Are streaming and other music consumption modes substitutes or complements?

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Abstract. From a representative survey of 2,000 French individuals, we study whether consumption of music through streaming services, such as Spotify or YouTube, is a substitute or a complement to other music consumption modes such as CD, Pay-downloads or live music. Controlling for the taste for music, various socio-demographic characteristics, as well as for the usual determinants of music consumption either offline (radio, TV, friends/relatives) or online (online recommendations, social networks), our results show that consuming music as streams (where the consumer does not possess the music but has just an access to it) has no significant effect on CDs purchase but is a complement to buying music online. The use of streaming services also affects positively live music attendance, but only for national or international artists who are more likely to be available on streaming services. These results suggest that a new music ecosystem is emerging in which the "possession" as well as the "access" modes of recorded music consumption might coexist.

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 been reduced by an half since 2000. Despite the strong growth they experienced over the period, digital sales do not succeed in compensating the dramatic drop in physical sales. Yet, for several years, streaming is seen as a promising business model. Actually, the term streaming recovers two different business models. Either users listen free-of-charge to music but endure commercial breaks between the songs. Or music consumers can subscribe to the service at a flat-rate in order to gain unlimited access to the content of the streaming service without commercial breaks and with a higher technical quality. Usually it exists also a more expensive premium access that allows users to also listen 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 mobile devices and offline listening what leads to redundancy of the physical storage of digitized music files." (Thomes, 2011).

After an 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). Since 2006, the four majors, Universal Music, SonyBMG, Warner and EMI, had reached an agreement with YouTube to be paid for the broadcast of video clips of music of which they hold the rights. The big four have also entered into licensing agreements with Spotify and Deezer, the two main streaming services available in Europe. Spotify, a Swedish based company, announces a total active user base of ten millions with about 3 millions of paying subscribers. According to ABI Research music-streaming services should, thanks to mobile phones, experience a rapid expansion in the coming half-decade. By 2016, subscribers who access from a mobile phone to paid music services might exceed 150 million. A last figure illustrates the potential of streaming business model for the recorded music industry. In France, Deezer's native country, streaming revenues already accounted in 2011 for 35% of digital sales (source: SNEP). In Sweden, boosted by Spotify, streaming by subscription even accounted at the same period for more than 80% of digital sales.

While streaming services, and especially You Tube, seem to become a more and more important mean 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 to 42% one year earlier.[1] Likewise, on January 2012, the shut-down of the illegal streaming services provider, Megaupload, seems to have boosted illegal file-sharing through p2p networks[2]. If streaming services are substitutes for piracy, have they also, as alleged for piracy, a negative impact on CD sales? Similarly, does streaming appear as complementary or substitutable for pay-downloads? Since streaming is likely to increase the audience of an artist, what is the impact on the consumption of live music? These are the questions we aim at answering in this paper by dealing with the issue of the substitutability, complementarity or independence between streaming and other music consumption modes.

We use a representative survey of more than 2,000 French individuals that were polled in late 2010 about their habits in terms of music consumption, in particular their purchase of albums in

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[1] http://www.guardian.co.uk/music/2009/jul/12/music-industry-illegal-downloading-streaming.
[2] See the data provided by http://www.internetobservatory.net.

conventional stores and/or online, about the use of streaming services, and about their consumption of live music. Controlling for the taste for music, various socio-demographic characteristics, as well as for the usual determinants of music consumption either offline (radio, TV, friends/relatives) or online (online recommendations, social networks), we show that consuming music as streams (where the consumer does not possess the music but has just an access to it) has no significant effect on CDs purchase but is complementary with buying music online. The use of streaming services also affects positively live music attendance, but only for national or international artists who are more likely to be available on streaming services. This results suggest that a new music ecosystem is emerging in which the "possession" as well as the "access" mode of recorded music consumption might coexist.

The rest of the paper proceeds as follow. 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 while section 5 is dedicated to the discussion. Section 6 concludes.

2. Literature review

An increasing literature is now devoted to the influence of digitization on the music market. First, of course, numerous papers have investigated the impact of file sharing on recorded music sales. Academic papers devoted to music piracy usually aim at measuring the compared merits of sampling and substitution effects. According to the sampling effect, a digital copy of a song allows a consumer to discover it before purchase and thus reduces the risk of mismatch between her taste and the song. Music is indeed an experience good which utility can only be assessed after the consumption (Nelson, 1970). In a theoretical framework, Peitz and Waelbroeck (2006) show that the sampling effect can enhance legitimate sales provided that the digital copy is differentiated enough as regards to the original and that a consumer values a product close to her 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.

Among the growing empirical literature devoted to music piracy, three approaches can be distinguished. Some studies rely on 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., 2010). Other studies rely on data for individual recordings on sales and on file sharing (Blackburn, 2004; Oberholzer and Strumpf, 2007). Finally, some studies rely on consumers survey to assess the links between individuals' purchase and illegal downloading activity (Michel, 2006; Bounie et al., 2007; Rob and Waldfogel, 2006; Zentner, 2006; Waldfogel, 2010 ; Andersen and Frenz, 2010 ; Bastard et al., 2012a). They usually conclude that piracy hurts legitimate sales; although they diverge on the rate of sales displacement.[3,4] Each of these three approaches presents its own limitations. Approximating file sharing by the possession of a computer or an access to broadband Internet is of course questionable. The reliability of data on file sharing is also highly questionable. 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 behavior have to date been of relatively modest size and even some of the most reputable surveys on the matter are based on convenience samples. These studies may not allow for generalization on consumers at large (Handke, 2011).

