASTE*). We distinguish three levels of attachment to music (strong, moderate and weak) and expect positive correlation with all the modes of music consumption. Finally, Sex (*MALE*), age (*AGE*), education (*EDUCATION*), income (*STAND_LIVING*) and the local population size (*SIZEAREA*) are usual socio-economic and demographic characteristics. The expected effects of gender, age and level of education differ according to the type of consumption. It seems that buying music online can be explained by the technological skills of Internet users, which are largely specific to young and well-educated people. Opera and classical music as opposed to other types of concerts are also strongly determined by the level of education and the age of the audience. As music is a normal good, demand should increase with user earnings. All explanatory variables are described in Table 2.

3.3 The endogeneity issue

The main pitfall of our empirical analysis is the potential endogeneity issue in our estimations. The taste for music is the main reason why the error term can be correlated with variables of the model. Internet users who pay for music (recorded or live music) do so for the same reason that they listen to music on streaming services or radio and TV: they enjoy music. To address this issue, we implement an instrumental variable. We constructed a variable called *NEWSONLINE*

which refers to reading news and articles from different sources⁸ over the Internet. *NEWSONLINE* varies from 0 for internet users who never read any source online to 24 for those who read all the six sources every day. We argue that this instrumental variable satisfies both exclusion and inclusion restrictions. First, there is no reason to believe that reading news online could have an impact on buying recorded music or attending live concerts. Second, there is indeed a relationship between reading news online and using streaming to listen to music. A simple probit model with *STREAMING* as the dependent variable and *NEWSONLINE* as the independent variable shows the correlation between these two variables is significant at the 1% level.

Since our dependant variable is right-censored and our potentially endogenous regressor (*STREAMING*) is dichotomous, we have to estimate a recursive and mixed-process model (Roodman, 2009). This allows the construction of a recursive system of equations in which the first stage estimates the reduced form of the model and the second stage the parameters of the structural model. The structural model is our main model and the reduced form is the variable suspected of endogeneity (*STREAMING*) regressed on the instrument (*NEWSONLINE*) and on the other explanatory variables. Converging to the maximum likelihood in this system of equations can be complicated and computationally demanding. Roodman (2009) proposes a general tool implemented on Stata software and using the GHK algorithm⁹ to estimate a limited-information maximum likelihood.

4. Results

Since our dependent variable is right-censored, a tobit regression is best designed to estimate the model. Furthermore, we have to consider potential correlation between the error terms of the four models (one for each of the dependent variables). To address the existence of unobserved variables common to the four models, we perform a multivariate tobit regression. A likelihood ratio test rejects the independence of the error terms of the four regressions and thus justifies the use of a multivariate tobit regression. The need to estimate a multivariate regression is also confirmed by the estimated correlation of error terms in Table 3. Table 4 presents the results

⁸ The six sources used are national newspapers, local newspapers, Google news or Yahoo news, websites of TV channels, blogs, and pure players of news on the Internet. For each source, 5 answers are considered: every day, at least once a week, at least once a month, rarely, never.

⁹ The GHK algorithm is a simulated likelihood method.

using the instrumental variable specified above. We note that the instrument is strongly positively correlated with the endogenous regressor in the first stage of our regression.

Our regressions show that *STREAMING* has no impact on CD sales. Furthermore, streaming does have a positive impact on live music attendance, as expected, but only on concerts by national or international stars. Hence, unlike file-sharing, streaming turns out to have no impact on physical recorded music sales but like file-sharing, streaming is complementary with attending concerts by national or international stars.

Interestingly, this recursive model enables us to bring to light the indirect effect of explanatory variables on the attendance of concerts by international and national stars. For instance, the taste for music and the recommendation of friends exhibit both direct and indirect effects on concert attendance. Being young, an intensive Internet user and using the web to get information and advice on music all favour the practice of streaming and indirectly play a role in concert attendance. Conversely, being male and earning a large income only affect the *INTER* variable.

As expected (see Peitz and Waelbroeck, 2005), offline recommendation by TV and radio has a positive impact on buying recorded music. However, watching musical TV shows has a negative impact on the attendance of local and classical concerts. This confirms the inability of mass media to improve the visibility of “non-star” artists. Social recommendation, whether offline or online, increases the probability of consuming music. Finally, as expected, variables associated with the taste for music are positive and significant, whatever the model.

