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# E-Commerce and the Market Structure of the Recorded Music Industry

Marc Bourreau,<sup>\*</sup> Romain Lestage,<sup>†</sup> François Moreau<sup>‡</sup>

## Abstract

In this paper, we study the impact of the development of e-commerce on the concentration of the recorded music industry in France, for the period 2003-2010. First, we find that over the whole period, CD sales, measured at the distributor level, are less concentrated online than offline. Second, we find that sales concentration online has increased between the early period of e-commerce (2003-2006) and the later period (2007-2010).

*Keywords:* e-commerce; market structure; sales concentration; recorded music industry.

*JEL codes:* L1; L82; L86.

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## 1. Introduction

Over the last decade, the rise of e-commerce has had a profound impact on retailing in many industries. The development of e-commerce has increased price competition, which has been well documented in the literature,<sup>1</sup> but it has also affected the market structure of different industries. Goldmanis et al. (2010) argue that the introduction of e-commerce should generate a shift in market shares from small (high-cost) firms to big (low-cost) firms, because it significantly lowers buyers' search costs, thereby leading to higher market concentration. Their model, and the empirical tests that confirm their theoretical predictions, are based on the assumption that firms are heterogeneous with respect to their marginal cost or quality of output, but not in terms of horizontal differentiation.

However, in some industries, horizontal differentiation plays a key role. For example, in the music industry, consumers search more for finding a product that fits their taste than for lower prices. In this paper, we study whether the development of e-commerce has led to higher market concentration in the recorded music industry.

According to the Long Tail hypothesis (Anderson, 2006), e-commerce and digital technologies should result in higher sales for niche artists and lower sales for stars, and therefore in a lower concentration of sales at the artist level. However, it is unclear whether it would translate in a lower concentration at the *firm* level. If niche artists are mainly distributed by small firms (small independent distributors), we would expect a lower market concentration. By contrast, if niche artists belong to the majors' back catalog,<sup>2</sup> we would observe a higher market concentration (or no effect on market concentration).

Papers that study the Long Tail phenomenon at the firm level are scarce. Bourreau et al. (2013) show that labels that have adapted to digitization perform better in terms of creative output (they release more new products), but do not sell more, which is consistent with the Long Tail hypothesis. Weeds (2012) studies, in a theoretical setting, the impact of digital technologies on the distribution of firms in creative industries. None of these papers estimate the impact of e-commerce on market concentration, which is the focus of this paper.

The rest of the paper is organized as follows. We first outline our empirical strategy. We then present and discuss our estimation results. Finally, we conclude.

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<sup>1</sup> See, for example, Brynjolfsson and Smith (2000) and Baye et al. (2004).

<sup>2</sup> In the recorded music industry, the majors -- like Universal Music, Warner Music or Sony Music -- account for about 75% of worldwide music sales.

## 2. Empirical strategy

We study the structure of the market for physical CDs in France over a 8-year period (2003-2010).<sup>3</sup> First, we compare the market structure of the e-commerce (online sales) and brick-and-mortar (offline sales) channels over the whole period. Second, we analyze the evolution of the concentration of online and offline sales over the period 2003-2010.

We use data on yearly sales of physical CDs in France obtained from the GfK group, which tracks CD sales in retail outlets in France. We measure CD sales concentration at the distributor level, which is usually how sales concentration is measured.<sup>4</sup> Distributors sell the physical CDs to the retailers, and a typical distributor owns several labels in different genres of music. In our dataset, there are 1,286 different distributors.

Following Brynjolfsson et al. (2011), we estimate a log-linear relationship between sales and sales rank for each distributor  $i$  in a channel  $j$ , a genre  $k$  and a time period  $t$ . We consider 7 musical genres (classical music, jazz, French popular music, international popular music, world music, compilation, others), and we distinguish the online sales channel from the brick-and-mortar channel. We also consider 8 years, from 2003 to 2010. There are thus 112 subsets of data (8 years x 7 musical genres x 2 channels). Finally, there are 1,286 different distributors, but they do not all sell CDs in all years, genres or channels. We then end up with a total of 20,113 observations.

