Freemium in Digital Markets: Evidence from an Online Game

Research Question

We propose to analyse the effectiveness of the *freemium* pricing model, which has proliferated in online markets, spanning news publishing, music streaming, consumer software, online gaming, online retailing, professional networking platforms, dating sites etc. Freemium refers to a hybrid pricing model combining free and paid features of a product - basic features of a product can be used for free while more advanced features or more intensive use requires the payment of a fee. Examples across different markets are easy to come by: the *New York Times* offers 10 free articles a month but requires payment to access additional articles, *Dropbox* offers a certain back-up volume for free but charges monthly subscription fees for increased volumes, *Microsoft* allows consumers to use a set of features of its MS Office suite for free while access to the full functionality requires a subscription, and infamous *Candy Crush* can be played for free although advanced features that affect the game experience have to be purchased.

Despite the wide-spread use of the freemium pricing model, little is known about its effectiveness or how consumer demand responds to such type of pricing. In our project, we will combine experimental data with extremely detailed information on user activity of a popular online game by mobile games producer *Wooga* to address this question empirically. The data offer experimental variation with regard to one of the key in-app triggers to convert players from free to paying users. We rely on this experimental variation and the ability to closely track individual player in-app behaviour for nearly 300,000 players over time to examine how players make in-app purchasing decisions.

Our aim is to examine two specific questions. First, how profitable is it for firms to sell their services via the "freemium" format rather than via the traditional "first pay, then consume" format? Second, do consumers benefit from consuming services via freemium rather than through pay-first pricing (consumer surplus)?

Studying the design of freemium pricing in the mobile gaming industry, which accounts for over three quarters of total app revenue in the major app stores (Forbes, November, 1st, 2013), is particularly insightful because game developers collect around 90% of their revenues through different forms of freemium pricing. However, our insights could also be of obvious relevance to companies in other markets that apply or consider applying some form of the freemium pricing model.

Experiment & Empirical approach

To analyze our research questions, we will estimate a structural model of player demand and optimal pricing on the side of the firm. A structural model is necessary to infer the counterfactual 'pay-first' pricing outcomes, in an environment where we only observe the equilibrium outcomes based on freemium. Our estimated counterfactuals will allow us to evaluate the overall effectiveness of the freemium model.

The identification of our counterfactuals hinges crucially on the experimental variation available in the data. In Jelly Splash, players have to move past "gates" in regular intervals to move forward in the game. Gates can be unlocked either by accumulating a sufficient number of stars from prior play performance or by purchasing access. Accumulating a sufficient number of stars is free, but it usually means that players have to re-play a number of levels multiple times ("grinding") in order to obtain the number of stars required to unlock the gate. Players encounter the first of such gates at level 40. In an experiment, the first gate was moved to level 20 for a random subset of players. We focus on all players that were part of the experiment and hence split into a treatment (gate at level 20) and control (gate at level 40) group.

We model the demand function of an individual as making dynamic decisions about whether to continue playing the game or not. We focus on the following choices: (a) continue after level $l = 20$, (b) quit between levels $l = 20$ and $l = 40$, (c) continue after level $l = 40$.[1] Players randomly face the first gate at level $l = 20$ or $l = 40$. When they face the gate, they can purchase access, where the purchasing price depends on the player's earlier performance. In other words, the option to either pay or grind allows us to compute a 'residual price' that a player faces at the gate since grinding may be relatively more or less difficult depending on the number of stars accumulated in previous levels. Using this residual price, we can estimate the probability of purchase at level $l = 20$ and level $l = 40$.

We model the firm's supply function assuming the firm is a quantity-setting monopolist that sells a single good. We then take the firm's equilibrium supply function and plug in our price elasticity estimates from the demand function to obtain a predicted value for the firm's marginal costs. Armed with this estimate, the predicted marginal cost, as well as our estimates on price elasticity, we can *simulate* the optimal prices the firm should set at level $l = 20$.

In summary, our analysis allows us to make welfare comparisons between a counterfactual world with optimal pricing at level $l = 20$, and an observed world with optimal pricing at level $l = 40$. This comparison is informative about the "value" of freemium because we are simulating how market outcomes would change if consumers were asked to make their purchase decision earlier in time.

RESEARCH TEAM AND BUDGET

Researchers:

- Christian Helmers (Assistant Professor, Santa Clara University, USA)
- Alessandro Iaria (Assistant Professor, CREST/ENSAE, France)
- Manasa Patnam (Assistant Professor, CREST/ENSAE, France)
- Julian Runge (PhD Student, Humboldt University; Wooga, Germany)
- Stefan Wagner (Associate Professor, ESMT, Germany)

Budget – total requested $15,000:

- Research assistance (data cleaning and preparation): $9,000
- Travel (collaboration and workshops/conferences): $6,000

[1] We also plan to address the possibility that some players in the control group that go beyond level $l = 20$ may decide to drop out of the game even before reaching the purchase decision at level $l = 40$. Note that our analysis allows us to ignore player behavior before level 20.

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ACADEMIC POSITIONS

01/2014-	Assistant Professor, Department of Economics, Santa Clara University
01/2011-08/2013	Assistant Professor, Department of Management, Universidad Carlos III, Madrid
06/2010-12/2010	Research Economist, London School of Economics
02/2013-12/2013	Visiting Research Scholar, Department of Agricultural & Resource Economics, UC Berkeley
07/2012-10/2012	Visiting Researcher, Economics Division, World Intellectual Property Organization (WIPO)
01/2012-06/2012	Visiting Research Scholar, Department of Economics, Stanford University
06/2011-09/2011	Visiting Researcher, Ludwig Maximilians University (LMU) Munich, INNO-tec
11/2009-05/2010	Visiting Research Scholar, Department of Economics, UC Berkeley

EDUCATION

2006-2010	DPhil in Economics, Department of Economics, University of Oxford
2005-2006	MSc in Economics for Development, University of Oxford (with Distinction)
2005-2007	Advanced Studies Programme, Kiel Institute for World Economics (IfW)
2002-2005	Licence (B.A.), Economics, HEC University of Lausanne
2002	Exchange Program, Catholic University of Rio de Janeiro (PUC-Rio)
2000-2002	Economics & Management, Catholic University of Eichstätt-Ingolstadt, Germany

AFFILIATIONS

2011 -	Research Associate – Centre for the Study of African Economies (CSAE), Oxford
2011 -	Research Associate – LSE SERC
2008 -2014	Research Affiliate – Kiel Institute for World Economics (IfW)

ENTREPRENEURSHIP

2015	www.mykubby.com

PUBLICATIONS

Patent Litigation in Europe, with Katrin Cremers, Maximilian Ernicke, Dietmar Harhoff, Luke McDonagh, Paula Schliessler, Nicolas van Zeebroeck, ***European Journal of Law and Economics***, forthcoming

My precious! The location and diffusion of scientific research: evidence from the Synchrotron Diamond Light Source, with Henry Overman, ***Economic Journal***, forthcoming

Patent Litigation in China: Protecting Rights or the Local Economy?, with Brian Love and Markus Eberhardt, ***Vanderbilt Journal of Entertainment and Technology Law***, forthcoming

Inter Partes Review and the Design of Post-Grant Patent Reviews, with Colleen Chien, ***Stanford Technology Law Review***, forthcoming

An Empirical Analysis of Primary and Secondary Pharmaceutical Patents in Chile, with Maria-Jose Abud and Bronwyn Hall, ***PLOS ONE***, DOI: 10.1371/journal.pone.0124257.

