# NBER Research Proposal

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We hereby submit a research proposal directed towards the Digitization group in response to the NBER's Call for Research Proposals on Digitization, Productivity, Innovation and Entrepreneurship.

Digitization and the dissemination of broadband Internet brought along a phenomena commonly known as digital piracy whereby copyrighted content - software, music, books, movies, and video games - is illegally distributed and accessed on the web. Prior research has studied how digital piracy impacts sales and societal welfare. A number of works have also looked at how factors such as product quality, search costs, legal prosecution and competition from legal channels impact piracy activity (Peitz and Waelbroeck, 2006; Rob and Waldfogel, 2006; Zentner, 2006; Waldfogel, 2010; Smith and Telang, 2009; Danaher et al., 2010; Geng and Lee, 2013; Danaher and Smith, 2014; Danaher et al., 2014; Aguiar et al., 2015; Godinho de Matos et al., 2015).

Different countries around the world have taken different measures to address piracy. Some countries act on the supply side of the market - increased DRM protection, website shutdowns (Germany), blocking of websites (Denmark, UK, Italy, Ireland, Portugal) and criminal prosecution of providers (US, Sweden). Other countries act on the demand side of the market - criminal prosecution of end users (U.S.), three strikes laws banning users from accessing the internet (France, New Zealand) and public educational campaigns (UK). Some countries pursue mixed strategies.

In this project we propose to study the impact of anti-piracy policies across the globe, focusing on the effect that website blocking may have on Bit Torrent activity both in the short-run and in the long-run. Website blocking consists in a legal order to Internet Service Providers to deny their subscribers access to websites providing copyright infringing content. Some countries implement traffic blocking at IP level, others use DNS blocking and others use a combination of both strategies. Blocking can be applied to long lists of infringing websites in batches. Blocking websites makes it harder to access media content illegally on the Internet. This can be an effective strategy to reduce piracy if pirates turn to legal distribution channels.

Website blocking differs from website shutdown because with the former ISPs block the users' access to websites but the websites remain in operation. Because neither the website nor the links that it points to are removed from the internet, these infringing websites can be accessed by subscriber's of other ISPs (that do not block access) or by sophisticated subscribers of the ISPs restricting access – e.g. users that resort to technologies such as virtual private networks or that change their domain name server resolution protocol to allow them to circumvent the block.

The loopholes associated to website blocking may, however, backfire. For example, blocking one website may result in new websites coming up all providing illegal access to media content. Blocking access to a myriad of new websites might be harder than blocking access to one single website – the one that was up before any blocking started. Also, blocking access to websites may translate into unintended consequences for the ISPs such as bad word-of-mouth.

We propose to analyze consumer responses to website blocking in this paper. To this end, we have obtained anonymized data on worldwide Bit Torrent activity aggregated by ISP covering a period of 4 years (2012-2016). This dataset includes Bit Torrent stream counts by type content exchanged (e.g. music, movie, software, encrypted) per month and per ISP. These data allows us to perform a cross country comparison of piracy behavior and explore the heterogeneous effects of different website blocking approaches - court ordered or not, individual target or batch blocking, IP or DNS blocking - on consumer behavior across countries both in the short-run and in the long-term.

In order to better understand the effect of website blocking policies, we propose to complement the above mentioned country level analysis with an in-depth case study of the effect of website blocking in a specific country for which we obtained household level data through an ongoing collaboration with a local ISP. Our individual level dataset contains anonymized records of Internet traffic volumes, BitTorrent usage volumes, use of the company's Video On Demand service, and a snapshot of each household's social network derived from cell phone call detailed records. A preliminary analysis of these data suggests that the impact of website blocking in this country although short lived increased consumption in legal distribution channels that would not have otherwise happened.

We also propose to use our individual level dataset to extend our analysis to learn what role social networks (identified from the call detailed records) may play in the process of learning how to circumvent website blocking as well as in the adoption of more sophisticated piracy behaviors such as the use of proxy networks and encryption that ultimately will make it harder to identify and prevent piracy. In short, do users influence their friends to commit piracy? Do friends exchange information about how to best circumvent anti-piracy strategies? Do friends help each other identifying websites that provide illegal access to media content and website blocking is used?

Finally, as a by-product of our research, we plan to assemble and make freely available to our peers, a database of policy decisions, court orders and country specific legislation worldwide, which will characterize when and by which means website blocking is taking place across the globe. We believe that such a dataset will provide valuable knowledge on the evolution of anti-piracy policies over time in different geographical regions around the globe and that our analysis will inform firms and policy makers about what are the most effective strategies to limit digital piracy.

# References


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Danaher, B. and Smith, M. D. (2014). Gone in 60 seconds: The impact of the megaupload shutdown on movie sales. *International Journal of Industrial Organization*, 33:1–8.