To test whether sales are more concentrated online or offline, we first pool the 112 subsets into a single dataset, and estimate the following equation:

$$\ln(\text{Sales}_{ijkt}) = b_0 + b_1 \cdot \ln(\text{SalesRank}_{ijkt}) + b_2 \cdot \text{Online}_j + b_3 \cdot \text{Online}_j \cdot \ln(\text{SalesRank}_{ijkt}) + b \cdot X_{jkt} + e_{ijkt}. \quad (1)$$

In Equation (1),  $\ln(\text{Sales}_{ijkt})$  is the dependent variable, and  $\ln(\text{SalesRank}_{ijkt})$  the main explanatory variable. The dependent variable  $\text{Sales}_{ijkt}$  represents the total CD sales of distributor  $i$  in channel  $j$ , for

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<sup>3</sup> Although this market is declining, CD sales were the main source of revenue in the recording industry over the period covered by this study. In France, in 2010, digital sales accounted for only 16% of the revenues of the French recording market (Source: SNEP). According to the International Federation of the Phonographic Industry, digital music eventually caught up with CD sales in terms of worldwide revenue in April 2015 (IFPI Digital Music Report 2015).

<sup>4</sup> See, e.g., Nicolas A., 2011, "Evolution des marchés de la musique en France 2003-2010", Cité de la Musique - Observatoire de la Musique, Paris, France. Available at [http://philharmoniedeparis.fr/sites/default/files/mme\\_2003\\_2010.pdf](http://philharmoniedeparis.fr/sites/default/files/mme_2003_2010.pdf).

a given genre  $k$  and a time period  $t$  for all the artists distributed by firm  $i$ . The  $SalesRank_{ijkt}$  variable gives the corresponding sales rank.  $Online_j$  is a dummy variable, which equals 1 for the online sales channel, and 0 for the offline channel.  $X_{jkt}$  is a vector of control variables: musical genre dummies (Jazz, Classical, French popular music, ...); a dummy ( $a2007\_2010$ ) indicating whether the observation belongs to the period 2007 to 2010 or to the period 2003 to 2006; the size of the online or offline market,  $\ln(TotalSales_{jkt})$ ; and the number of distributors selling in this submarket,  $\ln(\#Distributors_{jkt})$ . We estimate Equation (1) with ordinary least squares (OLS).

The log-linear curve described by Equation (1) is known as a Pareto Curve. In our specification,  $b_1$  measures how fast distributor  $i$ 's sales decrease with the sales rank. The longer the tail of the distribution, and thus the less concentrated the market, the less negative will be  $b_1$ . The interaction term  $Online_j * \ln(SalesRank_{ijkt})$  indicates whether the decrease in sales as a function of the rank is significantly different between the two sales channels. A positive and significant  $b_3$  would indicate that the market is less concentrated online than offline.

To test how the difference in sales concentration between the two sales channels has evolved over time, we estimate the following equations:

$$\begin{aligned} \ln(Salesonline_{ikt}) &= b_0 + b_1 * \ln(SalesonlineRank_{ikt}) + b_2 * a2007\_2010 + b_3 * a2007\_2010 * \\ \ln(SalesRankonline_{ikt}) &+ b * X'_{kt} + e_{ikt} , \end{aligned} \quad (2)$$

$$\begin{aligned} \ln(Salesoffline_{ikt}) &= b'_0 + b'_1 * \ln(SalesofflineRank_{ikt}) + b'_2 * a2007\_2010 + b'_3 * a2007\_2010 * \\ \ln(SalesRankoffline_{ikt}) &+ b' * X'_{kt} + e'_{ikt} . \end{aligned} \quad (3)$$

A positive and significant  $b_3$  (resp.,  $b'_3$ ) means that the online (resp., offline) market was more concentrated over the period 2003-2006 than over the period 2007-2010. Since the errors terms in Equations (2) and (3) are likely to be correlated, we estimate the two equations with the seemingly unrelated regressions (SUR) model.