The choice between formal and informal intellectual property: a review, with Bronwyn Hall, Vania Sena, and Mark Rogers, ***Journal of Economic Literature***, Vol. 52(2), pages 375-423 (2014).

Does the Rotten Child Spoil his Companion? Spatial Peer Effects Among Children in Rural India, with Manasa Patnam, ***Quantitative Economics***, Vol. 5(1), pages 67-121 (2014).

The Impact of University Research on Corporate Patenting: Evidence from UK Universities, with Mark Rogers, ***Journal of Technology Transfer***, forthcoming

Is there a patent troll problem in the UK?, with Luke McDonagh and Brian Love, ***Fordham Intellectual Property, Media, and Entertainment Law Journal***, Vol. 24, pages 509-553 (2014).

Innovation and Diffusion of clean/green technology: Can patent commons help?, with Bronwyn Hall, ***Journal of Environmental Economics and Management***, Vol. 66(1), pages 33-51 (2013).

Patent Litigation in the UK - An Empirical Survey 2000-2008, with Luke McDonagh, ***Journal of Intellectual Property Law and Practice***, Vol. 8(11), pages 846-861 (2013).

Do Spillovers Matter When Estimating Private Returns to R&D?, with Markus Eberhardt and Hubert Strauss, ***The Review of Economics and Statistics***, Vol. 95(2), pp. 436-448 (2013).

The importance (or not) of patents to UK firms, with Bronwyn Hall, Vania Sena, and Mark Rogers, ***Oxford Economic Papers***, Vol. 65(3), pp. 603-629 (2013)

Patent litigation in England and Wales and the issue-based approach to costs, with Luke McDonagh**,** ***Civil Justice Quarterly***, Vol. 32(3), pp. 369-384 (2013).

The use and abuse of export subsidies: Evidence from Colombia, with Natalia Trofimenko, ***The World Economy***, Vol. 36(4), pp. 465-486 (2013)

The Formation and Evolution of Childhood Skill Acquisition: Evidence from India, with Manasa Patnam, ***Journal of Development Economics***, Vol. 95, pp. 252-266 (2011)

Does Patenting Help High-Tech Start-Ups?, with Mark Rogers, ***Research Policy***, Vol. 40, 1016-1027 (2011)

Innovation and the Survival of New Firms in the UK, with Mark Rogers, ***Review of Industrial Organization***, Vol. 36, No. 3, pp. 227-248 (2010)

The role of patent protection in (clean) technology transfer, with Bronwyn Hall, ***Santa Clara Computer and High Technology Law Journal***, Vol. 26 (4), pp. 487-532 (2010)
Reprinted in Peter Menell and Sarah Tran (eds.) 'Intellectual Property, Innovation and the Environment,' Edward Elgar, forthcoming 2013

Firm Growth and Firm Size, with Christoffer Koch and Mark Rogers, ***Applied Economics Letters***, Vol. 17 (16), pp. 1547-1550 (2010)

SUBMITTED WORKING PAPERS

What Can Explain the Chinese Patent Explosion?, with Markus Eberhardt and Zhihong Yu, CSAE Working Paper 2011-15 (*revised & resubmitted Oxford Economic Papers*)
[media coverage: BBC World Service, China Daily, Il Sole 24ore, FT Investment Adviser]

Invalid but Infringed?! An Analysis of the Bifurcated Patent Litigation System, with Katrin Cremers, Fabian Gässler, Dietmar Harhoff, and Yassine Lefouili (*revise & resubmit Journal of Economic Behavior & Organization*)

Technology Entry in the Presence of Patent Thickets, with Bronwyn Hall, and Georg von Graevenitz, NBER WP 21455.

Do Board Interlocks Increase Innovation? Evidence from Natural Experiments in India, with Manasa Patnam and Raghavendra Rau

Trademark Squatters: Theory and Evidence from Chile, with Carsten Fink and Carlos Ponce

The heterogeneous effect of software patents onexpected returns: evidence from India, with Markus Eberhardt, Marcel Fafchamps, and Manasa Patnam

Looking for Trouble? Technological Change and the Growing Importance of Patents for Telecom Operators, with Andrea Fosfuri and David Wehrheim

Attention and Saliency on the Internet: Evidence from an Online Recommendation System, with Pramila Krishnan and Manasa Patnam, CEPR Discussion Paper No. 10939

Choose the Neighbor before the House: Agglomeration Externalities in UK Science Parks, Winner of best paper award "Centro Stefano Franscini – ETH Zürich"

Untested Assumptions and Data Slicing: A Critical Review of Firm-Level Production Function Estimators, with Markus Eberhardt, Oxford University, Department of Economics Discussion Paper No. 513

WORKING PAPERS

Does Online Search Increase Sales? Evidence from Big Data for Car Markets in Germany and the UK, with Valentine Millot, Oliver Turnbull, Eddie Wilson, and Georg von Graevenitz

Shared Ownership of Intangible Property Rights: The Case of Patent Co-Assignments, with Andrea Fosfuri and Catherine Roux

The Effect of Market Entry on Innovation - Evidence from UK University Incubators, CEP Discussion Paper No. 1002. [media coverage: Times Higher Education]

The Impact of International Patent Systems: Evidence from Accession to the European Patent Convention, with Bronwyn Hall

WORK IN PROGRESS

Incentives to Litigate: Evidence from a Court Reform in the UK, with Yassine Lefouili and Luke McDonagh

The Impact of Foreign Pharmaceutical Patents on Innovation in Chile, with Bronwyn Hall

Measuring Brand Value Using Product Recall Shocks, with Valentine Millot and Georg von Graevenitz

DATA

The Use of Intellectual Property in Chile, with Maria-Jose Abud, Carsten Fink, and Bronwyn Hall, WIPO Economic Research Working Paper No. 11

Intellectual Property at the Firm-Level in the UK: The Oxford Firm-Level Intellectual Property Database, with Mark Rogers and Philipp Schautschick Oxford University, Department of Economics Discussion Paper No. 546
Corresponding data available at: http://www.epip.eu/datacentre.php

R&D expenditure and capital in Europe, with Christian Schulte and Hubert Strauss, EIB Papers, Volume 14, Issue 1.
Corresponding data available at: www.eib.org/attachments/r-d-cap-stocks-22-countries.xls

BOOK CHAPTERS

Patent Assertion Entities in Europe, with Brian J. Love, Fabian Gaessler, Max Ernicke, in Daniel Sokol (Editor), Patent Assertion Entities and Competition Policy, Cambridge University Press, forthcoming

Trade Marks and Performance in UK firms, with Mark Rogers, in Teresa da Silva Lopes and Paul Duguid (eds.) 'Trade Marks, Brands and Competitiveness,' Routledge.

