Price Discrimination in Digital Markets: Two examples

Conference on Digital Competition and Price Differentiation
Copenhagen, 19 June 2017

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Introduction

• Price Discrimination (PD): “the practice of selling the same product to different customers at different prices even though the cost of sale is the same to each of them” (Posner, 2001)

• I will mostly focus on exploitative price discrimination and its welfare effects in specific digital contexts or markets:
  • Geo-blocking in physical goods and digital content (based on Marcus and Petropoulos, 2017)
  • “Infrastructure as a service” (IaaS) Cloud Computing Services (Petropoulos, 2017)
  • Discrimination through personalized pricing
Potential Benefits and concerns from PD

• By increasing output:
  • firms can recover fixed costs and make profits.
  • Increase in social equality by allowing consumers who cannot afford uniform pricing to have access to more products and services
  • Facilitate investments and dynamic efficiency

• However, PD may also lead to:
  • Exclusion of competitors
  • Higher entry barriers and hostile market environment for the expansion of small firms
  • Exploitation of consumers
  • Facilitate other exclusionary practices

• Case-by-case analysis is needed
Geo-blocking

Traders operating in one MS block or limit the access of their online interfaces to customers from other MS.
Geo-blocking as an impediment to cross-border commerce

• “Overall, two cross-border shopping attempts out of three fail …” (Commission’s Impact Assessment report, Geo-blocking)

Source: GfK Mystery Shopping Survey and JRC/IPTS calculations
Prevalence of geo-blocking at different stages of the online shopping process, by sector (expressed as a proportion of attempted transactions within each stage of the shopping process)

Geo-blocking prevalence by sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Access</th>
<th>Registration</th>
<th>Delivery</th>
<th>Payment</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical household appliances</td>
<td>3%</td>
<td>40%</td>
<td>58%</td>
<td>44%</td>
<td>86%</td>
</tr>
<tr>
<td>Electronics &amp; computer hardware</td>
<td>4%</td>
<td>35%</td>
<td>51%</td>
<td>33%</td>
<td>79%</td>
</tr>
<tr>
<td>Computer games and software</td>
<td>5%</td>
<td>37%</td>
<td>33%</td>
<td>37%</td>
<td>73%</td>
</tr>
<tr>
<td>Clothing, shoes and accessories</td>
<td>5%</td>
<td>24%</td>
<td>40%</td>
<td>22%</td>
<td>65%</td>
</tr>
<tr>
<td>Cosmetics and healthcare products</td>
<td>6%</td>
<td>25%</td>
<td>40%</td>
<td>18%</td>
<td>63%</td>
</tr>
<tr>
<td>Books</td>
<td>4%</td>
<td>25%</td>
<td>12%</td>
<td>39%</td>
<td>60%</td>
</tr>
<tr>
<td>Online reservations of offline leisure</td>
<td>7%</td>
<td>16%</td>
<td>14%</td>
<td>16%</td>
<td>40%</td>
</tr>
<tr>
<td>Travel services (hotels, transport)</td>
<td>9%</td>
<td>10%</td>
<td>7%</td>
<td>17%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Source: GfK Mystery Shopping Survey and JRC/IPTS calculations
Geo-blocking: Justified or unjustified?

If geo-blocking practices are based on businesses incurring significant extra complications and costs or other obstacles for cross-border sales, they are likely to be considered justified where they are proportionate. Otherwise, they constitute unjustified geo-blocking.

Common justifications

- Language barriers
- Regulatory complications (different VAT systems)
- Technical specifications (rules for labeling)
- Legal uncertainty
- Fraud prevention system
- Vertical agreements (Chicago school doctrine)
- Ability to provide services after the sale
- Lack of affordable quality of delivery services
The EC proposed regulation

• “Traders shall not apply different general conditions of access to their goods or services, for reasons related to the nationality, place of residence or place of establishment of the customer, in the following situations:
  • where the trader sells goods and those goods are not delivered cross-border to the MS of the customer by the trader;
  • where the trader provides electronically supplied services, other than services related to the provision of access to and use of copyright protected works;
  • where the ... services are supplied to the customer in the premises of the trader or in a physical location where the trader operates.”

• The proposed geo-blocking regulation does not address copyrighted content for a variety of reasons, but these goods and services represented 33% of online trade by individuals in 2014.
What is the economic impact of lifting geo-blocking restrictions in physical goods?

**CS:** 1.2%  
**PS:** 1.4%

Source: Duch-Brown and Martens (2016)
A closer look at the impact assessment

• Trade expansion: Prices would decrease across in all countries, both online (-1% on average) and offline (-0.5% on average). This will lead to increased consumption and sales.

• Reduced costs of supply: Many purchases that are made from “brick and mortar” retailers today would instead be made online. The cost of making the sale online is less than the cost of making the equivalent sale offline, and is sufficient to explain the predicted increase in producer surplus.

• Delivery (and other related) costs will limit arbitrage opportunities and price convergence.

• What about the economic impact of the proposed regulation on digital services (e.g. online booking, car-hire)?

• Impact assessment goes beyond elimination of geo-blocking: VAT harmonization and transparency, uniform consumer protection across EU, cross-border price delivery prices, packaging and labeling rules…
Lifting geo-blocking restrictions on audiovisual content: Potential demand

• The means by which consumers receive audiovisual content is evolving rapidly, with rapid growth in volume and revenues.

• Long-term intra-EU migrants have substantial interest in content from their country of origin, and also substantial willingness to pay.