Another stream of literature deals with the impact of music piracy on ancillary markets, especially on the live music market. Gayer and Shy (2006), Curien and Moreau (2009), and Dewenter et al. (2011) show theoretically that, due to the existence of a positive externality from the recorded music market to the live music market, file sharing, while possibly hurting records sales, should enhance the live music market by increasing the audience of artists. Hence, providing a vertical integration of music labels in the live music industry, file sharing can actually lead to higher profit. Mortimer et al. (2010) empirically show that files sharing reduce album sales but increase live music revenues, at least for lesser known artists (for "stars" the impact is negligible). From an artists' survey, Bacache et al. (2011) highlight that the more an artist performs on stage, the more tolerant towards file-sharing she is. There is also a reason to

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[3] Studies by Oberholzer-Gee and Strumpf (2007) and Andersen and Frenz (2010) are the only ones to conclude that piracy has no impact on music sales.

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

believe that suppliers of mp3-players and Internet service providers benefit from file-sharing (Handke, 2011). From a students 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 decreased Internet traffic by 18% and thus suggest that the ISP market is boosted by file-sharing.

Conversely, very few papers have, up to now, dealt with streaming. An exception is Thomes (2011) who mainly studies the link between piracy and streaming services. He show in a theoretical framework that free of charge online streaming services can be highly profitable if advertising imposes a weak nuisance to music consumers. He also shows that an increase in copyright enforcement shifts rents from music consumers to the monopolistic provider, moreover a 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 a substitute for piracy, would have an effect on ancillary markets. Secondly, unlike most of previous studies based on consumer surveys, we rely on a representative sample of French internet users rather than on a convenience sample. Third, to study the impact of streaming on the music industry rather than of piracy presents a great advantage when relying on a survey. There is no reason to believe that respondents could be reluctant to report their actual behaviour or give strategic answers. The streaming activity we deal with in this survey (using YouTube, Spotify, Deezer, etc.) is indeed perfectly legal.

3. Empirical methodology and data

Streaming is more differentiated from offline or online purchases than file-sharing is. Streaming indeed only offers a temporary access to a song and not the possession of it. But streaming is also more than a mere online radio. Streaming extends the capabilities of usual mass media: music is not only "pushed" to the user who can also select the music he is listening, manage playlist and share content. The impact of streaming on legal purchases is thus uncertain. On the one hand, streaming could, as much as file-sharing, negatively impact CDs sales and pay-downloads. On the other hand, streaming could appear more as a discovery tool than a

consumption tool and thus, through a sampling effect, affect positively music sales. This paper aims to assess the relevance of these two hypotheses. Furthermore, as a music discovering as well as a music consumption tool, streaming should have a positive impact on live music consumption. Montoro-Pons and Cuadrado-Garcia (2011) indeed empirically confirm the existence of a positive externality from recorded music consumption to concert attendance. This paper also aims at validating this positive externality for streaming.

To address these issues 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 Brittany population which is a region of France representing 3 millions of people (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 supposed to capture behaviour and characteristics unique to Britanny. 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 consider both recorded music and live music consumption and distinguish consumption on a binary mode (with a question *"Have you at least once in the past 12 months bought (resp. attended) ..."*) from the intensity of consumption (with a question *"How many CDs (resp. concerts) have you purchased (resp. attended) in the past 12 months ..."*). The first type of dependent variables is labelled "BUY_..." or "..._CONCERT" and the second type "QUANT_..."

Purchasing recorded music can be done in two different ways, online and offline. Offline music consumption refers to the purchase of CDs or DVDs while online consumption refers to digital sales (e.g. on iTunes Music Store). We thus consider three possible dependent variables: BUY_CD, BUY_ONLINE and QUANT_CD[5]. We also consider attendance at concert distinguishing between three categories of concerts representing three different preferences for

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[5] Unfortunately the intensity variable concerning the purchase of online music isn't available in the dataset.

music. The first refers to concert of classical music which is a very socially-oriented consumption and a category of music which needs an important "cultural capital". Concert of international stars 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 concert of local music which refers to less popular artists or bands, whatever the type of music, who are mainly promoted by word-of-mouth and their local networks (local newspapers, flyers, etc.), and have a spatially limited audience. We thus consider six dependent variables that pertain to live music consumption: INT_CONCERT, CLASS_CONCERT, LOCAL_CONCERT and QUANT_INT, QUANT_CLASS, QUANT_LOCAL. Tables 1 and 2 provide descriptive statistics about consumption behaviour and the intensity of these consumptions.

3.2 Explanatory variables

Our main independent variable is a dummy (STREAMING) that takes the value 1 if the respondent declares that she usually listens to music online through streaming (YouTube, Deezer, etc.). We also include in our regressions variables representing the way music is usually promoted by music labels and consider variables that account for consumer-to-consumer promotion (Word-of-Mouth). Advices from relatives and friends, radio and TV, are indeed the three main sources of influence for music consumers to purchase recorded music (Peitz and Waelbroeck, 2005). Besides the frequency with which the respondent listens to music on radio (MUSIC_RADIO), watches musical TV programs (MUSIC_TV), or follows offline advices from friends and relatives (RECOM_FRIENDS), we also consider online recommendations that the consumer receives through social networks, blogs, etc. (RECOM_INTERNET). Chevalier and Mayzlin (2006) indeed show that online recommendations have a positive impact on purchase of cultural goods.

We also include a variable reflecting the attachment to music (MUSIC_TASTE). We distinguish three levels of attachment to music (music lover, simple music lover and little music lover) and expect positive correlation with all the modes of music consumption. Finally, Sex (MALE), age (AGE), education (EDUCATION), income (STAND_LIVING) and the size of the city (SIZEAREA) are usual socio-economic and demographic characteristics. The expected effect of the gender, the age and the level of education differs according to the type of consumption. It seems that buying music online can be explained by technological skills of Internet users which are the prerogative of young and well educated people. Opera and classical music as opposed to

other type of concerts are also strongly determined by the level of education and the age of the audience. As the music is a "normal good" the demand should increase with user earnings. All explanatory variables are described in Table 3a and 3b.