GUEST EDITOR

Introduction to the Special Issue on Innovation and Intellectual Property, with Christine Greenhalgh and Jonathan Haskel, ***Oxford Economic Papers***, Vol. 65(3), pp. 597-602 (2013)

OTHER WRITING

Patent Litigation in China: protecting rights or the local economy, with Brian Love and Markus Eberhardt, Intellectual Asset Management, http://www.iam-media.com/Magazine/Issue/76/Features/Patent-litigation-in-China-protecting-rights-or-the-local-economy (February 2016)

Attention and saliency on the internet: Evidence from an online recommendation system, with Pramila Krishnan and Manasa Patnam, VoxEU, http://www.voxeu.org/article/attention-and-saliency-internet (January 2016)

AstraZeneca's move will increase the North-South divide, with Henry Overman, Times Higher Education http://www.timeshighereducation.co.uk/comment/opinion/astrazenecas-move-will-increase-north-south-divide/2003820.article (May 2013)

How to achieve diffusion of green technology? Can Patent Commons Help?, with Bronwyn Hall, United Nations University http://unu.edu/articles/science-technology-society/can-patent-commons-help-diffusion-of-green-technologies#christian-helmers (October 2011)

China: From Imitator to Innovator, with Markus Eberhardt and Zhihong Yu, VoxEU http://www.voxeu.eu/index.php?q=node/7028 (September 2011)

What makes science parks successful?, University World News, http://www.universityworldnews.com/article.php?story=2011050709095848 (May 2011)

Green Technology and Intellectual Property, with Bronwyn Hall, in `Climate Change: Current Issues,' IfW Institute for the World Economy (April 2011)

The impact of university research on corporate patenting: New evidence from the UK, with Mark Rogers VoxEU http://www.voxeu.org/index.php?q=node/5949 (December 2010)

Intellectual property and climate change, with Bronwyn Hall VoxEU http://www.voxeu.org/index.php?q=node/5706 (October 2010)

POLICY RELATED WRITTEN WORK

INTELLECTUAL PROPERTY and R&D

2015 *Examining Patent Cases at the Patents Court and Intellectual Property Enterprise Court 2007-2013*, with Luke McDonagh and Yassine Lefouilli, UK Intellectual Property Office.

2013 *The Use of Intellectual Property Right Bundles by Firms in the UK*, with Philipp Schautschick, UK Intellectual Property Office.

2013 *Intellectual property rights and high-growth firms in the UK*, with Georg von Graevenitz, Christine Greenhalgh, and Philipp Schautschick, UK Intellectual Property Office.

2012 *A Study of Patent Thickets*, with Bronwyn Hall, Georg von Graevenitz, and Chiara Rosazza-Bondibene, UK Intellectual Property Office.

2012 *Report on the EPO's Economic and Scientific Advisory Board's Workshop on Patent Quality*, European Patent Office.

2011 *Trademark Cluttering*, with Georg von Graevenitz, Christine Greenhalgh, and Philipp Schautschick, UK Intellectual Property Office.

2011 *The importance of patents and other formal intellectual property in comparison to informal protection methods*, with Bronwyn Hall, Vania Sena, and Mark Rogers, UK Intellectual Property Office.

2010 *Intellectual property, exporting, and UKTI support for export capability building*, with Mark Rogers, UK Trade & Investment (UKTI)

2009 *A literature review on the efficiency and effectiveness of university technology transfer offices and hybrid commercialisation models*, Mark Rogers, David Baghurst and Terry Pollard, Strategic Advisory Board for IP policy and UK Intellectual Property Office.

2009 *An Analysis of the Innovative Activity of Entrepreneurial and Young Firms in the UK*, with Mark Rogers, UK Department for Business, Innovation and Skills (BIS) and OECD

2008 *High Growth Firms in the UK*, with Mark Rogers, UK Department for Business, Enterprise and Regulatory Reform (BERR) – BERR Economics Paper No. 3

INTERNATIONAL TRADE

2009 *The Role of Trade Policy in Reducing Ukraine's Current Account Deficit - Lessons from Abroad*, with Ricardo Giucci, Veronika Movchan and Kateryna Kutsenko, Institute for Economic Research IER Policy Paper 01/2009

2007 *Analysis of International Trade in Services: Mongolia, with Miles Light, GTZ*, USAID, and Mongolian Ministry for Industry and Trade.

2006 *Assessing Bilateral Trade Potential at the Commodity Level*, with Jean-Michel Pasteels, ITC UNCTAD/WTO Working Paper 2006-11.

2006 *Options for Mongolia for the Formation of Bilateral Free Trade Agreements - Options in Merchandise Trade: An Overview; GTZ*, UNDP, USAID, and Mongolian Ministry for Industry and Trade.

2005 *TradeSim3: A Gravity Model for the Calculation of Trade Potentials for Developing Countries and Countries in Transition*; with Jean-Michel Pasteels, ITC UNCTAD/WTO Working Paper 2005-05.

CONFERENCES/SEMINARS

2016 Santa Clara University

2015 Santa Clara University, UC Berkeley; 13th International Industrial Organization Conference, Boston; Bay Area IP Scholars Workshop, Berkeley; Economic Analysis of Litigation, Torino; 6th ZEW/MaCCI Conference on the Economics of Innovation and Patenting; UC Berkeley; NBER Summer Institute (Digitization), Latin American and Caribbean Economic Association Annual Meeting, Santa Cruz.

2014 Latin American and Caribbean Economic Association Annual Meeting, São Paulo; 9th Annual Conference of the EPIP Association, Brussels; 41st Annual Conference EARIE, Milan; European Finance Association 41st Annual Meetings, Lugano; 14th Annual Intellectual Property Scholars Conference, Berkeley; ZEW Economics of ICT Conference; 12th International Industrial Organization Conference, Chicago; Santa Clara University; "Beyond Spillovers?" University of Kassel.

2013 American Economic Association Meetings San Diego; NBER Summer Institute (IPE); UC Merced; UC Berkeley; UC Davis; Santa Clara University; EPFL Lausanne; Tsinghua University; Royal Economic Society Conference; 5th ZEW/MaCCI Conference on the Economics of Innovation and Patenting; Barcelona GSE Summer Forum Economics of Science and Innovation; Rovira i Virgili; European Commission JRC Seville; USPTO-NYU Trademark Workshop; MEIDE Santiago de Chile.

2012 Empirical Studies of Trademark Data, University of Oxford; Universitat de Barcelona; University of Zürich; WIPO; 12th Annual Intellectual Property Scholars Conference, Stanford; Academy of Management Annual Meeting, Boston; TILEC Innovation, Intellectual Property and Competition Policy Conference, Tilburg; 11th Comparative Analysis of Enterprise Data Conference, Nürnberg; Stanford; UC Berkeley; 2nd SEEK Conference, ZEW.