### 3. Results and discussion

Table 1 provides the estimation results for Equation (1), with and without control variables (see columns (a) and (b)). The results indicate that over the whole period, the market is less concentrated online than offline at the distributors' level. This suggests that e-commerce allows smaller firms to capture a greater share of the recorded music market. This result can be explained by a supply-side

effect: small music distributors encounter difficulties to make their music available in conventional retail stores because of physical constraints in the “size of the shelves”, whereas they do not face such barriers in online stores that have less constraints in the size of their catalog.

**Table 1 – Sales concentration online and offline**

Dependent variable: $\ln(\text{Sales})$	(a)	(b)
Regression: OLS		
$\ln(\text{SalesRank})$	-7.863***	-7.902***
$\ln(\text{SalesRank}) * \text{Online}$	1.723***	1.726***
<i>Online</i>	-17.157***	-17.233***
<i>Constant</i>	73.762***	73.192*
Control variables	No	Yes (1)
<i>N</i>	20,113	20,113
<i>p</i> -value	0.000***	0.000***
Adj. $R^2$	0.63	0.63

\*\*\* significant at the 1% level, \* significant at the 10% level

(1) Control variables include: dummies for musical genre, a dummy for the time-period, a variable that accounts for the size (total sales) of each submarket considered, and a variable that accounts for the number of distributors in each submarket.

Table 2 provides the estimation results for Equations (2) and (3).<sup>5</sup> We find that online sales are more concentrated in the period 2007-2010 than in the period 2003-2006, whereas there is no significant change for offline sales when the control variables are included.

Table 1 shows that sales are less concentrated online than offline; however, Table 2 shows that there is a trend towards more concentration online over time. One possible explanation is that the larger music distributors have been slow to develop their online sales, compared to small distributors. A report from OECD (2005) attributes this slow move to the dominant position of main distributors in the physical distribution system: “*the dominance by the music majors of the physical distribution system and the promotional value chain [has] significantly delayed a move to digital distribution*”. A fear of cannibalization of sales in conventional stores, which were considered as important business partners by large distributors, could explain why small distributors were the main beneficiaries from e-commerce in the early period. According to this interpretation, it’s only in the later period that large distributors started to make high marketing and promotion efforts to develop their online sales.

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<sup>5</sup> We find that the error terms are correlated, which justifies using the SUR model for our estimation.

**Table 2 – Evolution of sales concentration over time for both online and offline channels**

Dependent variable: $\ln(\text{Sales})$ Regression: SUR	Online sales		Offline sales	
$\ln(\text{SalesRank})$	-4.782***	-4.789***	-6.537***	-6.537***
$\ln(\text{SalesRank}) * a_{2007\_2010}$	-.476***	-.492***	.188*	.163
$a_{2007\_2010}$	3.700***	3.839***	-1.959***	-1.759**
Constant	42.083***	36.724	58.451***	68.819*
Control variables	No	Yes (1)	No	Yes (1)
N	7,223	7,223	7,223	7,223
p-value	0.000***	0.000***	0.000***	0.000***
R <sup>2</sup>	0.60	0.60	0.56	0.56

\*\*\* significant at the 1% level, \*\* significant at the 5% level, \* significant at the 10% level.

(1) Control variables include: seven dummies for musical genre, a variable that accounts for the size (total sales) of each submarket considered, and a variable that accounts for the number of distributors in each submarket.

#### 4. Conclusion

The purpose of this paper was to study the impact of the development of e-commerce on the concentration of the recorded music industry in France, for the period 2003-2010. First, we have found that over the whole period, CD sales, measured at the distributor level, were less concentrated online than offline. Second, we have found that sales concentration online has increased between the early period of e-commerce (2003-2006) and the later period (2007-2010). One possible explanation is that the larger firms in the industry have been initially slower to move online compared to small firms, but have eventually caught up with their small rivals.

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