4. Results

In this section we first present our main estimation results, and then we provide some robustness checks. Table 4 and 5 respectively display the estimate of different modes of music consumption and the intensity of these consumptions. We use simple probit in Table 4 since the dependent variable is binary (taking the value of 1 if Internet users have consumed at least once in the last year and 0 otherwise). The dependent variables in Table 5 takes the value 0 to 5 representing the quantity of items purchased (5 signifies five or more items purchased). Even if we cannot observe more than five consumptions it seems that a binomial negative regression is best designed to estimate this model with count data. This intuition is confirmed by a likelihood ratio test which shows overdispersion of our dependent variable and deters the use of a Poisson estimator.

4.1 Main variables

Our regressions show that STREAMING has no impact on CD purchase but has a significant and positive effect on online music purchase. Furthermore if, as expected, streaming has a positive impact on live music attendance, it is limited to concert of national or international stars. Note that these results hold should we consider the binary variables of consumption (Table 4) or the discrete variables reflecting the intensity of consumption (Table 5). Hence streaming turns out as complementary with buying recorded music online as well as with attending concerts of national or international stars.

As expected, see Peitz and Waelbroeck (2005), offline prescription by TV and radio has a positive impact on buying recorded music. However watching musical TV shows has a negative impact on the attendance to local and classical concerts. This confirms the inability of mass media to favour the awareness of "non stars" artists. The social prescription, whether offline or online, increases the probability of consuming music. Finally, as expected, variables associated with the taste for music are, whatever the model, positive and significant.

4.2 Socio-economic variables

Results concerning socio-economic variables are as expected. Individuals between 40 and 59 years old buy more CD because they probably have a higher income. Age is also a strong determinant of attendance to concert of classical music. Income and education are positively correlated with music consumption. Internet users in large cities have a higher probability of going to a concert of classical music or a local artist, which can be explained by the availability of these concerts in biggest cities. More surprising is the negative relationship between the size of the urban area and the consumption of CD in traditional offline retailers. An explanation might be that access to live music being more difficult in small cities, the best way to have access to music content is to buy physical goods. We also note that the variable which control for regional specificity also seems to capture a singularity in Brittany behaviours.

4.3 Robustness check

Because Internet users who buy more than 5 CD per year represent two third of offline buyers, we decided to perform a tobit regression censored at 5 for the four dependant variables of Table 5. Estimates of the tobit model are available in Table 6 and produce no qualitative change as compared to the binomial negative regressions.

We also performed a multivariate probit regression to control for the effect of unobserved variables common to the five models estimated in Table 4. Results, available upon request, exhibit no qualitative changes and suggest that correlation of error terms is not a major concern in our empirical analysis.

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 result of the empirical analysis, we re-estimate models in Table 4 only considering the 1,008 internet users representative of the French population. We can see from Table 7 that our main results remain unchanged, only the significance of some variables has decreased which can be easily explained by the smaller size of the sample.

However, the main limitation of our empirical analysis is the potential endogeneity issue in ours 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 it for the same reason that they listen to music on streaming services or on the radio or TV: they enjoy music. We address this issue in three different ways. First, the strong significance of MUSIC_TASTE suggests that attachment to music is captured in our estimates. A second argument is that in our regressions the variable STREAMING is not systematically significant for all consumption modes. Should a strong endogeneity issue between modes of musical consumption and streaming exist, we can expect that it has the same consequence whatever the mode of consumption. Third, and above all, we re-estimate the regressions on Table 4 using an instrumental variable. We built a variable named NEWSONLINE which refers to reading news and articles from different sources[6] over the internet. NEWSONLINE varies from 0, if internet user never reads any source online, to 24, if he reads all the six sources everyday. 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 indeed is a relationship between reading news online and using streaming for 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.

As our dependant variable as well as the one we suspect of endogeneity are dichotomous we estimate a bivariate probit with the first equation representing the baseline model (as on Table 4). The second equation is the variable suspected of endogeneity regressed on the instrument as well as on the others explanatory variables (Greene, 2011). Table 8 shows the biprobit estimation for the five different modes of consumption. Both equations of the biprobit are reported for buying music online and concert of international star since in these cases STREAMING indeed appears as endogeneous. A likelihood ratio test suggests that the correlation parameter of error terms of the two equations (rho) is significantly different from 0 and thus legitimate to instrument our regressions. The positive relationship between streaming and these two consumption behaviours is unchanged and the instrument is strongly positively correlated with the variable suspected of endogeneity. Only the first equation of the biprobit is

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[6] The six sources used are national newspapers, local newspapers, Google news or Yahoo news, website of TV channels, blog, and pure players of news on the Internet. For each sources 5 answers are considered: everyday, at least each week, at least each month, rarely, never.

reported on Table 8 for the three others modes of musical consumption since we fail to reject the null hypothesis that the correlation parameter of error terms is equal to zero. We thus fail to reject the exogeneity of the STREAMING variable.

5. Discussion

Our result supports two major findings concerning the role of streaming on music consumption. First streaming is positively associated with buying music online but has no effect on buying music offline. Second, streaming has a positive effect on attendance to a concert of a national or international star but does not increase the probability of buying ticket for classical music or a local artist. We discuss these results taking into account the difference between recorded music and live concert.

As highlighted above, if listening music on streaming platforms is a strong substitute to recorded music, then we can expect a decrease in music sales when consumer use these platforms. Conversely if recorded music is complementary to streaming, then we can expect that a "sampling effect" leads to an increase in music sales, since the consumer's preferences and the song bought are better matched and the "cultural capital" is increased. Our results validate the second hypothesis, showing that streaming, as much as radio and TV can be positively associated with sales of recorded music. However this effect only appears for online music sales while TV and Radio have an impact on offline music sales as well.