Results concerning socio-economic variables are as expected. Individuals between 40 and 59 years-old buy more CDs. Age is also a strong determinant of attendance of classical concerts. Income and education are positively correlated with music consumption. Internet users in large cities have a higher probability of going to concerts of classical music or by local artists, which can be explained by the availability of these concerts in bigger cities. More surprising is the negative relationship between the local population size and the consumption of CDs in conventional offline retailers. One explanation might be that since access to live music is more difficult in less densely populated areas, the best way to obtain access to music content is to buy physical goods. We also note that the variable controlling for regional specificity also seems to

capture a singularity for respondents from Brittany.¹⁰

5. Discussion

Our results support two major findings concerning the impact of streaming on music consumption. First, streaming has no effect on offline music sales. Second, streaming has a positive effect on attendance of concerts by national and international stars but not on concerts of classical music or by local artists. We now discuss these results.

As highlighted above, if listening to music on streaming platforms is a strong substitute for recorded music, then we can expect a decrease in music sales when consumers use these platforms. Our results show that, unlike file-sharing, streaming does not seem to hurt music sales. Free streaming therefore appears to be a weak substitute for recorded music and, in a sense, might rather play the same role as radio and TV as a discovery tool. Our results also show that streaming has a positive impact on the demand for concerts by national and international artists, but has no effect on concerts of classical music or by local artists. This limited effect is probably explained by the low visibility of classical music and local artists on the streaming platforms. Access does not mean visibility, and for niche content or unknown artists, attracting the attention of internet users is still difficult on platforms which offer millions of videos and songs (Bastard et al., 2012). This result echoes the findings of Mortimer et al. (2012), who show that file-sharing has a positive impact on concerts by unknown artists but not on more famous ones. The opposite result for streaming highlights the most striking difference between these two platforms. While file-sharing is a consumer-oriented platform, recording companies have a greater influence on the choice of artists showcased on streaming services (on YouTube, for instance, most famous artists have an official webpage that is managed and promoted by their music label). The music industry is thus better able to foster its business model based on the promotion of the most “bankable” artists.

One limitation of our study is that we only test the impact of free streaming on music

¹⁰ To ensure that the composition of our sample (1,008 internet users representative of France and 999 representative of Brittany) has no impact on the results of the empirical analysis, we re-estimate the models in Table 3 while only considering the 1,008 internet users representative of the French population. No qualitative change occurs in this case. Data are available from the authors upon request.

consumption and neglect paid streaming services (through subscription). However, in early 2011 less than 4% of French internet users subscribed to a paid streaming service,¹¹ whereas 45% declared that they use streaming services to listen to music (Bigot and Croutte, 2011, p. 217). Another limitation is that we do not test the relationship between streaming and pay-per-download, which is a growing source of revenue for the music industry, thanks to iTunes Music Store among others. However, when the survey was conducted, physical sales (CDs) still accounted for nearly 80% of the French recorded music market.¹² Furthermore, our database actually contains a variable that indicates whether internet users have ever paid for downloading online music, but this variable can hardly be implemented in a robust empirical analysis. Firstly because this variable is a dummy and therefore does not take into account the intensity of pay-per-downloads. Secondly, and more importantly, because we are unable properly to take into account the endogeneity issue. In our survey, we fail to find a valid instrument that impacts *STREAMING* but not online music sales. The instrument we used previously, reading news online, is unsatisfactory as far as online rather than offline sales are concerned. However, a simple probit regression (see Table 5) suggests that a complementary effect between *STREAMING* and online sales might exist and justifies future research on this topic.

6. Conclusion

This paper is the first attempt to estimate the role of online streaming on different modes of music consumption. Using a survey of 2,000 internet users representative of the French population, our results show that streaming has no effect on physical sales of recorded music but does have a positive effect on live music from national or international artists. Our empirical analysis is also robust to different specifications and supports our identification strategy based on the introduction of an instrument to control for potential endogeneity bias. This strengthens the idea that streaming platforms can help to provide new business models for artists and the music industry, in line with recent literature on the impact of digital piracy on ancillary markets (Mortimer et al., 2012; Bacache et al., 2012) and on the rise of a new contractual organization in the recorded music industry (Curien and Moreau, 2009; Dewenter et al., 2012).