2011 Contributions to Smart, Green and Inclusive Growth for "Europe 2020", Madrid; Katholieke Universiteit Leuven; Universidad Carlos III Madrid; Patent Statistics for Decision Makers, USPTO Washington DC; University of Würzburg; Innovation, employment and welfare: a comparative study of Europe and China, UNU Merit; China's Technological Rise, ICTSD & Shanghai Institute of Foreign Trade & CIPS, Shanghai; Intellectual Property, Innovation and Business Performance, Oxford IP Research Centre; Technology Transfer Society Meetings, Augsburg; 6th Annual Conference of the EPIP Association, Brussels; 38th Annual Conference EARIE, Stockholm; 26th European Economic Association Meetings, Oslo; UC Berkeley – Peking

University Workshop on the Evolution of Chinese Patenting and its Implications for Research and Innovation, Beijing; Ludwig-Maximilians-Universität (LMU) München; 4th ZEW Conference on Economics of Innovation & Patenting, ZEW; Royal Economic Society Conference, Egham; 1st SEEK Conference, ZEW.

2010 ZEW `The Economics of Green IT'; LSE Urban and Regional Economics Seminar; Oxford University Kiel Institute (IfW); 5th Annual Conference of the EPIP Association, Maastricht; 25th European Economic Association Meetings, Glasgow; Econometric Society World Congress, Shanghai; Zvi Griliches Research Summer School, Barcelona; Knowledge in Organizations (KIO), Monte Verità; Competition and Innovation Summer School 2010, Turunc; Royal Economic Society Conference, Guildford; COINVEST Conference, Lisbon; Ludwig-Maximilians-Universität (LMU) München; Universidad Carlos III; Goethe University Frankfurt; European Business School (EBS); UC Berkeley.

2009 DIW Berlin `End of Year Summit'; Catholic University of Rio de Janeiro (PUC); Ludwig-Maximilians-Universität (LMU) München; Comparative Analysis of Enterprise Data Conference, Tokyo; 4th Annual Conference of the EPIP Association, Bologna; European Investment Bank; 8th Comparative Analysis of Enterprise Data Conference, Tokyo; 24th European Economic Association Meetings, Barcelona; Zvi Griliches Research Summer School, Barcelona; Oxford Intellectual Property Seminar; Gorman Workshop, Oxford University; Young Lives International Conference, Oxford; EUDN Workshop, Oxford; CSAE Oxford University.

2008 ZEW Mannheim; 3rd Annual Conference of the EPIP Association, Bern; 2nd World Conference of the Spatial Econometrics Association, New York; Latin American and Caribbean Economic Association Annual Meeting, Rio de Janeiro; 4th Annual Conference on Economic Growth and Development, Indian Statistical Institute, Delhi.

2007 22nd European Economic Association Meetings, Budapest; London Business School; Kiel Institute.

POLICY PRESENTATIONS

2015 Albanian Ministry of Economy, Trade, and Energy

2014 Jordanian Industrial Property Protection Directorate, Amman

2013 Chilean Intellectual Property Office (INAPI), Santiago de Chile; UK Intellectual Property Office, London; European Commission (DG MARKT), Brussels; WIPO Experts Meeting on Intellectual Property and Economic Development, Geneva

2012 Moldovan Intellectual Property Office (AGEPI), Chisinau; Chilean Intellectual Property Office (INAPI), Santiago de Chile; UK Intellectual Property Office, London

2011 WIPO Regional Forum, Bratislava; UK Intellectual Property Office, London; Chilean Intellectual Property Office (INAPI), Santiago de Chile

2010 ITC UNCTAD/WTO, Geneva; UK Department for Business, Innovation and Skills (BIS), London
WIPO-INPI Seminar on Intellectual Property, Industrial Strategy & Economic Development, Rio de Janeiro
WIPO-Worldbank Experts Meeting on Intellectual Property and Economic Development, Geneva

2009 European Investment Bank (EIB), Luxembourg; WIPO Meeting of Expert Group on Intellectual Property and SMEs, Geneva; Joint WIPO-PPO-KIPO Eastern European Regional Forum, Warsaw

2008 UK Intellectual Property Office, Newport; ITC UNCTAD/WTO, Geneva

2007 Ministry for Industry and Trade, Mongolia

2005 ITC UNCTAD/WTO, Geneva; Ministry for Industry and Trade, Mongolia

TEACHING EXPERIENCE

2014- Santa Clara University
- Intermediate Microeconomics (undergraduate economics)
- The Economics of Innovation and Intellectual Property (undergraduate economics)
- The Economics of Digitization (undergraduate economics)
- Law and Economics (undergraduate economics)

2011-2012 Universidad Carlos III de Madrid

- Economics of Organization (4th year economics/management undergraduate)
- Technology Management: Knowledge, Technology, Innovation (PhD)
- Strategic Management (PhD)
- Summer School on Competition, Innovation and Intellectual Property

2008-2010 Non-Stipendiary Lecturer Harris Manchester College, University of Oxford
2008-2009 University of Aston Business School, Birmingham
2006-2009 Oxford University Foreign Service Programme (OUFSP)
2007-2008 Department of Economics, University of Oxford
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PROFESSIONAL EXPERIENCE (CONSULTANT)

2009-2016 World Intellectual Property Organization (WIPO)
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2009 Oxford University Consulting (ISIS Innovation)
2005-2010 International Trade Center UNCTAD/WTO
2005-2007 GTZ (German Technical Co-operation)

RESEARCH GRANTS

2013-2014 ESRC-Google Data Analytics Social Science Research Grant (GBP 125,000)
2011-2012 TILEC IIPC Grant in Innovation, Intellectual Property and Competition Policy (EUR 15,000)
2010-2011 ZEW-SEEK Grant `Patent Litigation in Europe' (EUR 200,000)
2008 Young Lives Research Grant, University of Oxford (GBP 4,000)

REFEREE

- American Economic Review; The Review of Economics and Statistics; Journal of Development Economics; RAND Journal of Economics; Management Science; Economic Journal; Journal of Economic Geography; Journal of the European Economic Association; Journal of Environmental Economics and Management; Oxford Bulletin of Economics and Statistics; Journal of Development Studies; Canadian Journal of Economics; Environmental and Resource Economics; Journal of Applied Econometrics; Journal of African Economies; Scandinavian Journal of Economics; Journal of Economics & Management Strategy; Oxford Economic Papers; Research Policy; Decision Sciences; International Journal of Industrial Organization; Economic Record; International Journal of Transitions and Innovation Systems; International Journal of Information Technology & Decision Making, Journal of Economics and Statistics; Review of Industrial Organization; Industry and Innovation; Southern Economic Journal; Review of World Economics; IZA World of Labor; Industrial and Corporate Change; World Patent Information; Empirical Economics; PLOS ONE; The World Economy.
- Swiss National Science Foundation; Research Foundation Flanders.

