

# *Accessing and analysing interoperability in the digital economy*

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**Kris Erickson**, CREATE, School of Law

**Jesus Rodriguez-Perez**, CREATE, Computer Science

**Swagatam Sinha**, Adam Smith Business School

# Digital Rights Management (DRM)

European Copyright Directive 2001/29/EC

Article 6: 'Obligations as to technological measures':

“Member States shall provide adequate legal protection against the circumvention of any effective technological measures [...] and against the manufacture, import, distribution, sale, rental, advertisement for sale or rental, or possession [...] of tools to circumvent DRM”.

CDPA § s296

# Standards, consortia and hacking

- DVD format specification created by DVD Forum [Hitachi, JVC, Sony, Phillips, Time Warner + 5 other members in 1996]
- DVD Copy Control Association → Content Scramble System + Regional Playback Control
  - Raised criminal complaint in 2002 against Jon Johansen for creating DeCSS
- CSS resides on the player, the drive and the disc and controls read, playback and region.

# Two directions for interoperability?

## 'Backward'

I have invested in a legacy device or format and I want to enjoy my old collection;

My friends use the same system and I want to share content with them.

## 'Forward'

I would like my device/content to be compatible with as many new types of device/content as possible;

I would like my device to be compatible with new products which may extend its functionality.



**H1:** Consumers value interoperability in media devices and are will pay more for features which allow them to circumvent DRM locks

**H2:** Consumers value interoperability because it enables them to access legacy content in which they have previously invested (sunk costs).

# Web crawling technique

› Television & Video › DVD Players & Recorders › DVD Players

## LG Electronics DP132 DVD Player (2014 Model)

by [LG](#)



[184 customer reviews](#) | [73 answered questions](#)

### Available from these sellers.

- Connectivity includes 1 Analog Audio 2ch Output, 1 Composite Video Out, 1 USB 2.0
- DVD/CD Playback
- USB Direct Recording with DivX Playback
- Media File Playback via USB
- HDMI Output: No

› [See more product details](#)

[8 used](#) from **\$22.18**    [4 refurbished](#) from **\$26.99**

This item's packaging will indicate what is inside and cannot be hidden.



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**Extract to Database**

# Sampling strategy

1. Scrape product category -> 'DVD Players' using Amazon Product Advertising API (Jesus)
2. Filter only category 'Electronics' to exclude automotive, computer and combination drives.
3. Take all "Home cinema" DVD players offered on or after 1<sup>st</sup> January 2016 → **n=281**



# 'Average Treatment Effect' (ATE)

Nearest-neighbour matching holding constant covariates:

Year of introduction

Major brand

HDMI

1080p Upscaling features

Used condition

Used seller rating

What is the treatment effect of DRM-circumvention features:

VCD compatibility

Region-free

Xvid/DivX playback

**Table 2: Average Treatment Effect (ATE) for different DRM-circumvention features on DVD player price when different offers are present (SE in parentheses).**

DVD player Attributes	(1)	(2)	(3)	(4)
	Lowest New price	Lowest Used Price	Lowest Combined Offer	Price differential new - used
Any_circumvention	16.199* (9.701)	17.881* (10.4033)	19.068** (7.740)	2.15 (14.539)
VCD_compatible	-4.88 (9.244)	6.616 (19.317)	-0.485 (8.040)	-16.937* (9.585)
Multi_region	34.964 (24.496)	14.1752 (23.931)	37.558* (21.942)	-9.375 (12.123)
DivX compatible	30.2035** (13.321)	8.973 (12.071)	30.364*** (10.445)	31.108 (21.572)
Observations	181	179	277	88

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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# Interpretation of results

## **H1: Consumers value Interoperability**

- Significant positive correlation: Any\_circumvention and New price
- Average increase in price of \$19 for new DVD players with Interop.
- Strongest effect observed for Xvid/DivX features
- However, including used price appears to increase importance of region-free

## **H2: Consumers value backwards interoperability due to sunk costs**

- Limited support.
- No sig. result for VCD format or Region-free features on new price
- Not able to measure used value depreciation due to limited cases
- Future research --→ BluRay, larger sample, longer time period



# Thank you!

Please get in touch with the authors by email:

[Kristofer.erickson@glasgow.ac.uk](mailto:Kristofer.erickson@glasgow.ac.uk)