The fact that streaming has no negative effect on recorded music but a positive effect on

¹¹ Results of a representative survey of the whole French population on the online consumption of cultural goods (Hadopi, 2011).

attendance of concerts by national or international artists represents an important difference from file-sharing. It suggests that streaming is an online medium that promotes music (like TV or radio broadcasting) and that reinforces rather than harms the music industry. Streaming services may be the missing link between the music industry and the digital revolution.

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¹² <http://www.snepmusique.com/fr/cpg1-396677-385752-Le-marche-de-la-musique-enregistree---les-resultats-du-1er-trimestre-de-l-annee-2011.html>

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Table 1: Descriptive statistics on dependent variables

Intensity of musical consumption in the past 12 months	<i>CD</i>	<i>CLASSICAL</i>	<i>LOCAL</i>	<i>INTER</i>
Mean	2.26	0.37	0.80	0.53
Std Error	2.06	1.03	1.51	1.12
Min	0	0	0	0
Max	5	5	5	5

Table 2: Description of the independent variables

VARIABLES	Details of building
MALE	1 being a male, 0 otherwise
AGE24	1 if age [18-24], 0 otherwise
AGE39	1 if age [25-39], 0 otherwise
AGE59	1 if age [40-59], 0 otherwise
AGE+	1 if more than 60 years old, 0 otherwise
EDUCATION1	1 if professional diploma, 0 otherwise
EDUCATION2	1 if high school level, 0 otherwise
EDUCATION3	1 if mid-undergraduate, 0 otherwise
EDUCATION4	1 if undergraduate, 0 otherwise
EDUCATION5	1 if graduate or more, 0 otherwise
STAND_LIVING1	1 if daily life is difficult, 0 otherwise
STAND_LIVING2	1 if has an acceptable standard of living, 0 otherwise
STAND_LIVING3	1 if has a comfortable standard of living, 0 otherwise
SIZEAREA	Local population size with 1 rural area and 5 biggest cities
MUSIC_TASTE1	1 if great music lover, 0 otherwise
MUSIC_TASTE2	1 if enjoy music moderately, 0 otherwise
MUSIC_TASTE3	1 if not very interested in music, 0 otherwise
INTERNET	Intensity of Internet usage, 1 (every day) to 4 (few times a month)
MUSIC_RADIO	1 if listen to music on the radio every day, 0 otherwise
MUSIC_TV	1 if watch musical programs on TV, 0 otherwise
RECOM_FRIENDS	1 if listen to music recommended by friends, 0 otherwise
RECOM_INTERNET	1 if listen to music because of hearing about it on the Internet (social network, blog, forum), 0 otherwise
STREAMING	1 if listen to music through streaming on the Internet (YouTube, Deezer, webradio)
BRITTANY	1 if live in Brittany, 0 otherwise

Table 3: Estimated correlation

	Atanrho	Std. err
streaming, inter	-0.235*	(0.116)
streaming, classical	-0.109	(0.119)
streaming, CD	-0.119	(0.145)
streaming, local	-0.310*	(0.149)
inter, classical	0.197**	(0.0259)
inter, CD	0.130**	(0.0277)
inter, local	0.300**	(0.0284)
CD, local	0.060**	(0.0244)
CD, classical	0.316**	(0.0286)
local, classical	0.100**	(0.0317)

** p<0.01, * p<0.05

Table 4: Recursive multivariate tobit model to account for an endogenous dummy variable