FIELD RESEARCH EXPERIENCE

2006 Center for the Study of African Economies, University of Oxford; Assistance to Pedro Vicente in field-research on 'Vote-Buying and Corruption' in São Tomé e Principe

MILITARY SERVICE

1999-2000 Compulsory Military Service (Germany)

LANGUAGES

German (native); Portuguese (fluent); English (fluent); French (DELF Diploma I and II); Spanish (Diploma Superior de Español); Italian (CELI 5 Diploma); Danish (intermediate); Russian (basic)

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Employment and Other Affiliations

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CREST–ENSAE, from September 2014

Visiting Scholar
Institute for Fiscal Studies (IFS), 2010–Present

Education

PhD in Economics
University of Warwick, 2008–2014
Thesis Title: *Essays on Choice Set Heterogeneity in Demand Estimation*

MSc in Economics
University of Warwick, 2007–2008

Laurea Specialistica in Economics
University of Milan–Bicocca, 2004–2007

Laurea Triennale in Economics and Business
University of Milan–Bicocca, 2001–2004

Research Interests

Applied Econometrics, Empirical IO, and Economics of Science and Innovation

Honours and Funding

2016	Labex Ecodec Grant, €10.000
2015	Labex Ecodec Grant, €5.000
April 2014	"*Rising Stars*" session, 12th International IO Conference
2013–2014	ERC Starting Grant, by Fabian Waldinger
June 2012	Royal Statistical Society award for best Empirical IO paper, NIE PhD Colloquium
2012–2013	Royal Economic Society, Junior Fellowship
2009–2012	Leverhulme Trust Scholarship

Professional Activities

Referee for *Canadian Journal of Economics, Economic Inquiry, International Journal of Industrial Organization, Journal of Mathematical Economics*

Member of the Steering Committee for DATALEAD conference in Paris, 2015

Member of the Program Committee for RES PhD Meetings in London, 2016

Teaching Experience

2014–Present	Empirical IO, for graduate students (ENSAE)
2010–2014	Economics 2 (classes), for non-economics stud. (Warwick)
2010–2011	CRETA PhD Minicourses, for economics PhD stud. (Warwick)
2009–2010	Economics 1 (classes), for non-economics stud. (Warwick)
2006–2007	Industrial Organization (classes), for business stud. (Bicocca)

Publications

A Convenient Method for the Estimation of the Multinomial Logit Model with Fixed Effects, with *Xavier D'Haultfœuille*; Economics Letters, 2016, vol. 141, pp. 77–79

Working Papers

International Knowledge Flows: Evidence from the Collapse of International Science in the Wake of WWI, with *Fabian Waldinger*

Consumer Benefit of Big-Box Supermarkets: The Importance of Controlling for Endogenous Entry

The Kindness of Strangers, with *Julia Wirtz*

Work in Progress

Bounding Demand Elasticities with Unobserved Choice Set Heterogeneity, with *Gregory Crawford* and *Rachel Griffith*

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EDUCATION

University of Cambridge, PhD in Economics — December 2012

University of Oxford, M.Sc in Economics for Development — August 2006

University of Delhi, B.A.(Hons) in Economics (First Class) — July 2005

PUBLICATIONS

"Does the Rotten Child Spoil His Companion? Spatial Peer Effects Among Children in Rural India" (with Christian Helmers). ***Quantitative Economics***, Vol. 5(1), March 2014.

"Neighbours and Extension Agents in Ethiopia: Who matters more for technology diffusion?" (with Pramila Krishnan). ***American Journal of Agricultural Economics***, Vol. 96(1), July 2013.

"The Formation and Evolution of Childhood Skill Acquisition: Evidence From India" (with Christian Helmers). ***Journal of Development Economics***, Vol. 95(2), July 2011.

"Transforming public schools: Impact of the CRI program on child learning in Pakistan," (with Reehana Raza and Farooq Naseer). ***Economics of Education Review***, Vol. 29(4), August 2010.

WORKING PAPERS

"Attention and Saliency in Online Markets: Evidence from an Online Recommendation System" (with Christian Helmers and Pramila Krishnan).
CEPR Discussion Paper No. 10939.

"Let's Make Software Patentable..or Maybe Let's Not: Evidence from the Indian Software Industry" (with Markus Eberhardt, Marcel Fafchamps and Chrsitian Helmers)
(**R&R *Economics Letters***).
Stanford Center for International Development Working Paper No. 526.

"The Natural Resource Curse Revisited: Theory and Evidence from India" (with Amrita Dhillon, Pramila Krishnan and Carlo Perroni).
CAGE Working Paper No.268.

"Estimating Fiscal Multipliers with Correlated Heterogeneity" (with Manos Kitsios).
IMF Working Paper WP/16/13.

"Volatility of Global Carbon Emissions and Spillovers From International Trade".

"Corporate Networks And Peer Effects In Firm Policies".

"Do Board Interlocks Increase Innovation? Evidence From Natural Experiments In India" (with Christian Helmers and Raghavendra Rau).

ACADEMIC ACTIVITIES

Organiser

Organiser, and member of the scientific committee for the conference **'STATS IN PARIS'** on the theme of networks at ENSAE, Paris.

Organiser and member of the big-data program **'DATALEAD'** jointly organised by ENSAE and Berekely on the theme of big data.

Member of Paris-Saclay **Data Science Institute** and '*New Challenges for New Data*' project at CREST.

Refereeing

Annals of Economics and Statistics, American Journal of Agricultural Economics, Comparative Education Review, Economic Journal, Journal of Business & Economics Statistics, Journal of Development Economics, Journal of Development Studies, Journal of Economic and Human Biology, Public Choice, Revue Economics.

Invited Talks

Ninth bi-annual Postal Economics Conference on the Digital Economy, TSE (2016), NBER Summer Institute (2015), Cemmap (UCL) Big-Data conference (2015), Toulouse School of Economics (2014), Paris School of Economics (2014), University of Namur (2014), Santa Clara University (2014), Federal Reserve Board Dallas (2014), Georgetown University (2014), Berkeley - DataLead Speaker (2014), Delhi School of Economics (2013), Ecole Polytechnique (2013), Warwick Political Economy Workshop (2011), Central European University (2012), NUS Singapore (2012), Indian School of Business (2012), Sauder School of Business UBC (2012), Carlos III (2012), Copenhagen Business School (2012), Einaudi Institute for Economics and Finance (2012), CEMFI (2012), LMU Munich (2011), Royal Holloway (2011), World Bank DECRG (2010).

AWARDS & GRANTS

LABEX Grant for project on attention and saliency in online markets.

INET Grant for project on attention and saliency in online markets.

IGC (DFID) Grant for project on technology adoption in Ethiopia.

ESRC Grant for project on the natural resource curse revisited.

Dr. Manmohan Singh Scholarship for doctoral studies at Cambridge.

Marie-Curie AMID Early Stage Researcher Fellowship held at Bocconi University.

Luca D'Agliano Scholarship for Development Economics.

Suzy Paine Award Department of Economics, University of Cambridge.

Young Lives **Research Grant** (together with Christian Helmers), University of Oxford.