This result suggests that there are two distinct demands for recorded music and that offline and online music are vertically differentiated in three ways. First digital music can be used in portable devices (smartphone, MP3 player, Tablet and others) but also more easily stored and managed on storage media. Second, online music is usually unbundled. On the digital market, consumers are free to buy a single song and not the whole album[7]. Third, online retailers overcome the capacity constraint issue and provide online recommendation tools that help consumers to find the products which best match their preferences (people who like X also like Y…). As a result, complementarity between online sales and streaming platforms is driven by the need for consumers to make a choice over a broad and unbundled set of products while radio

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7 During 2011, singles represent respectively 1% and 43% of physical and digital French market.

and TV are still preferred for those who make their choice in the traditional physical market[8]. Interestingly enough, this result also provides a possible alternative explanation to recent findings showing that in Sweden and France the enforcement of laws aiming at reducing copyright infringement increased recorded music sales. Adermon and Liang (2010) found that the implementation on April 2009 of such a law increased physical music sales by 27 percent and digital sales by 48 percent. Likewise, Danaher et al. (2012) find that, in France, the consequence of the implementation of the Hadopi law in 2009 was that French iTunes sales were 22.5 percent higher for singles and 25 percent higher for digital albums than they would have been, on average, in the absence of Hadopi. Since Sweden and France are two countries were music streaming is especially widespread[9], the increase in digital sales, especially in France, could also be explained by the increasing use of streaming since we show that streaming and digital sales are complement. This issue is an avenue for future research.

Our results also show that streaming has a positive impact on the demand for concert of national and international artists, but has no effect on concert of classical music and local artist. This limited effect can certainly be explained by the low visibility of classical music and local artist on the streaming platforms. Indeed access doesn't mean visibility, and for niches content or unknown artists, focusing the attention of internet users is still difficult on platforms which gather over millions of videos and songs[10].

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 is positively associated with pay-download consumption but has no effect on physical sales of recorded music. Live music also benefits from streaming, but only when national or international artists are considered. Our empirical analysis is also robust to different specifications and estimators and this strengthens the idea that streaming platforms can help to provide new business models for artists and the music industry.

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[8] Notice that, also dealing with a survey on a representative sample of French internet users, Bastard et al. (2012a) show that piracy and online music purchasing are complements.
[9] See IFPI's Digital Music Report 2012, p. 10.

If the net effect of piracy on the legitimate overall demand for music (being recorded or live music) is still controversial, the complementarity between streaming and online sales seems a promising direction for the music industry business models. On the recorded music market, the coexistence of a demand for streams (especially on "free "access") and a demand for paying "possession" enables to consider that streaming could become to the pay download market what radio and TV historically were for the physical music market. Apparition of an online mode of consumption which uses, among others, YouTube, Deezer, Spotify to sample music and pay-download stores to buy the music they need to put into their mobile or music player, establishes new business models of music consumption. Paid subscription to access extended repertoire on streaming platforms is also promising especially when wireless technology will provide permanent access to streaming servers (in the "cloud"), making no difference between access and possession.

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[10] This conjecture is empirically validated on the French music market by Bastard et al. (2012b).

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Tableau 1: Descriptive statistics on dependent variables concerning music consumption

Have at least once in the past 12 months	BUY_CD	BUY_ONLINE	CLASS_ CONCERT	LOCAL_ CONCERT	INTER_ CONCERT
Mean	0.16	0.63	0.15	0.29	0.26
Std Error	0.37	0.48	0.36	0.45	0.44
Min	0	0	0	0	0
Max	1	1	1	1	1

Tableau 2: Descriptive statistics on dependent variables concerning intensity of music consumption

Intensity of musical consump-tion in the past 12 months	QUANT_CD	QUANT_CLASS	QUANT_LOCAL	QUANT_INTER
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 3a : 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 has a professional diploma, 0 otherwise
EDUCATION2	1 if has a high scool level, 0 otherwise
EDUCATION3	1 if has a mid-undergraduate, 0 otherwise
EDUCATION4	1 if has an undergraduate, 0 otherwise
EDUCATION5	1 if is graduate or more, 0 otherwise
STAND_LIVING1	1 if daily life is difficult, 0 otherwise
STAND_LIVING2	1 if has an acceptbale standard of living, 0 otherwise
STAND_LIVING3	1 if has confortable standard of living, 0 otherwise
SIZEAREA	Size of the urbain area with 1 rural area and 5 biggest cities
MUSIC_TASTE1	1 if he is a music lover, 0 otherwise
MUSIC_TASTE2	1 if enjoy music, 0 otherwise
MUSIC_TASTE3	1 if he is not very fond of music, 0 otherwise
INTERNET	Intensity of Internet usage, 1 to with 1 for everyday and 4 for few times per month
MUSIC_RADIO	1 if listen to music on the radio everyday, 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 I hear about on the Internet (social network, blog, forum), 0 otherwise
STREAMING	1 if listen to music in streaming on the Internet (youtube, deezer, webradio)
BRITTANY	Live in Brittany, 0 otherwise

