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Toulouse School of Economics

# THE JEAN-JACQUES LAFFONT DIGITAL CHAIR

#2
Spring 2016

## DIGITAL ECONOMY NEWSLETTER

**Bringing together academics, policy-makers and private partners to discuss the latest research evidence on new digital technologies and their impact on society**

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# Dear readers

In February 2015, the Toulouse School of Economics (TSE) and the Institute for Advanced Study in Toulouse (IAST) launched the Jean-Jacques Laffont Digital Chair to promote research on the impact of digital technology in such areas as industrial organisation, competition policy, education, finance, culture and health. The Chair is named after the late Toulouse economist Jean-Jacques Laffont, whose work led to major advances in public economics and information theory.

Within this initiative, the TSE organised a one-day workshop on 'Digital books and their impact on content' in Toulouse in January 2016. The event brought together academics and a variety of practitioners to consider the challenges and opportunities provided by new digital technology in the book industry.

Debate about the impact of digital technology continued over the following two days at the ninth TSE conference on 'The economics of intellectual property, software and the internet' – which will now be held annually as a core activity of the Digital Chair. The event featured a wide range of topics - including platforms, patents, search, social media, mobile apps, the sharing economy, crowdfunding, crowdsourcing and online marketplaces - and both theoretical and empirical analysis.

The conference closed with a roundtable on platform competition and regulation - and a TSE report on this topic will be published later in the year. In the meantime, this issue of the **#TSEdigital newsletter** summarises a selection of the research findings presented at the workshop and the conference. More details are available on the TSE website:

http://www.tse-fr.eu/conferences/2016-digital-books-and-their-impact-content

http://idei.fr/conferences/2016-ninth-idei-tse-iast-conference-economics-intellectual-property-software-and-internet

# The future of books in the digital age

Digitisation is transforming the market for books. Researchers, publishers, booksellers, librarians and industry consultants came together in Toulouse recently to consider the challenges and opportunities for book publishing in the digital age.

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This year sees the tenth anniversary of the first 'digital reading device' (the Sony PRS-500), noted Peter Hildick-Smith, founder and CEO of publishing consultancy Codex Group, at the outset of the TSE's workshop on the future of books in the digital age. That makes it an opportune time to look back at the impact of digitisation on the book business - on the costs and prices of books; on how their content is selected, edited, designed, promoted and distributed; and on the industry's traditional gatekeepers between authors and readers – publishers and bookstores.

According to **Joel Waldfogel** of the Carlson School of Management, University of Minnesota, it wasn't until late 2007 and the launch of the Amazon Kindle that there was a widely adopted platform for consumption of digital books. While readers could view a pdf file on a computer, the legal and illegal markets for digital books remained small prior to Kindle, but since then, digital readers have diffused rapidly.

In research with **Imke Reimers** at Northeastern University, Waldfogel finds that by September 2013, the share of households with a digital reader had grown to 43%. The US market for digital books has grown correspondingly to 5% of the market for trade books in 2010, to about 15% in 2011, to 20% of the market in 2012 and to 27% in 2013. At the same time, the lower marginal costs of digital book production have reduced prices by 10-15% in the past four years.

## Digital disintermediation

Digitisation has also had a second important effect, Waldfogel explained. Making a new book meaningfully available to consumers in the past required the assistance of one of the major publishing houses. Now by contrast, online platforms such as Amazon's Kindle Direct Publishing arm, Smashwords, Lulu and others make it possible for authors to circumvent the traditional gatekeepers to make their products directly available to readers. The number of self-published works has grown by almost 300% since 2006 and now exceeds the number of traditionally published works.

Given the inherent difficulty in predicting the appeal of new books, growth in the number of new titles can lead to the introduction of some highly appealing products. Analysis of bestseller lists in conjunction with title-level data on physical sales and estimates of digital book sales shows that many self-published books have substantial 'ex post' appeal to consumers. Works that began their commercial lives through self-publishing - think Fifty Shades of Grey - began to appear on bestseller lists in 2011. By 2013, such works accounted for a tenth of both bestseller listings and estimated unit sales. In romantic fiction, self-published works account for almost a third.

Waldfogel concluded that the new digital technologies have brought about important benefits for both consumers and creators. But digital disintermediation presents a challenge to traditional publishers and retailers. The online retail giant Amazon has responded by becoming a major facilitator and retailer for self-published titles.

Traditional publishers are also responding: for example, Penguin purchased one of the largest self-publishing companies Author Solutions in July 2012. Traditional publishers are also recruiting authors from the ranks of successful self-published authors.

## Finding what readers want

Is the proliferation of new books really such a significant development? **Marcello Vena**, founder and managing partner of media consultancy All Brain, was a little more sceptical in his discussion of the 'long tail'. This is the idea that digital book publishers (and other media businesses) should reduce their attention on blockbusters and focus more on niche products as a source of the most profitable growth.