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Geng, X. and Lee, Y.-J. (2013). Competing with piracy: A multichannel sequential search approach. *Journal of Management Information Systems*, 30(2):159–184.

Godinho de Matos, M., Ferreira, P., and Smith, M. D. (2015). The effect of television content on pirates online activity: Evidence from a randomized experiment. *SI 2015 Economics of IT and Digitization Workshop, National Bureau of Economic Research*.

Peitz, M. and Waelbroeck, P. (2006). Piracy of digital products: A critical review of the theoretical literature. *Information Economics and Policy*, 18(4):449–476.

Rob, R. and Waldfogel, J. (2006). Piracy on the high cs: Music downloading, sales displacement, and social welfare in a sample of college students. *Journal of Law and Economics*, 49(1):29–62.

Smith, M. D. and Telang, R. (2009). Competing with free: the impact of movie broadcasts on DVD sales and internet piracy 1. *MIS Quarterly*, 33(2):321338.

Waldfogel, J. (2010). Music file sharing and sales displacement in the itunes era. *Information Economics and Policy*, 22(4):306–314.

Zentner, A. (2006). Measuring the effect of file sharing on music purchases. *Journal of Law and Economics*, 49(1):63–90.

# MAY 2016, MIGUEL GODINHO DE MATOS CURRICULUM VITAE


| | |
|---|---|
| **Name** | Miguel Maria Castro Melo Godinho de Matos |
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## RESEARCH INTERESTS

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|---|---|
| Primary | Economics of Digitization; Consumer Behavior; Social Network Analysis and Peer influence |
| Secondary | Telecommunications and Media; Applied Econometrics; Big Data |

## TEACHING INTERESTS

Big Data Analytics, Data Mining, Business Forecasting, Business Statistics, Econometrics, Social Network Analysis

## EDUCATION

| | | |
|---|---|---|
| **2009- 2013** | **CARNEGIE MELLON UNIVERSITY, *Pittsburgh (USA)*** | |
| | Doctoral Degree in Engineering & Public Policy | |
| **2009- 2011** | **CARNEGIE MELLON UNIVERSITY, *Pittsburgh (USA)*** | 3.9 (of 4.0) |
| | Masters Degree in Engineering & Public Policy | |
| **2008** | **EUROMONEY TRAINNING, *Prague (Czech Republic)*** | |
| | Valuation & Financial Analysis Training | |
| **2005-2007** | **INSTITUTO SUPERIOR TÉCNICO, *Lisbon (Portugal)*** | 19 (of 20) |
| | Masters Degree in Computer Engineering | |
| **2006-2007** | **T.U.DELFT, *Delft (The Netherlands)*** | |
| | Erasmus | |
| **2002-2005** | **INSTITUTO SUPERIOR TÉCNICO, *Lisbon (Portugal)*** | 18 (of 20) |
| | Bachelor Degree in Computer Engineering | |

## ACADEMIC POSITIONS

| | |
|---|---|
| **From Sep 2014** | **UNIVERSIDADE CATÓLICA PORTUGUESA (CLSBE) – *Assistant Professor*** |
| *Lisbon* | Assistant professor of Information Systems and Management at Católica Lisbon School of Business and Economics |
| *Portugal* | |
| **From Sep 2014** | **CARNEGIE MELLON UNIVERSITY (CMU) – *Visiting Research Scholar*** |
| *Pittsburgh* | Visiting Research Scholar at the Heinz College of Carnegie Mellon University (CMU). Working with Professor Pedro Ferreira on in-vivo experiments in social networks. |
| *U.S.A.* | |
| **2013-2014** | **UNIVERSIDADE CATÓLICA PORTUGUESA (CLSBE) – *Post Doctoral Researcher*** |
| *Lisbon* | Post Doctoral Researcher Católica Lisbon School of Business and Economics working with Francisco Veloso studying the impact of content recommendation systems on consumer choice. |
| *Portugal* | |

**2013-2014** **CARNEGIE MELLON UNIVERSITY (CMU) – *Post Doctoral Researcher***

*Pittsburgh U.S.A*

Post Doctoral Researcher at the Heinz College of Carnegie Mellon University (CMU) working with professors Pedro Ferreira and Rahul on the analysis of social networks and peer influence on consumer behavior.