Tableau 3b: Descriptive statistics of independent variables

VARIABLES	BUY_CD		BUY_ONLINE		CLASS_ CONCERT		LOCAL_ CONCERT		INTER_ CONCERT	
	Mean	Std Error	Mean	Std Error	Mean	Std Error	Mean	Std Error	Mean	Std Error
MALE	0.55	0.49	0.50	0.50	0.56	0.49	0.59	0.49	0.53	0.49
AGE24	0.15	0.35	0.14	0.34	0.1	0.29	0.19	0.39	0.18	0.38
AGE39	0.37	0.48	0.33	0.47	0.24	0.42	0.34	0.47	0.37	0.48
AGE59	0.36	0.48	0.39	0.48	0.41	0.49	0.34	0.47	0.33	0.47
AGE+	0.12	0.31	0.14	0.33	0.25	0.43	0.13	0.33	0.12	0.31
EDUCATION1	0.16	0.36	0.29	0.45	0.17	0.37	0.21	0.40	0.25	0.43
EDUCATION2	0.24	0.42	0.22	0.41	0.19	0.39	0.23	0.42	0.24	0.42
EDUCATION3	0.19	0.39	0.19	0.38	0.18	0.38	0.19	0.39	0.18	0.38
EDUCATION4	0.23	0.42	0.18	0.38	0.25	0.43	0.22	0.41	0.20	0.40
EDUCATION5	0.18	0.38	0.12	0.32	0.21	0.40	0.15	0.35	0.13	0.33
STAND_LIVING1	0.17	0.37	0.19	0.38	0.15	0.35	0.17	0.37	0.18	0.37
STAND_LIVING2	0.36	0.48	0.37	0.48	0.33	0.46	0.38	0.48	0.37	0.48
STAND_LIVING3	0.47	0.50	0.44	0.49	0.52	0.50	0.45	0.49	0.45	0.49
SIZEAREA	2.75	1.43	2.55	1.38	3.06	1.38	2.83	1.38	2.69	1.39
MUSIC_TASTE1	0.46	0.49	0.35	0.47	0.50	0.50	0.46	0.49	0.42	0.49
MUSIC_TASTE2	0.48	0.50	0.54	0.49	0.42	0.49	0.48	0.50	0.48	0.50
MUSIC_TASTE3	0.06	0.23	0.11	0.30	0.07	0.25	0.06	0.23	0.10	0.29
INTERNET	3.87	0.46	3.71	0.67	3.8	0.58	3.74	0.65	3.78	0.59
MUSIC_RADIO	0.63	0.48	0.61	0.48	0.59	0.49	0.59	0.49	0.60	0.48
MUSIC_TV	0.66	0.47	0.69	0.46	0.57	0.49	0.61	0.48	0.67	0.46
RECOM_FRIENDS	0.61	0.48	0.50	0.50	0.55	0.49	0.60	0.48	0.57	0.49
RECOM_INTERNET	0.51	0.50	0.37	0.48	0.40	0.49	0.45	0.49	0.47	0.49
STREAMING	0.71	0.45	0.58	0.49	0.53	0.49	0.64	0.47	0.67	0.46
BRITTANY	0.44	0.49	0.50	0.50	0.39	0.49	0.54	0.49	0.48	0.50

Tableau 4: Probit regression of demand for music

VARIABLES	BUY_CD	BUY_ONLINE	CLASS_CONCERT	LOCAL_CONCERT	INTER_CONCERT
MALE	0.0124	0.108	0.00448	0.255***	0.0751
	(0.0610)	(0.0723)	(0.0756)	(0.0649)	(0.0636)
AGE24	0.0006	-0.214	-0.845***	0.153	0.0511
	(0.121)	(0.150)	(0.149)	(0.127)	(0.127)
AGE39	0.160	-0.0390	-0.771***	0.0365	0.106
	(0.0992)	(0.122)	(0.120)	(0.107)	(0.107)
AGE59	0.306***	0.100	-0.311***	0.0823	0.0624
	(0.0923)	(0.115)	(0.104)	(0.101)	(0.102)
AGE+	Ref.	Ref.	Ref.	Ref.	Ref.
EDUCATION1	-0.133	-0.596***	-0.679***	-0.452***	-0.130
	(0.115)	(0.127)	(0.131)	(0.115)	(0.116)
EDUCATION2	-0.157	-0.200	-0.436***	-0.183	-0.0202
	(0.116)	(0.126)	(0.131)	(0.116)	(0.117)
EDUCATION3	-0.131	-0.234*	-0.364***	-0.258**	-0.0855
	(0.119)	(0.127)	(0.132)	(0.119)	(0.120)
EDUCATION4	0.0700	-0.0192	-0.0619	0.0413	0.121
	(0.121)	(0.124)	(0.126)	(0.117)	(0.118)
EDUCATION5	Ref.	Ref.	Ref.	Ref.	Ref.
STAND_LIVING1	-0.253***	-0.122	-0.137	-0.0581	-0.178**
	(0.0836)	(0.103)	(0.110)	(0.0906)	(0.0903)
STAND_LIVING2	-0.0873	-0.0852	-0.0840	0.0286	-0.0724
	(0.0683)	(0.0800)	(0.0836)	(0.0710)	(0.0708)
STAND_LIVING3	Ref.	Ref.	Ref.	Ref.	Ref.
SIZEAREA	-0.0668***	-0.0254	0.0912***	0.0683***	-0.0138
	(0.0236)	(0.0275)	(0.0287)	(0.0249)	(0.0245)
MUSIC_TASTE1	0.674***	0.577***	0.837***	0.926***	0.399***
	(0.0983)	(0.135)	(0.135)	(0.116)	(0.107)
MUSIC_TASTE2	0.494***	0.366***	0.351***	0.559***	0.147
	(0.0846)	(0.127)	(0.129)	(0.108)	(0.0974)
MUSIC_TASTE3	Ref.	Ref.	Ref.	Ref.	Ref.
INTERNET	0.103**	0.222***	0.140**	-0.0208	0.0762
	(0.0412)	(0.0726)	(0.0622)	(0.0480)	(0.0481)
MUSIC_RADIO	0.167***	0.141*	-0.0324	-0.0197	0.0338
	(0.0612)	(0.0743)	(0.0769)	(0.0649)	(0.0643)
MUSIC_TV	0.166***	0.0420	-0.142*	-0.182***	0.0228
	(0.0642)	(0.0771)	(0.0782)	(0.0677)	(0.0685)
RECOM_FRIENDS	0.335***	0.250***	0.216***	0.364***	0.238***
	(0.0651)	(0.0796)	(0.0814)	(0.0685)	(0.0676)
RECOM_INTERNET	0.0698	0.249***	0.166*	0.138*	0.204***
	(0.0713)	(0.0815)	(0.0881)	(0.0725)	(0.0717)
STREAMING	-0.00785	0.255***	-0.137	0.0315	0.206***
	(0.0696)	(0.0845)	(0.0859)	(0.0732)	(0.0730)
BRITTANY	-0.0203	-0.158**	-0.157**	0.253***	-0.0650
	(0.0625)	(0.0741)	(0.0786)	(0.0667)	(0.065)
Constant	-0.669***	-2.280***	-1.310***	-1.469***	-1.385***
	(0.217)	(0.329)	(0.307)	(0.248)	(0.247)
Observations	2,01	2,007	2,01	2,01	2,01
Pseudo R2	0.07	0.11	0.15	0.12	0.06