Center for Research in Microeconomics (CReMic) Bursary, Faculty of Economics, Cambridge.

POLICY WORK

Consultant, World Bank: Member of team evaluating the National Rural Employment Guarantee Act (NREGA) in India and Azerbaijan higher education project.

Consultant, Aga Khan Foundation: Member of team for evaluating the Community Led Total Saniation Program (CLTS) in Pakistan.

SKILLS

Proficient with the use of R, STATA, ArcGIS, LaTeX. Knowledge of MATLAB, GAMS, Fortran, HPC.

LANGUAGES

English, French, Hindi.

Stefan Wagner

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ESMT European School of
Management and Technology
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Germany

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www.esmt.org

Current employment

Associate Professor with tenure, January 2016–present (since 2014 holder of the TUSIAD/TCCI Chair in European Economic Integration);

Associate Professor, 2013–2015;

Assistant Professor, 2011–2012;

ESMT European School of Management and Technology, Berlin, Germany.

Education

Habilitation (Dr. habil.), Ludwig-Maximilians-University LMU, Munich, Germany, 2010.

Dr. oec. publ., Ludwig-Maximilians-University LMU, Munich, Germany, 2005.

Fulbright Scholar, Graduate School of Economics, University of California at Los Angeles (UCLA), USA, 2001–2002.

Dipl.-Kfm., Ludwig-Maximilians-University LMU, Munich, Germany, 2001.

Studies in Economics within the ERASMUS program at the Université UT1, Toulouse, France, 1998–1999.

Visiting appointments

Visiting Scholar and Japan Society for the promotion of Sciences (JSPS) Scholar, Hitotsubashi University, Insititue of Innovation Research, Tokyo, 2014.

Visiting Professor, Yonsei University, School of Business, Seoul, Korea, 2012.

Visiting Scholar, National University of Singapore (NUS), Singapore, 2011.

Visiting Scholar, Melbourne Business School, Melbourne, Australia, 2009.

Visiting Scholar, Boston University and the National Bureau of Economic Research (NBER), University of Boston, Boston, Massachusetts, USA, 2005–2006.

Past employment

Wissenschaftlicher Assistent and Akademischer Rat, Ludwig-Maximilians-University LMU, Munich, Germany, 2006–2010.

Summer Associate, McKinsey & Company, Munich, Germany, Summer 2001.

Visiting Associate, The Boston Consulting Group, Düsseldorf, Germany, Summer 2000.

Teaching experience

Innovation Management

Ph. D., Berlin Doctoral Program in Economics and Management Science BDPEMS (2015, 2014, 2013, 2012).

MBA and Executive MBA, ESMT European School of Management and Technology (2015, 2014, 2013, 2012), Yonsei University, elective course, School of Business (2012).

Master of Science in Management, core course, ESMT European School of Management and Technology (2015), University of Munich (2009); elective course, EPFL Lausanne (2013).

Bachelor in Management, core course, University of Bayreuth (2010), University of Munich (2010, 2009, 2008).

Entrepreneurship/Business Planning

MBA, core course, ESMT European School of Management and Technology (2014, 2013, 2012, 2011 – inclusion in the President's Honor Roll for Teaching Excellence).

European Master in Management*,* block course, EM Lyon (2010, 2009, 2008).

Bachelor in Management, University of Munich (2006).

Quantitative Methods

Ph. D., University of Munich (elective in Advanced Industrial Organization; 2009, 2008, 2007), German Academic Association for Business Research VHB (Introduction to Multivariate Empirical Analysis, block course; 2015, 2014, 2013, 2012, 2011, 2010).

Bachelor in Management, core courses and elective seminars, University of Munich (2007, 2005, 2004, 2003).

Consulting experience

Regular freelance consulting work for private and public sector clients including BMW Group, Cap Gemini, Federal Ministry of Education and Research, Germany, the European Commission, Handelsblatt Group and Kabel Deutschland.

Honors and awards

Berlin Centre for Consumer Policies, Senior Fellow (2016).

Japan Society for the Promotion of Science, Fellow (2014).

German Academic Exchange Service DAAD Scholar (2005).

Outstanding Dissertation Award, Munich School of Management Alumni (2005).

Fulbright Scholarship (2001–2002).

European Community (Erasmus) Scholarship (1998–1999).

German National Academic Foundation (Studienstiftung des dt. Volkes, 1998–2001).

Research grants

Various travel grants from COST/STRIKE, DFG and the DAAD.

ENTR/05/82 (2006-2007): Research project on "The Strategic Use of Patents and its Implications for Enterprise and Competition Policies" commissioned by the European Commission (Enterprise and Industry Directorate-General), jointly with D. Harhoff, B. Hall, G. von Graevenitz, K.Hoisl, 125,000 EUR.

Strategies for the Promotion of Regenerative Technologies in Medicine and Biology (2006): Evaluation of firms' strategic patenting behavior within regenerative technologies in Medicine and Biology for the German Federal Ministry of Education and Research, 16,660 EUR.

Referee

Journals:
Academy of Management Journal, Economic History Review, Economics of Innovation and New Technology, Industrial and Corporate Change, Journal of Evolutionary Economics, Management Science, Review of Industrial Organization, Research Policy, Scandinavian Journal of Economics, Small Business Economics, Strategic Management Journal, Technovation, Zeitschrift für betriebswirtschaftliche Forschung.

Conferences:
Academy of Management Meeting, Druid, EPIP, GForum, VHB TIM Tagung.

Journal publications

Wagner, S., and S. Wakeman (Forthcoming). What do patent-based measures tell us about product commercialization? Evidence from the pharmaceutical industry. *Research Policy*

Harhoff, D., G. von Graevenitz, and S. Wagner. (Forthcoming). Conflict resolution, public goods and patent thickets. *Management Science*

Wagner, S., K. Hoisl, and G. Thoma (2014). Indirect knowledge flows: The bridging role of professional service firms. *Strategic Management Journal* 35(11): 1671–1688.

von Graevenitz, G., S. Wagner, and D. Harhoff (2013). Incidence and growth of patent thickets: The impact of technological opportunities and complexity. *Journal of Industrial Economics* 61(3): 521–563.

Liegsalz, J., and S. Wagner (2013). Patent examination at the State Intellectual Property Office in China. *Research Policy* 42(2): 552–563.

von Graevenitz, G., S. Wagner, and D. Harhoff (2011). How to measure patent thickets: A novel approach. *Economics Letters* 111(1): 6–9.

Reitzig, M., and S. Wagner (2010). The hidden costs of outsourcing: Evidence from patent data. *Strategic Management Journal* 31(11): 1183–1201.

- reprinted in: *The economics of outsourcing*, ed. L.P. Willcocks and M.C. Lacity, 696–715. Cheltenham: Edward Elgar.

Wagner, S., and I. Cockburn (2010). Patents and the survival of Internet-related IPOs. *Research Policy* 39(2): 214–228. (Revision of NBER Working Paper No. 13146, Cambridge MA).