• Short-term intra-EU migrants, travellers, linguistic minorities, and those who are studying a language or are already proficient in it are all likely to have interest and willingness to pay for cross-border access audiovisual content.

• Marcus and Petropoulos (2017) identify an aggregate EU-wide opportunity of €378 million per annum, with a lower bound of €189 million per annum and an upper bound of €945 million per annum, for the elimination of geo-blocking of audiovisual content.

• This represents an incremental amount that consumers are willing to spend. How much can be realised in practice is uncertain.
Lifting geo-blocking restrictions in audiovisual: Potential concerns

- The relationship between geo-blocking and piracy is unclear.
- Exclusive territorial licenses for only one Member State are very common. This market partitioning exists for valid reasons, and generates benefits for European consumers, not just costs.
- Prohibition on geo-blocking of online audiovisual content might raise concerns about the creation of new content and how it would be financed. There is a risk that less content would be produced, thus reducing consumer choice and consumer welfare.
- Such concerns might be mitigated by limiting any prohibition on geo-blocking to works for which sufficient time has elapsed from the date of first theatrical release to ensure that nearly all of the revenue potential has already been realised.
The aggregate annual opportunity associated with prohibiting geo-blocking of various copyrighted services.

**Source:** Bruegel calculations

<table>
<thead>
<tr>
<th></th>
<th>Music</th>
<th>EBooks and ePublishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum aggregate opportunity</td>
<td>€ 12,1</td>
<td>€ 21,1</td>
</tr>
<tr>
<td>(€ mn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expected aggregate opportunity</td>
<td>€ 19,7</td>
<td>€ 31,6</td>
</tr>
<tr>
<td>(€ mn)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum aggregate opportunity</td>
<td>€ 29,5</td>
<td>€ 45,7</td>
</tr>
<tr>
<td>(€ mn)</td>
<td></td>
<td></td>
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</tbody>
</table>

- Elimination of geo-blocking in the music sector can be expected to have positive effects both for consumers and for producers, but the effects differ among the Member States. In some Member States, consumers are more likely to listen to music from elsewhere than to music produced within their own Member State; likewise, music from some Member States is more sought after than that of others by residents of other Member States.
- Since the production of music is less costly than the production of films, any potential negative dynamic effects on financing the content from removing geo-blocking restrictions (e.g. in the UK) are less of a concern.
- Any prohibition of geo-blocking for e-books would need to take cognizance of fixed price obligations imposed in several of the Member States.
Further Policy Issues on E-commerce

• What should be the welfare criterion?
  • Full *Pareto optimality*: one party is better off, and nobody is worse off
  • *Kaldor-Hicks optimality*: those that are made better off could hypothetically compensate those that are made worse off

• E-commerce Sector Inquiry: Should we rethink vertical restraints?
  • Prohibition to use price comparison tools
  • Prohibition to use market places
  • Distinction between active and passive sales?
The Cloud Computing Market

**Service Models**

- **INFRASTRUCTURE AS A SERVICE (IaaS)**
  - IaaS provides access to fundamental resources such as physical machines, virtual machines, virtual storage, etc. Example: Amazon Web Services, GoGrid, 3Tera

- **PLATFORM AS A SERVICE (PaaS)**
  - PaaS provides the runtime environment for applications, development & deployment tools, etc. Example: Azur Service Platform, force.com, Google App Engine

- **SOFTWARE AS A SERVICE (SaaS)**
  - SaaS model allows to use software applications as a service to end users. Example: Google Docs, acrobat.com, salesforce.com

**Cloud Clients**
- Web browser, Mobile App, Thin Client

**SaaS**
- CRM, E-mail, Games, Virtual Desktop

**PaaS**
- Database, Web Browser, Deployment Tools

**IaaS**
- Virtual Machines, Servers, Storage, Network
Pricing Schemes

- On-demand: Fixed price per unit of time per virtual machine
- Spot market: Auction based pricing with hourly revisions
Quality of service (Gartner Diagram)
Main findings

• Risk of interruption can be an effective price discrimination tool:
  • Customers with high valuation go to the posted price option
  • Customers with lower valuations go to the auction with the risk of interruption

• Even in the case of no capacity constraints, the revenue maximizing service provider may find profitable to make the spot service option stochastically unavailable

• The market leaders are more likely to use this stochastic mechanism

• Whenever profitable, PD is also welfare improving.
Personalized pricing and PD

• Collection and processing of customers’ data help firms to better understand customers’ preferences and design personalized selling strategies.

• The value of information may not be sufficient for first-degree PD but could lead to “almost perfect” discrimination (see Ezrachi and Stucke, 2016):

• More personalized pricing can lead to increase in profitability:
  • Shiller (2014): If Netflix had introduced a first-degree price discrimination strategy in setting its subscription fee (based on customer’s web-browsing information) it would have increased its profit by 12.2%
  • Baker, Kiewell and Winkler (2014): 8.7% increase in operating profits (assuming no loss in volume)
In contrast, Choe, King and Matsushima (2016) develop a game theoretic model that shows how the adoption of personalized pricing by two competitors can intensify market competition

- Significant first-mover advantage. Does this raise entry barriers
- More competition if competitors have also developed algorithms that facilitate personalized pricing.

Some other concerns:

- Risk-based pricing (e.g. health insurance) can be a worrisome issue (Bleiberg and West, 2015)
- Discrimination based on race, religion and other characteristics is prohibited by law. Can we guarantee that algorithms will respect that?
- How much should we know about the implemented algorithms?