**2011-2011** **CARNEGIE MELLON UNIVERSITY (CMU) – *Teaching Assistant***

*Pittsburgh U.S.A*

Teaching assistant for the Engineering and Public Policy Department at Carnegie Mellon University. I lectured the graduate level course "*Telecommunications, Technology Policy and Management"* chaired by Professor Marvin Sirbu

## GRANTS AND AWARDS

**2016** **Principal Investigator for an unrestricted $12,000 gift for research** from Carnegie Mellon University to conduct research on digital media to complement the 2015 grant received from IDEA

**2015** **Principal Investigator for an unrestricted $20,000 gift for research** from the Initiative for Digital Entertainment Analytics (IDEA) at Carnegie Mellon University to conduct research on consumer behavior in digital media channels and digital piracy (paper currently being finalized: *The Effect of Television Content on Pirate's Online Activity: Evidence From a Randomized*)

**2013** Post Doctoral Research Grant SFRH/BPD/94212/2013 awarded from the Portuguese Foundation for Science and Technology (36,000€)

**2009 - 2013** Doctoral Grant SFRH/BD/33772/2009 awarded from the Portuguese Foundation for Science and Technology the Carnegie Mellon Portugal Program. (Full Tuition + Stipend)

**2006** Scholarship SINFO XII 2006 for extracurricular activities awarded by the Information Systems Department of Instituto Superior Técnico for academic merit

**2005** Best Student Award 2005/2006 conceded for excellent academic performance by Instituto Superior Técnico

## WORKING PAPERS

Godinho de Matos, Miguel, P.A. Ferreira and Rodrigo Belo (July 2015). Target the ego or target the group? The value of friends in consumer retention efforts, evidence from a randomized experiment

Godinho de Matos, Miguel, P.A. Ferreira and Michael D. Smith (July 2015). The Effect of Television Content on Pirate's Online Activity: Evidence From a Randomized Experiment (**Revise & Resubmit @ Management Science**)

Godinho de Matos, Miguel, P.A. Ferreira and Rodrigo Belo (Feb 2015). Word of mouth in video-on-demand: Evidence from a randomized experiment **(Revise & Resubmit @ Management Science)**

Belo, Rodrigo, P.A. Ferreira, Miguel Godinho de Matos and Filipa Reis (Jan 2015). Prime Time Any Time: The Effect of Time-Shifted TV on Media Consumption

Ferreira, Pedro, Rahul Telang and Miguel Godinho de Matos (Jan 2014). Identifying Contagious Churn in Cell Phone Networks

## EARLY STAGE WORKING PAPERS

P.A. Ferreira, Godinho de Matos, Miguel, Baojiang Yang (Jan 2015). Quantifying the welfare impact of lockin period in the telecommunications industry

Belo, Rodrigo, P.A. Ferreira, Godinho de Matos, Miguel, Xiaochen Zhang (Jan 2015). Recommender Systems and Consumer Welfare: Results from a Randomized Experiment in Video-on-Demand

Belo, Rodrigo, P.A. Ferreira, Godinho de Matos, Miguel, Xiaochen Zhang (May 2015). Personalization, Price Discrimination and Recommender Systems

## JOURNAL PAPERS PEER REVIEWED

Godinho de Matos, Miguel, P.A. Ferreira, Michael D. Smith and Rahul Telang (March 2016). Culling the herding: Using real world randomized experiments to measure social bias with known costly goods, Management Science, Articles in Advance

Godinho de M. M; Ferreira, Pedro A; Krackhardt, David. 2014. Peer Influence In The Diffusion Of The IPhone 3G Over a Large Social Network, Management Information Systems Quarterly (MISQ) 38, 4: 1103 - A15.

Wilhelm, Stefan, and Miguel Godinho de Matos (2013). Estimating Spatial Probit Models in R, The R Journal, Volume 5, p130-143

## CONFERENCE PROCEEDINGS PEER REVIEWED

Godinho de Matos, Miguel, P.A. Ferreira and Michael D. Smith (July 2015). The Effect of Television Content on Pirate's Online Activity: Evidence From a Randomized Experiment, The National Bureau of Economic Research Summer Institute (NBER), Cambridge, Massachusetts 16-19th July 2015

Godinho de Matos, Miguel, P.A. Ferreira and Rodrigo Belo (May 2015). Target the ego or target the group? The value of friends in consumer retention efforts, evidence from a randomized experiment **Forthcoming at** 13th ZEW Conference on The Economics of Information and Communication Technologies

Godinho de Matos, Miguel, P.A. Ferreira and Rodrigo Belo (Oct 2014) Price Discounts and Peer Effects in Information Goods: Results from a Large Scale Organic in-Vivo Randomized Experiment, The Conference on Digital Experimentation, MIT 10-11th October

Belo, Rodrigo, Miguel Godinho de Matos and P.A. Ferreira (2013). Prime Time Any Time: The Effect of Time-Shifted TV on Media Consumption, 23rd Workshop on Information Technology and Systems, Milan 19-20 December

Godinho de Matos, Miguel, P.A. Ferreira, Michael D. Smith, Rahul Telang (2013). The Impact of Likes on the Sales of Movies in Video-on-Demand: a Randomized Experiment, 23rd Workshop on Information Technology and Systems, Milan 18-20 December