Reitzig, M., and S. Wagner (2010). Patently (un)clear. *Business Strategy Review* 21(1): 28–33.

Wagner, S. (2010). Managerial succession and organizational performance: Evidence from the German soccer league. *Managerial and Decision Economics* 31(6): 415–430.

Harhoff, D., and S. Wagner (2009). The duration of patent examination at the European Patent Office. *Management Science* 55(12): 1969–1984.

Schulz, C., and S. Wagner (2008). Outlaw community innovations. *International Journal of Innovation Management* 12(3): 399–418.

- reprinted in: Perspectives on user innovation, Series on Technology Management, ed. Stephen Flowers, Flis Henwood , 191–210. London: Imperial College Press

Wagner, S. (2008). Business method patents in Europe and their strategic use: Evidence from franking device manufacturers. *Economics of Innovation and New Technology* 17(3): 173–194.

Czado, C., V. Erhardt, A. Min, and S. Wagner (2007). Zero-inflated generalized Poisson models with regression effects on the mean, dispersion and zero-inflation level applied to patent outsourcing rates. *Statistical Modelling* 7(2): 125–153.

Jerak, A., and S. Wagner (2006). Modeling probabilities of patent oppositions in a Bayesian semiparametric regression framework. *Empirical Economics* 31(2): 513–533.

National publications

Süssmuth, B., and S. Wagner (2012). A market's reward scheme, media attention, and the transitory success of managerial change. *Jahrbücher für Nationalökonomie und Statistik (Journal of Economics and Statistics)* 232(3): 258–278.

Wagner, S. (2009). Reform der Einschränkung der Urheberrechte in Lehre und Forschung: Abschätzung von Zahlungsbereitschaften für flexibleren Zugang zu studienrelevanter Literatur. *zfbf - Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung* 61: 857–880.

Wagner, S. (2009). Patente in der Finanzindustrie: Terra Incognita. *Quarterly Journal of Economic Research (Vierteljahreshefte zur Wirtschaftsforschung)* 78(1): 156–166.

Wagner, S. (2007). Make-or-buy decisions in patent related services. *ZfB Zeitschrift für Betriebswirtschaft*, Special Issue 4: 47–68.

Jostarndt, P., and S. Wagner (2006). Kapitalstrukturen börsennotierter Aktiengesellschaften: Deutschland und USA im Vergleich. *Quarterly Journal of Economic Research* (Vierteljahreshefte zur Wirtschaftsforschung), 75(4): 93–108.

Treptow, F., and S. Wagner (2005). Stock exchanges and issuers: A changing relationship. Quarterly *Journal of Economic Research (Vierteljahreshefte zur Wirtschaftsforschung*) 74(4): 125–139.

Refereed conference proceedings

Harhoff, D., G. von Graevenitz, and S. Wagner (2014) A primer on conflict resolution, public goods and patent thickets. Academy of Management Best Paper Proceedings.

Ermecke, R., P. Mayrhofer, and S. Wagner (2009). Agents of diffusion: Insights from a survey of Facebook users. *Proceedings of the 42nd Hawaii International Conference on System Sciences* (HICSS 2009).

Jerak, A., and Wagner (2004). Semiparametric Bayesian analysis of EPO patent opposition. In: *COMPSTAT Proceedings in Computational Statistics*, ed. J. Antonoch. 1263–1270. Heidelberg: Physica-Verlag, 2004.

Working papers and work in progress

Wagner, S., and S. Wakeman (2015). What do patent-based measures tell us about product commercialization? Evidence from the pharmaceutical industry. *ESMT Working Paper*, ESMT No. 14–01 (R1).

Wagner, S. (2014). Acquiring-firm returns in technology motivated acquisitions.

Koroleva, K., Stimac, V. and S. Wagner. Identifying the drivers of product adoption in social networks.

Books

Fischl, B., and S. Wagner (Forthcoming). *Der perfekte Businessplan*. 3rd ed. Munich: C.H. Beck.

Wagner, S. (2006). *Economic analyses of the European patent system*. Wiesbaden: DUV Gabler. (Dissertation LMU Munich, 2005).

Book chapters

Harhoff, D., and S. Wagner (2009). Regressionsanalyse. In: *Theorien und Methoden der Betriebswirtschaft*, ed. M. Schwaiger and A. Meyer, 477–490. Munich: Vahlen.

Other publications

Fischl, B., M. Hartl, and S. Wagner (2009). Businessplanerstellung. *StartingUp Magazin*, 4/2009.

Harhoff, D, B. Hall, G. von Graevenitz, K. Hoisl, and S. Wagner (2007). *The strategic use of patents and its implications for enterprise and competition policies*. Report to the European Commission, Tender ENTR/05/82, 2007.

Kirsten, J., F. Gabriel, M. Ledig, and S. Wagner (2004). Economic development and the future of regenerative medicine in Germany. BioRegio STERN/Capgemini Report.

Presentations and invited seminars

2016:
University of Cologne, DRUID Asia (Singapore)

2015:
Innovation Summit (Technical University of Darmstadt), Business and Public Policy Workshop (ESMT Berlin), Academy of Management Meeting (Vancouver), University of Lugano

2014:
Copenhagen Conference on Innovation and Entrepreneurship 2014, DRUID Society Conference, (Copenhagen), Academy of Management Meeting (Philadelphia)

2013:
ARISE Workshop at National University of Singapore NUS, Conference on "The Economics of Intellectual Property, Software and the Internet" (Toulouse School of Economics), 5th ZEW/MaCCI Conference on the economics of innovation and patenting (ZEW, Mannheim), University of Trier, INSEAD Singapore, Binus International University, Jakarta

2012:
Joint UNU-MERIT/School of Governance Seminars (Maastricht), Conference on Patents, Entrepreneurship and Innovation (Alexandria, VA), Institute for Empirical Research in Economics

(Leipzig), Academy of Management Meeting (Boston, MA), Yonsei University, School of Business (Seoul), Third Asia-Pacific Innovation Conference (Seoul)

2011:
European Commission (Joint Research Center, Sevilla), Singapore Management University SMU, National University of Singapore NUS, Melbourne Business School, Academy of Management Meeting 2011 (San Antonio), Imperial College (London), VHB TIE Tagung (Berlin), Christmas Meeting of German speaking Economists Abroad GEA (Berlin)

2010:
National University of Singapore NUS (Singapore), Hong Kong University of Science and Technology (Hong Kong), VHB Tagung (Bremen), Academy of Management Meeting(Montreal)

2009:
Intellectual Property Research Institute of Australia IPRIA (Melbourne), Melbourne Business School (Melbourne), PATINNOVA 2009 (Prague), Summer School of Economics and Management of Intellectual Property Rights (Bologna), Academy of Management Meeting (Chicago), VHB TIM Tagung (Aachen)