His analysis, which examines data on digital book sales in Canada and Italy, suggests that for this market, the long tail theory is a myth. What's more, an increasingly concentrated retail market seems to be less capable of fostering and growing a long tail of digital books. So while the overall digital book market may have been growing very significantly, bestsellers have been taking the lion's share of that expansion.

**Stephen Maurer** of the University of California, Berkeley, was also concerned, pointing out that the weakening of copyright driven by digital technologies leads to the decline of traditional institutions for finding and disseminating new titles. He quotes the Roman satirist Martial, who said that markets routinely ignore good and even excellent works. This insight is a reminder that incentives to find content are just as necessary as incentives to make it.

In principle, new electronic search tools could compensate, but today's unknown authors typically sell fewer e-books than hardbacks despite the fact that the latter cost twice as much. This strongly suggests that online search is less effective as a way to connect writers and readers than traditional methods. Meanwhile, publishers have become markedly less adventurous, often getting involved after the market has discovered a book – again, think Fifty Shades of Grey.

Maurer's research on the incentives and institutions for discovering what readers want goes back to ancient times. He explores several possible responses to the changes brought on by the digital age. First, society can shore up current publishing models by expanding copyright and technical protections, which seems unlikely to save book search (though they might help other creative industries). Second, search engines could pay for editors. Finally, society can return to the Homeric pattern of harvesting advice directly from audiences – 'word-of-mouth' markets.

> "Online publishing platforms make it possible for authors to circumvent the book industry's traditional gatekeepers"

**Virginie Clayssen,** innovation director at the French publishing group Editis, was more optimistic about publishing's future in the face of digital technologies. She argues that the industry needs to focus on what it does best: identifying and selecting authors, editing their work, production, marketing and rights management. Publishers can embrace the innovative creation techniques that digital technologies make possible while remembering that 'publishers are not champions of the algorithm, they are champions of the book'.

Clayssen quoted the serial publishing entrepreneur Richard Nash, who suggests that the business model of publishing should evolve away from picking hits towards supporting talent: 'When you understand editing as a service, as opposed to a process of picking products that may or may not sell, your value is defined by how good you are rather than how lucky you are. Which suggests that editors, when they eat robots, when they use tools, when they use data, when they embrace a post-industrial mode, can be the entities that are attracting the value.'

## How books are sold

A number of speakers at the TSE workshop considered issues around how physical books and digital books are sold. **Oystein Foro**s of the Norwegian School of Economics explored whether it matters if content providers or retail platforms choose the price; Germain Gaudin of the Dusseldorf Institute for Competition Economics examined the impact of multi-product retailers, such as Walmart, on book sales; **Peter Hildick-Smith** explained how deeply discounted prices and co-release with hardback editions facilitated the growth of demand for digital books; and Stephen Maurer mentioned the 'uncompensated externality' that usually benefits Amazon, where readers go to physical bookstores, find products they like but then buy them elsewhere.

Finally, **Christian Thorel** of Ombres Blanches, one of France's best independent bookstores, spoke about the social value of small retail outlets. **Joel Waldfogel** asked if there were data on titles, readers and locations, which researchers might use to substantiate the claim that society is better with bookstores. The workshop closed with agreement on the value of continuing communication between researchers and publishing industry representatives on the future of books in the digital age.

> "Online search is less effective as a way to connect writers and readers than traditional methods"

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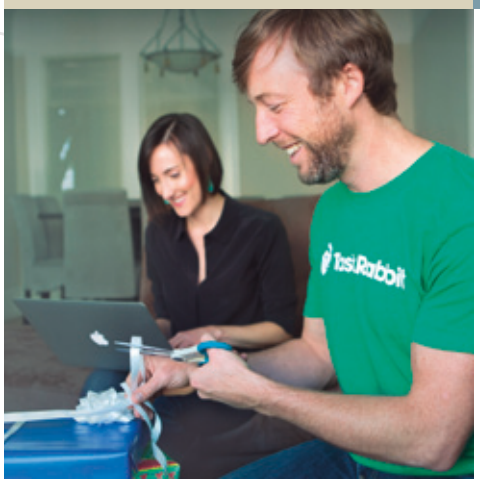
# Who is boss in the sharing economy?

Should Uber drivers and other professional service providers be defined as employees or independent contractors? Research by **Andrei HAGIU** suggests the need for a new class of arrangement between firms and workers in the emerging marketplaces of the digital economy.

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The revenues that firms generate typically depend on both their own efforts and those of various agents that provide complementary services. For example, consultants, hairdressers and taxi drivers provide services to customers, leveraging their firms' infrastructures and brand names; and sales reps, brokers and distributors provide services by helping to sell products and services to consumers.

Firms can choose between an employment mode for these agents – in which they control service provision – and an agency (or platform) mode - in which the agents control provision of their services to customers. This is a longstanding divide - for example, for manufacturers and sales agents; insurance companies and insurance brokers; and hair salons and hairdressers.