Belo, Rodrigo, Miguel Godinho de Matos and P.A. Ferreira (2013). Prime-Time Any Time: The Effect of Time-Shifted TV on Media Consumption, 41st TPRC, George Mason University, Washington DC, 28-29th September 2013

Godinho de Matos, Miguel, P.A. Ferreira, Michael D. Smith and Rahul Telang (2013). The Impact of Likes on Sales of Movies in a VoD System: A Randomized Experiment, Economics of Digitization, The National Bureau of Economic Research Summer Institute (NBER), Cambridge, Massachusetts 18-19th July 2013

Godinho de Matos, Miguel, P.A. Ferreira, Rahul Telang and Michael D. Smith (2013). The Impact of Popularity on Sales of Movies in a VoD System: A Randomized Experiment Economics of Digitization, The National Bureau of Economic Research (NBER), Stanford, California, 8th March

Godinho de Matos, Miguel, P.A. Ferreira and David Krackhardt (2012). Peer Influence in Product Diffusion Over a Very Large Social Network, International Conference on Information Systems (ICIS2012), Orlando, Florida, 16-19 December 2012

Godinho de Matos, Miguel, P.A. Ferreira and David Krackhardt (2012). Peer Influence and Homophily in Product Diffusion Over a Very Large Social Network, International Conference on Social Computing (SocialCom2012), Amsterdam, The Netherlands, 3-5 September 2012

Godinho de Matos, Miguel, P. A. Ferreira (2011). Entry in Telecommunication Markets: Determining the Industry's Market Structure, Carnegie Mellon University, 39th TPRC, George Mason University, Washington DC

## CONFERENCE PRESENTATIONS PEER REVIEWED

Belo, Rodrigo, P.A. Ferreira and Miguel Godinho de Matos (2014). "The Effect of Streaming Time-shifted TV on TV Consumption, Statistical Challenges in eCommerce Research Symposium, Tel Aviv, Israel, June 11-13, 2014.

Godinho de Matos, Miguel, P.A. Ferreira, Rahul Telang and Michael D. Smith (2013). The Impact of Likes on Sales of Movies in a VoD System: A Randomized Experiment, Statistical Challenges in eCommerce Research Symposium, Lisbon, Portugal, June 27-28, 2013.

Godinho de Matos, Miguel, P.A. Ferreira and David Krackhardt (2012). Peer effects on iPhone 3g adoptions, Statistical Challenges in eCommerce Research Symposium, Montreal, Quebec, June 28-29, 2012.

## STUDENT ADVISING

Xiaochen (Jamea) Zhang, Department of Engineering and Public Policy, Carnegie Mellon University, working on the effects recommender systems on firm profits and consumer surplus (I am member of the thesis committee that is chaired by Professor Pedro Ferreira)

Baojiang (Chris) Yang, Department of Engineering and Public Policy, Carnegie Mellon University, working on the effects of product bundling and consumer choices in telecommunications (I am member of the thesis committee that is chaired by Professor Pedro Ferreira)

Filipa Reis, Heinz College, Carnegie Mellon University, working on peer effect of telecommunication networks and media consumption (I am member of the thesis committee that is chaired by Professor Pedro Ferreira)

## SERVICE & OTHER ACTIVITIES

**2014-Today** Reviewer for the Management Information Systems Quarterly Journal

**2013** Treasurer and Member of the local organizing committee of the Statistical Challenges in eCommerce Research Symposium that took place at Católica Lisbon School of Business and Economics in Lisbon, Portugal

## INDUSTRY POSITIONS

**2011-Present** **Telecommunications Firms – *External Consultant in Business Analytics***

*Europe & Singapore*

Have been leading several business analytics projects including the development of models for predicting consumer churn, the development of models of time series for forecasting video-on-demand sales, the design and implementation of field experiments for the analysis of user ratings and popularity information on movie sales and for determining the price elasticity of demand for movie titles in video-on-demand. Have also developed several algorithms for inferring television audiences from set-top-box clickstream data and for obtaining consumer insights from the analysis of call detail records.

**2008-2009** **BANCO FINANTIA – *Senior Corporate Finance Analyst***

*Lisbon Portugal*

Supported clients throughout their entire investment process. My work involved firm valuation, business plan design, due diligence coordination and sectorial research. I worked mainly with clients from Brazil, Spain and Portugal. My industry focus was on telecommunications, but I also worked in energy and in the healthcare sector.

**2007-2008** **MCKINSEY&COMPANY - BTO - *Business Analyst***

*Lisbon Portugal*

I was a member of the Business Technology Office and served one of the most important banking players in Portugal. Among other engagements, I helped redesign the bank's entire credit workout division.