2008:
Conference on IP and the Creative Industries (London), Economics and Psychology of Football (Innsbruck), Economics of Innovation and Patenting (Mannheim), Knowledge for Growth { European Strategies in the Global Economy (Toulouse), User Innovation Workshop (Cambridge, MA), Academy of Management Meeting AOM (Los Angeles), Econometric Society European Meeting ESEM (Mailand), 35th Conference of the European Association for Research in Industrial Economics EARIE (Toulouse), KU Leuven, TU Munich

2007:
European Policy for Intellectual Property Conference (Lund), The Economics of Technology Policy (Ascona), Strategic Management Society (Catania), DRUID Conference (Copenhagen), Regional Comparative Advantage and Knowledge-Based Entrepreneurship RICAFE2 (Riga), Econometric Society European Meeting ESEM (Budapest), VHB TIM Tagung (Vienna), KU Leuven, TU Munich

2006:
Annual Conference on Corporate Strategy ACCS (Berlin), NBER Entrepreneurship Meeting (Boston), 33rd Conference of the European Association for Research in Industrial Economics EARIE (Amsterdam)

2005:
X. Tor Vergata Finance Conference (Rome), European Policy on Patents and Intellectual Property: What direction should it go? (Copenhagen), German Economic Association of Business Administration GEABA (Freiburg)

2004:
CEPR conference on The Impact of Institutions on Innovations (Barcelona), German Economic Association of Business Administration GEABA (Bonn), Copyright and database protection, patents and research tools, and other challenges to the intellectual property system (Maastricht), University Bologna, Economic Seminar Series of the European Patent Office (Munich)

Skills

C, HTML, STATA, R/ S-Plus, SPSS, Matlab

Personal

Tennis, hang–gliding, skiing, snowboarding, piano, keyboards, electric bass, cinema, literature

Languages

Fluent in English and French; German (native language)

Updated: *April 18, 2016*

JULIAN RUNGE

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Adalbertstr. 21, 10997 Berlin, Germany

E-Mail julian.runge@gmail.com
Skype julian.runge2

EMPLOYMENT

Head of Analytics and Data Science – Wooga, Berlin 07/2012-present

- Wooga, founded in Berlin in 2009, now 300 employees, is one of the world's leading mobile games companies with hundreds of millions of customers
- Built and leads a high-performing team of eight data scientists
- Refined pricing and A/B testing methodology, developed and deployed predictive model for CLV, developed and deployed churn and purchase prediction models
- Seven-figure revenue impact
- Part of the extended management team

Research assistant - School of Business and Economics of Humboldt University, Berlin 06/2010-06/2012

- Implemented advanced statistical analysis in Stata
- Consolidated large scale data from different sources
- Programmed, implemented and analyzed economic experiments and surveys

Previous employments

- Founder, Tamono, Berlin
- Freelancer, Zalando, Berlin
- Intern, Siemens Healthcare, New York
- Working student, KPMG Audit, Frankfurt

EDUCATION

Ph.D. Business Economics (graduation exp. 2018) – Humboldt University, Berlin 10/2014-present

- Research focus: Marketing and predictive analytics, managerial decision support, decision making, freemium
- Visiting Researcher at Stanford Graduate School of Business to work with Jonathan Levav and Harikesh Nair Q1/2016

M.Sc. Economics and Management Science – Humboldt University, Berlin 06/2012

- Grade: A-, top 5% of class

B.Sc. Economics – Goethe University, Frankfurt am Main 09/2009

- Grade: A, top 5% of class

RESEARCH INTERESTS

Marketing and predictive analytics, managerial decision support, decision making, freemium

PUBLICATIONS

Peer reviewed scientific contributions

- Churn prediction for high-value players in casual social games, with Peter Gao, Florent Garcin & Boi Faltings (2014, *Proceedings of the 2014 IEEE Conference on Computational Intelligence and Games)*; one of five nominees for best paper award
- Hidden Markov Models for Churn Prediction, with Pierangelo Rothenbuehler, Florent Garcin & Boi Faltings (*Proceedings of the 2015 SAI Conference on Intelligent Systems)*
- Predicting Purchase Decisions in Mobile Free-to-play Games, with Rafet Sifa, Fabian Hadiji, Anders Drachen, Kristian Kersting & Christian Bauckhage (*Proceedings of the 11th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment)*; winner of the best paper award

Work in progress

- Designing Freemium: An Analytical Framework and Evidence from a Large-scale Field Experiment, with Stefan Wagner and Jörg Claussen

- Perceptual variables and start-up decisions of necessity entrepreneurs, with Christian Schade
- Estimating CLV in the app economy, with Daniel Klapper and Daniel Guhl

Non-scientific contributions

- The Golden Curve: Predicting Customer Value in Freemium, *The Next Web*, June 12th 2014
- Predictive analytics set to become more valuable in light of rising CPIs, *Gamasutra*, Nov. 4th 2014
- Does Time Matter? Modeling Temporal Dynamics for Better Predictions, *Experfy Insights*, Nov. 2015

TEACHING

- International Summer School in Economics and Management Science in Havanna, Cuba, teaching assistant for Managerial Economics	09/2011
- Guest lecture on Product and Marketing Analytics in the App Economy, European School of Management and Technology, Berlin	09/2015
- (Co-)supervision of master theses at Humboldt University Berlin, Ecole Polytechnique Federale de Lausanne, London School of Economics, Northwestern University	Since 2013

PRESENTATIONS

- *People play, people talk – the role of word-of-mouth in the app economy*
  . Mobile Growth Europe 2015, Berlin, Germany
  . Game Analytics and Business Intelligence 2015, London, UK
  . Casual Connect 2015, Tel Aviv, Israel
  . UC Santa Cruz, US
- *Hidden Markov Models for Churn Prediction*
  . SAI IntelliSys 2015, London, UK, with Pierangelo Rothenbuehler
- *How to build data science teams in product-centered organizations*
  . Gaming Analytics Summit 2015, San Francisco, USA
- *Churn prediction for high-value players in casual social games*
  . 2014 IEEE Conference on Computational Intelligence and Games, Dortmund, Germany
  . Game Analytics and Business Intelligence 2014, London, UK
  . Casual Connect Eastern Europe 2014, Belgrade, Serbia
- *CLV prediction in freemium*
  . Big Data World Congress 2014, London, UK
  . Smart Data Summit 2014, Dubai, UAE
- *Perceptual variables and start-up decisions of necessity entrepreneurs*
  . G-Forum 2012, Potsdam, Germany, with Christian Schade

AWARDS & SCHOLARSHIPS

Best paper awards

- Nominee, 2014 IEEE Conference on Computational Intelligence and Games	08/2014
- Winner, 11th AAAI Conf. on Artificial Intelligence and Interactive Digital Entertainment	11/2015

Fulbright Scholarship

- For studies in the M.A. Economics at the New School for Social Research in New York City, USA	08/2008-04/2009

Friedrich Ebert Foundation scholarship

- Funding for studies of economics in Frankfurt and Berlin	05/2007-06/2012

Member (now alumnus) of Life Science-Lab, Heidelberg

- Organization for the advancement of especially skilled high school students	09/2001-present

Last updated: April 26th 2016



Julian Runge