	STREAMING	INTER	CLASSICAL	LOCAL	CD
STREAMING		0.566** (0.214)	0.0883 (0.200)	0.664 (0.346)	0.327 (0.466)
MALE	0.0425 (0.0656)	0.109* (0.0508)	0.0394 (0.0457)	0.278** (0.0658)	0.124 (0.0899)
AGE24	1.525** (0.139)	-0.0606 (0.133)	-0.543** (0.122)	-0.204 (0.193)	-0.305 (0.262)
AGE39	0.767** (0.104)	0.0728 (0.0969)	-0.492** (0.0882)	-0.108 (0.135)	0.103 (0.184)
AGE59	0.376** (0.0980)	0.0313 (0.0800)	-0.241** (0.0722)	0.0504 (0.106)	0.501** (0.144)
AGE+	Ref.	Ref.	Ref.	Ref.	Ref.
EDUCATION1	0.0166 (0.121)	-0.00604 (0.0932)	-0.319** (0.0838)	-0.358** (0.120)	-0.251 (0.164)
EDUCATION2	-0.137 (0.123)	0.00924 (0.0954)	-0.193* (0.0858)	-0.113 (0.124)	-0.322 (0.169)
EDUCATION3	-0.228 (0.125)	-0.0931 (0.0981)	-0.255** (0.0883)	-0.265* (0.128)	-0.240 (0.174)
EDUCATION4	-0.0689 (0.126)	0.0448 (0.0982)	0.00396 (0.0884)	0.137 (0.127)	0.176 (0.173)
EDUCATION5	Ref.	Ref.	Ref.	Ref.	Ref.
STAND_LIVING1	0.0724 (0.0895)	-0.122 (0.0696)	-0.0609 (0.0626)	-0.0728 (0.0899)	-0.455** (0.123)
STAND_LIVING2	-0.0259 (0.0734)	-0.160** (0.0565)	-0.0306 (0.0508)	-0.0424 (0.0729)	-0.251* (0.0995)
STAND_LIVING3	Ref.	Ref.	Ref.	Ref.	Ref.
SIZEAREA	0.0105 (0.0254)	0.000215 (0.0196)	0.0449* (0.0176)	0.0708** (0.0253)	-0.0679* (0.0345)
MUSIC_TASTE1	0.557** (0.105)	0.266** (0.0902)	0.452** (0.0817)	0.753** (0.122)	1.348** (0.167)
MUSIC_TASTE2	0.308** (0.0923)	0.0288 (0.0755)	0.133 (0.0681)	0.220* (0.100)	0.796** (0.136)
MUSIC_TASTE3	Ref.	Ref.	Ref.	Ref.	Ref.
INTERNET	0.216** (0.0479)	0.0268 (0.0388)	0.0810* (0.0352)	-0.00362 (0.0531)	0.124 (0.0722)
MUSIC_RADIO	0.0949 (0.0658)	0.0316 (0.0513)	-0.00669 (0.0461)	-0.0676 (0.0664)	0.229* (0.0907)
MUSIC_TV	0.127 (0.0694)	0.0291 (0.0538)	-0.152** (0.0484)	-0.211** (0.0697)	0.243* (0.0952)
RECOM_FRIENDS	0.335** (0.0680)	0.150* (0.0591)	0.0732 (0.0535)	0.420** (0.0796)	0.469** (0.108)
RECOM_INTERNET	0.563** (0.0750)	0.0551 (0.0736)	0.0228 (0.0672)	-0.00457 (0.105)	0.0557 (0.142)
NEWSONLINE	0.0520** (0.00770)				
BRITTANY	0.155* (0.0671)	-0.0158 (0.0528)	-0.117* (0.0475)	0.200** (0.0688)	0.0754 (0.0939)
Constant	-2.634** (0.254)	-0.0745 (0.188)	0.354* (0.169)	-0.0692 (0.248)	0.544 (0.338)
Observations	2,007	2,007	2,007	2,007	2,007

Robust standard errors in parentheses

** p<0.01, * p<0.05

Table 5: Probit with having already used pay-per-download as dependant variable

VARIABLES	ONLINE_SALES
MALE	0.108 (0.0723)
AGE24	-0.214 (0.150)
AGE39	-0.0390 (0.122)
AGE59	0.100 (0.115)
AGE+	Ref.
EDUCATION1	-0.596** (0.127)
EDUCATION2	-0.200 (0.126)
EDUCATION3	-0.234 (0.127)
EDUCATION4	-0.0192 (0.124)
EDUCATION5	Ref.
STAND_LIVING1	-0.122 (0.103)
STAND_LIVING2	-0.0852 (0.0800)
STAND_LIVING3	Ref.
SIZEAREA	-0.0254 (0.0275)
MUSIC_TASTE1	0.577** (0.135)
MUSIC_TASTE2	0.366** (0.127)
MUSIC_TASTE3	Ref.
INTERNET	0.222** (0.0726)
MUSIC_RADIO	0.141 (0.0743)
MUSIC_TV	0.0420 (0.0771)
RECOM_FRIENDS	0.250** (0.0796)
RECOM_INTERNET	0.249** (0.0815)
STREAMING	0.255** (0.0845)
BRITTANY	-0.158* (0.0741)
Constant	-2.280** (0.329)
Observations	2,007
Pseudo R2	0.11

Robust standard errors in parentheses

** p<0.01, * p<0.05