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

Tableau 5: Binomial negative regression for the intensity of music consumption

VARIABLES	QUANT_CD	QUANT_CLASS	QUANT_LOCAL	QUANT_INTER
MALE	0.0583	0.233*	0.327***	0.190**
	(0.0428)	(0.137)	(0.0913)	(0.0935)
AGE24	-0.0387	-1.498***	-0.0773	0.170
	(0.0913)	(0.300)	(0.181)	(0.196)
AGE39	0.0915	-1.387***	-0.178	0.224
	(0.0744)	(0.200)	(0.157)	(0.165)
AGE59	0.229***	-0.564***	0.0631	0.124
	(0.0692)	(0.166)	(0.151)	(0.167)
AGE+	Ref.	Ref.	Ref.	Ref.
EDUCATION1	-0.141*	-0.982***	-0.523***	-0.0534
	(0.0780)	(0.234)	(0.153)	(0.179)
EDUCATION2	-0.192**	-0.596***	-0.0883	0.0201
	(0.0781)	(0.224)	(0.146)	(0.170)
EDUCATION3	-0.146*	-0.725***	-0.312**	-0.151
	(0.0783)	(0.246)	(0.150)	(0.179)
EDUCATION4	0.0318	-0.133	0.119	0.0971
	(0.0746)	(0.203)	(0.139)	(0.165)
EDUCATION5	Ref.	Ref.	Ref.	Ref.
STAND_LIVING1	-0.195***	-0.0790	-0.120	-0.189
	(0.0614)	(0.210)	(0.131)	(0.142)
STAND_LIVING2	-0.107**	-0.0712	-0.0752	-0.299***
	(0.0452)	(0.153)	(0.0952)	(0.103)
STAND_LIVING3	Ref.	Ref.	Ref.	Ref.
SIZEAREA	-0.0339**	0.143***	0.0969***	-0.000167
	(0.0162)	(0.0522)	(0.0363)	(0.0369)
MUSIC_TASTE1	0.752***	1.630***	1.527***	0.766***
	(0.0861)	(0.268)	(0.198)	(0.172)
MUSIC_TASTE2	0.533***	0.794***	0.983***	0.380**
	(0.0830)	(0.259)	(0.194)	(0.168)
MUSIC_TASTE3	Ref.	Ref.	Ref.	Ref.
INTERNET	0.0840**	0.334***	0.126*	0.161*
	(0.0349)	(0.125)	(0.0722)	(0.0861)
MUSIC_RADIO	0.109**	-0.0206	-0.0120	0.0978
	(0.0437)	(0.140)	(0.0903)	(0.0949)
MUSIC_TV	0.129***	-0.391***	-0.212**	0.0714
	(0.0463)	(0.138)	(0.0915)	(0.101)
RECOM_FRIENDS	0.228***	0.515***	0.662***	0.370***
	(0.0421)	(0.153)	(0.0988)	(0.104)
RECOM_INTERNET	0.0577	0.206	0.195**	0.272***
	(0.0452)	(0.154)	(0.0986)	(0.104)
STREAMING	-0.0149	-0.215	0.0420	0.392***
	(0.0477)	(0.147)	(0.103)	(0.110)
BRITTANY	0.0299	-0.295**	0.292***	-0.0240
	(0.0424)	(0.143)	(0.0945)	(0.0968)
Constant	-0.198	-2.361***	-2.460***	-2.472***
	(0.181)	(0.553)	(0.366)	(0.442)
Observations	2,007	2,007	2,007	2,007
Pseudo R2	0.02	0.07	0.06	0.04

