Rational Addiction to Audiovisual Narratives
an Analysis of Broadcasting and Consumption of Fiction in France

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Motivation

- TV series occupy a growing space in the audiovisual market
- For a long time, television was the only way to consume these programs
- Broadcasting technology innovations disrupts this classical model by allowing non-linear consumption
New broadcasting technology allows for new forms of narrative writing

Those induce a change in demand and utility functions for TV series, resulting in a transition from synchronized programs towards on demand

Free-to-air television has to adapt to this change in demand and face the competition of Pay-TV and online services
Outline

1 Introduction

2 Literature

3 Data and Methodology

4 Results

5 Conclusion
Insights from the literature

- A wide literature in social sciences
  - Combes 2015, Kranz 2015, Mikos 2016
  - Different modes of consuming TV series. Some of them can lead to addictive effects and binge watching
  - The narrative form of the series is not considered in these studies

- How can we understand these effects with an economic framework?
  - Becker, Murphy 1982: the rational addiction framework
  - Applications to cultural goods: Cameron 1999, Castiglione, Infante 2015
Let the utility function at time $t$ be:

$$u(t) = u[y(t), c(t), S(t)]$$

With $y$ a non-addictive good and $c$ an addictive good.

Let $\delta$ be the depreciation rate on past consumption:

$$\dot{S}(t) = c(t) - \delta S(t)$$
Habits and addiction

Habituial goods

A good is habitual if and only if

\[ \frac{\partial c(t)}{\partial S(t)} > 0 \]

Addictive goods

A good is addictive if and only if

\[ \frac{\partial c(t)}{\partial S(t)} > \delta \]

- Addiction is defined as a habit strong enough that steady states are unstable
The demand function relies on two main parameters:

- **Addictiveness**: effect of the stock of previous consumption on current and future one
- **Discount rate**: more present-oriented individuals are more likely to get addicted

Narrative writing can affect both these parameters:

- Series using multiple storylines and cliffhangers reinforce the utility of past consumption
- Risk of spoiler effects can increase the preference for the present
**Methodology**

**Independent-episodes TV-series**

We say a TV-series has independent episodes if and only if those episodes can be followed in any order without significant loss of utility.

- We distinguish between two types of TV-series: independent episodes and *serials*.
- Serials: the narrative develops slowly, over episodes or seasons.
- We alledge that this continuity of narration gives rise to addiction effects.
Data provided by Médiamétrie, French audience measurement company

Fictional program aired between 8.30 and 10 p.m. on French free-to-air channels, 2011-2016

Live and catch-up audiences

36 400 observations, 5 000 different TV series and movies
The market for free-to-air broadcasting

- Shared between public (France TV), private (M6, TF1) hertzian channels, and TNT (digital terrestrial television)
- Main source of revenue: advertising space, proportional to the volume of audience
- Average time spent watching television in France: around 3h41', stable
Empirics: outline

1. Identify the effect of narrative on TV series consumption
   - How do consumption patterns vary for different narrative formats?

2. Specify a demand function for TV-series to explain this effect
Linear model: impact of narrative on consumption

- We estimate the causal effect of the narrative structure on the proportion of live audience.
- **Controls**: evolution of technology (year), time of the broadcast, total volume of audience and country of origin.
- **Results**: Broadcasting a serial rather than a series with independent episodes leads to a transfer of **4.8% of the audience towards catch-up**, all other things equal.

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Figure – Cath-up audience (thousands)
The rational addiction model

The model:

\[ C_{i,t} = \beta_1 C_{i,t-1} + \beta_2 C_{i,t+1} + \beta_3 X_{i,t} + \alpha_i + \varepsilon_{it} \] (1)

- \( \beta_1 \) and \( \beta_2 \) measure the addictiveness of the series \( i \)
- \( X \) a vector of control variables

Estimation:

- Arellano-Bond (1991) method to deal with endogeneity of past and future consumption
- Model estimated on 101 serials of at least 10 episodes, then on a similar database of independent-episodes series
Results: rational addiction model

- Strong causal effect of the past and future consumption
- Significant effects on the independent-series database, but weaker

<table>
<thead>
<tr>
<th>Variables</th>
<th>Myopic addiction model</th>
<th>Rational addiction model</th>
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<tbody>
<tr>
<td>Audience$_{t-1}$</td>
<td>0.389**</td>
<td>0.298**</td>
</tr>
<tr>
<td>Audience$_{t+1}$</td>
<td></td>
<td>0.236**</td>
</tr>
<tr>
<td>Advertising</td>
<td>-13.43↑</td>
<td>-14.39↑</td>
</tr>
<tr>
<td>Year</td>
<td>-219.7**</td>
<td>-213.6**</td>
</tr>
<tr>
<td>Grade</td>
<td>1.9</td>
<td>332.2</td>
</tr>
</tbody>
</table>
We ARIMA time series models to take into account the auto-regressive nature of the demand.

- Can only be estimated on one series at a time

- 2 case studies presented in the article and appendix
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Industrial implications

- The new forms of the demand function structures a captive audience for online platforms.
- TV serials do not fit the constraints of free-to-air television.
- The spread of audience and decline in popularity of independent-episodes series lead to a fall in profitability of these channels.
Policy implications

- Free-to-air Television is one of the main investors in the production of fiction in France
- Their difficulty to monetize non-linear audience makes it not profitable for them to finance serials
- This can result in a sub-optimal production of these programs
- Very rigid institutional structure: difficulty to reform
Summary

- The transition from *habits* to *addiction* effects in TV series changes the demand function.
- This explains the shift from synchronized consumption of audiovisual programs to on-demand.
- This has strong industrial and regulatory implications for the market for broadcasting of fiction in France.
Thank you for your attention!
References


Additional Tables and Graphs
**Table** – Estimation results with heteroskedasticity-consistent standard errors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>(Std. Err.)</th>
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<tr>
<td>Total audience</td>
<td>0.00**</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Year</td>
<td>-0.47**</td>
<td>(0.02)</td>
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<tr>
<td><strong>Serialized</strong></td>
<td><strong>-4.81</strong>**</td>
<td><strong>(0.11)</strong></td>
</tr>
<tr>
<td>USA</td>
<td>-2.4**</td>
<td>(0.07)</td>
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<tr>
<td>France (base)</td>
<td>0.00</td>
<td>(0.00)</td>
</tr>
<tr>
<td>UK</td>
<td>-3**</td>
<td>(0.25)</td>
</tr>
<tr>
<td>Sweden</td>
<td>-4.6**</td>
<td>(0.74)</td>
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