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

Table 6: Tobit regression with dependant variable censored at 5

VARIABLES	QUANT_CD	QUANT_CLASS	QUANT_LOCAL	QUANT_INTER
MALE	0.380	0.0776	1.107***	0.340*
	(0.234)	(0.322)	(0.273)	(0.196)
AGE24	-0.185	-3.745***	0.240	0.308
	(0.466)	(0.663)	(0.530)	(0.392)
AGE39	0.570	-3.518***	-0.0189	0.447
	(0.383)	(0.527)	(0.449)	(0.329)
AGE59	1.498***	-1.441***	0.314	0.226
	(0.359)	(0.439)	(0.421)	(0.312)
AGE+	ref	ref	ref	ref
EDUCATION1	-0.698	-2.741***	-1.828***	-0.253
	(0.431)	(0.560)	(0.487)	(0.354)
EDUCATION2	-0.985**	-1.575***	-0.619	-0.0365
	(0.440)	(0.542)	(0.481)	(0.357)
EDUCATION3	-0.819*	-1.620***	-1.151**	-0.369
	(0.448)	(0.547)	(0.492)	(0.366)
EDUCATION4	0.358	-0.149	0.280	0.257
	(0.454)	(0.515)	(0.482)	(0.361)
EDUCATION5	ref	ref	ref	ref
STAND_LIVING1	-1.186***	-0.485	-0.262	-0.493*
	(0.323)	(0.458)	(0.381)	(0.272)
STAND_LIVING2	-0.554**	-0.307	-0.0355	-0.463**
	(0.261)	(0.356)	(0.298)	(0.217)
STAND_LIVING3	ref	ref	ref	ref
SIZEAREA	-0.164*	0.401***	0.311***	-0.0295
	(0.0905)	(0.123)	(0.105)	(0.0757)
MUSIC_TASTE1	3.794***	3.820***	4.272***	1.409***
	(0.396)	(0.619)	(0.518)	(0.335)
MUSIC_TASTE2	2.298***	1.625***	2.440***	0.550*
	(0.346)	(0.572)	(0.480)	(0.309)
MUSIC_TASTE3	ref	ref	ref	ref
INTERNET	0.440***	0.787***	0.131	0.315**
	(0.164)	(0.259)	(0.200)	(0.152)
MUSIC_RADIO	0.692***	-0.120	-0.123	0.145
	(0.237)	(0.323)	(0.273)	(0.198)
MUSIC_TV	0.717***	-0.806**	-0.789***	0.140
	(0.250)	(0.329)	(0.283)	(0.208)
RECOM_FRIENDS	1.288***	0.912***	1.826***	0.765***
	(0.251)	(0.348)	(0.289)	(0.209)
RECOM_INTERNET	0.434	0.583	0.575*	0.574***
	(0.272)	(0.366)	(0.304)	(0.220)
STREAMING	-0.217	-0.544	0.160	0.730***
	(0.267)	(0.365)	(0.311)	(0.226)
BRITTANY	0.190	-0.739**	1.019***	-0.116
	(0.240)	(0.335)	(0.282)	(0.201)
Constant	-3.225***	-6.521***	-7.354***	-5.059***
	(0.867)	(1.293)	(1.074)	(0.782)
Observations	2,007	2,007	2,007	2,007
Pseudo R2	0.04	0.1	0.07	0.04

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

Table 7: Probit regression with the sub-sample of 1000 French internet users

VARIABLES	BUY_CD	BUY_ONLINE	CLASS_ CONCERT	LOCAL_ CONCERT	INTER_ CONCERT
MALE	-0.00323	0.0815	-0.0596	0.215**	0.116
	(0.0849)	(0.0978)	(0.102)	(0.0912)	(0.0897)
AGE24	0.0740	-0.148	-0.901***	-0.0119	-0.0629
	(0.175)	(0.219)	(0.213)	(0.188)	(0.182)
AGE39	0.147	0.0378	-0.952***	0.0987	0.0741
	(0.139)	(0.174)	(0.173)	(0.154)	(0.151)
AGE59	0.183	0.182	-0.361**	0.109	0.0207
	(0.129)	(0.166)	(0.145)	(0.147)	(0.142)
AGE+	ref	ref	ref	Ref	ref
EDUCATION1	-0.0301	-0.527***	-0.847***	-0.534***	-0.173
	(0.153)	(0.174)	(0.174)	(0.158)	(0.159)
EDUCATION2	-0.0741	-0.0533	-0.353**	-0.150	0.00660
	(0.154)	(0.168)	(0.171)	(0.156)	(0.158)
EDUCATION3	-0.0513	-0.0355	-0.335*	-0.268*	-0.0687
	(0.158)	(0.171)	(0.174)	(0.161)	(0.162)
EDUCATION4	0.0340	0.0747	-0.0378	0.0526	0.157
	(0.159)	(0.166)	(0.163)	(0.153)	(0.158)
EDUCATION5	ref	ref	ref	Ref	ref
STAND_LIVING1	-0.231**	-0.189	-0.188	0.00221	-0.0458
	(0.114)	(0.140)	(0.139)	(0.123)	(0.121)
STAND_LIVING2	0.0278	-0.0276	-0.226**	-0.0173	0.00148
	(0.0992)	(0.112)	(0.115)	(0.104)	(0.102)
STAND_LIVING3	ref	ref	ref	Ref	ref
SIZEAREA	-0.0724**	0.00292	0.0779**	0.0749**	-0.00866
	(0.0300)	(0.0346)	(0.0356)	(0.0321)	(0.0312)
MUSIC_TASTE1	0.693***	0.579***	0.811***	0.730***	0.304**
	(0.138)	(0.184)	(0.182)	(0.160)	(0.151)
MUSIC_TASTE2	0.391***	0.296*	0.434**	0.430***	0.182
	(0.120)	(0.173)	(0.171)	(0.151)	(0.138)
MUSIC_TASTE3	ref	ref	ref	ref	ref
INTERNET	0.136**	0.232**	0.141*	0.0109	0.0362
	(0.0572)	(0.0961)	(0.0857)	(0.0693)	(0.0651)
MUSIC_RADIO	0.166*	0.218**	-0.0817	-0.0480	0.0812
	(0.0857)	(0.0996)	(0.104)	(0.0922)	(0.0892)
MUSIC_TV	0.204**	0.128	-0.181*	-0.0735	0.238**
	(0.0881)	(0.107)	(0.106)	(0.0954)	(0.0960)
RECOM_FRIENDS	0.297***	0.149	0.111	0.372***	0.292***
	(0.0914)	(0.111)	(0.112)	(0.0961)	(0.0944)
RECOM_INTERNET	-0.00444	0.265**	0.249**	0.116	0.168*
	(0.0991)	(0.113)	(0.118)	(0.101)	(0.101)
STREAMING	-0.0818	0.306***	-0.117	-0.00451	0.210**
	(0.0964)	(0.115)	(0.112)	(0.102)	(0.101)
Constant	-0.723**	-2.624***	-1.072***	-1.466***	-1.457***
	(0.295)	(0.435)	(0.403)	(0.353)	(0.330)
Observations	1,008	1,008	1,008	1,008	1,008
Pseudo R2	0.06	0.11	0.16	0.11	0.06

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

	BUY_ONLINE		INTER_CONCERT		BUY_CD	LOCAL_CONCERT	CLASS_CONCERT
MALE	0.0768	0.0431	0.0495	0.0404	0.00811	0.237***	-0.0170
	(0.0718)	(0.0655)	(0.0640)	(0.0656)	(0.0619)	(0.0665)	(0.0758)
AGE24	-0.542***	1.563***	-0.237	1.524***	-0.0581	-0.0318	-1.076***
	(0.171)	(0.140)	(0.181)	(0.140)	(0.200)	(0.197)	(0.195)
AGE39	-0.226*	0.774***	-0.0635	0.762***	0.126	-0.0705	-0.893***
	(0.129)	(0.103)	(0.129)	(0.103)	(0.137)	(0.136)	(0.129)
AGE59	0.0100	0.368***	-0.0133	0.364***	0.290***	0.0327	-0.366***
	(0.115)	(0.0971)	(0.103)	(0.0968)	(0.102)	(0.106)	(0.105)
AGE+	ref	ref	ref	ref	ref	ref	ref
EDUCATION1	-0.546***	0.0241	-0.110	0.0343	-0.130	-0.436***	-0.644***
	(0.128)	(0.121)	(0.114)	(0.120)	(0.113)	(0.117)	(0.132)
EDUCATION2	-0.143	-0.120	0.0176	-0.115	-0.149	-0.157	-0.388***
	(0.123)	(0.123)	(0.116)	(0.123)	(0.118)	(0.118)	(0.132)
EDUCATION3	-0.158	-0.214*	-0.0294	-0.208*	-0.120	-0.221*	-0.304**
	(0.127)	(0.125)	(0.121)	(0.125)	(0.122)	(0.122)	(0.134)
EDUCATION4	0.0166	-0.0702	0.145	-0.0514	0.0750	0.0575	-0.0345
	(0.122)	(0.126)	(0.117)	(0.125)	(0.122)	(0.118)	(0.124)
EDUCATION5	ref	ref	ref	ref	ref	ref	ref
STAND_LIVING1	-0.135	0.0663	-0.186**	0.0782	-0.256***	-0.0679	-0.145
	(0.0996)	(0.0896)	(0.0871)	(0.0894)	(0.0834)	(0.0901)	(0.106)
STAND_LIVING2	-0.0910	-0.0361	-0.0769	-0.0298	-0.0882	0.0236	-0.0884
	(0.0779)	(0.0737)	(0.0694)	(0.0733)	(0.0685)	(0.0711)	(0.0826)
STAND_LIVING3	ref	ref	ref	ref	ref	ref	ref
SIZEAREA	-0.0300	0.00981	-0.0183	0.0121	-0.067***	0.063**	0.0842***
	(0.0270)	(0.0252)	(0.0242)	(0.0252)	(0.0237)	(0.0251)	(0.0290)
MUSIC_TASTE1	0.408***	0.568***	0.260**	0.562***	0.648***	0.834***	0.705***
	(0.144)	(0.104)	(0.125)	(0.104)	(0.123)	(0.144)	(0.164)
MUSIC_TASTE2	0.268**	0.316***	0.0690	0.312***	0.478***	0.505***	0.283**
	(0.129)	(0.0917)	(0.102)	(0.0913)	(0.0964)	(0.119)	(0.136)
MUSIC_TASTE3	ref	ref	ref	ref	ref	ref	ref
INTERNET	0.140**	0.208***	0.0172	0.217***	0.0909*	-0.0576	0.0856
	(0.0679)	(0.0472)	(0.0533)	(0.0475)	(0.0526)	(0.0541)	(0.0656)
MUSIC_RADIO	0.106	0.0914	0.0129	0.0961	0.162***	-0.0322	-0.0510
	(0.0728)	(0.0657)	(0.0640)	(0.0656)	(0.0625)	(0.0654)	(0.0757)
MUSIC_TV	0.0107	0.104	0.00144	0.115*	0.162**	-0.192***	-0.157**
	(0.0756)	(0.0696)	(0.0670)	(0.0692)	(0.0655)	(0.0675)	(0.0766)
RECOM_FRIENDS	0.145*	0.336***	0.153*	0.340***	0.320***	0.310***	0.142
	(0.0820)	(0.0681)	(0.0789)	(0.0678)	(0.0794)	(0.0831)	(0.0940)
RECOM_INTERNET	0.0611	0.567***	0.0492	0.557***	0.0412	0.0447	0.0228
	(0.0987)	(0.0755)	(0.103)	(0.0753)	(0.107)	(0.107)	(0.124)
STREAMING	1.019***		0.871***		0.129	0.462	0.468
	(0.231)		(0.298)		(0.381)	(0.353)	(0.365)
BRITTANY	-0.187**	0.157**	-0.0947	0.154**	-0.0270	0.228***	-0.181**
	(0.0729)	(0.0670)	(0.0655)	(0.0670)	(0.0653)	(0.0703)	(0.0777)
NEWSONLINE		0.0521***		0.0517***			
		(0.00763)		(0.00768)			
Constant	-1.942***	-2.595***	-1.16***	-2.645***	-0.633***	-1.337***	-1.126***
	(0.333)	(0.252)	(0.263)	(0.251)	(0.239)	(0.268)	(0.306)
LR Test of rho=0	0.0059***		0.0565*		0.72	0.235	0.131
Observations	2,007	2,007	2,007	2,007	2,007	2,007	2,007