But the divide has become much more prominent in recent times, reflecting the emergence of online platforms in a rapidly growing number of service industries - consulting, education, home services, legal, outsourcing, staffing and taxis. These service marketplaces take advantage of information, communication and remote collaboration technologies to enable professionals to connect directly with customers. Examples include Coursera, Gerson Lehrman Group, HourlyNerd, Lyft, Uber, TaskRabbit and Upwork.

These new firms differ from their more traditional counterparts - say the University of Phoenix, McKinsey, traditional taxi companies and Infosys - in letting professionals control some or all of the relevant decisions, such as prices, equipment, training and promotion. In research with Julian Wright of the National University of Singapore, Andrei Hagiu analyses how firms make a choice between these two modes of organisation: employing and controlling professionals; or enabling professionals to interact with customers on terms that they choose themselves.

> "Companies need an option between employee and independent contractor"

The model features two types of decisions that affect the joint payoffs of the firm and the professionals: non-transferable and transferable. Non-transferable decisions are always completely controlled by the professionals - for example, how friendly to be to customers - or by the firm - for example, the quality of a salon's interior or the ride-hailing app.

In contrast, transferable decisions can be made by either party: the type of car an Uber driver uses; the kinds of details an Airbnb host lists about an apartment offered for rent; or how hair stylists at a salon advertise their services. If the transferable decisions are controlled by the firm, then it is functioning as a traditional business; if the transferable decisions are controlled by the professionals, then the firm is functioning as a platform. But what about the growing number of firms in the grey area in between, as digital technologies have made it easier to build marketplaces for services and fine-tune the degree of control exerted over interactions between service providers and customers?

The optimal model for a company might be somewhere in the middle - controlling some aspects of contractor performance but not others, a situation that current business regulations do not yet take into account. The real debate, Hagiu concludes, should not be over whether workers in the shared economy are employees or independent contractors. Rather, it should be about how to devise new arrangements that would accurately reflect their unique in-between status.

**Andrei HAGIU** is Associate Professor at Harvard. More details on his research with Julian Wright are available in 'Enabling versus Controlling'.

**http://www.hbs.edu/faculty/Publication%20Files/16-002_d5494e32-fa62-45a5-bb3f-cbc468db8b05.pdf**

# What makes geeks tick?

Many online platforms rely on users to provide content for free. Research by **Lei XU** analyses data from Stack Overflow - the largest online Q&A community for computer programmers - to explore the idea that people contribute voluntarily so as to enhance their reputations and find better jobs.

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Many online platforms rely on users to provide content for free. Research by Lei XU analyses data from Stack Overflow - the largest online Q&A community for computer programmers - to explore the idea that people contribute voluntarily so as to enhance their reputations and find better jobs.

One striking phenomenon of the digital age is the huge number of people contributing freely to collective projects such as Wikipedia, bulletin boards and open source software. As the TSE's Nobel laureate Jean Tirole asked in an early study of the economics of open source written with Josh Lerner: is this a case of altruism or are there ulterior motives behind private contributions to a public good?

With the prevalence of online platforms, this question has become increasingly important. Many businesses have failed to launch a successful platform, usually because of insufficient user participation. Platforms suffer from the classic 'chicken and egg' problem that people won't get involved unless they expect others to get involved too. This means that building a successful platform requires an understanding of users' potential motivations.

> "Users contribute to online platforms like Stack Overflow to boost their employment prospects"

Evaluating the motivations behind user participation is not an easy task, especially for platforms that rely on voluntary contributions or 'crowdsourcing'. The motivations behind seemingly altruistic activities can vary dramatically by platform and audience. A well-designed incentive structure can encourage more user participation, thus leading to a successful platform.

Research by Lei Xu and colleagues addresses this issue by analysing data from Stack Overflow, the largest online Q&A platform for computer programming. The study considers Lerner and Tirole's hypothesis that contributions are motivated by 'career concerns': people's desire to signal their abilities so as to obtain better employment.

Stack Overflow has an affiliated careers site, which hosts job listings and contributors' CVs so as to match employers and employees. The information on each job candidate includes their employment history as well as summary statistics of their contributions to Stack Overflow. The researchers investigate how activities that can enhance a user's reputation vary before and after the user finds a new job – and they draw a contrast with activities that do not help to enhance the user's reputation.

The study's key result is that after finding a new job, users contribute 25% less in reputation-generating activity on Stack Overflow. By contrast, users reduce their non-reputation-generating activity by only 8% after finding a new job. These findings suggest that users contribute voluntarily to Stack Overflow at least in part because they perceive it as a way to improve their employment prospects.

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**Lei XU** obtained his PhD at McGill University and will join TSE as a post-doctoral researcher in September 2016. More details on his research are available in 'What Makes Geeks Tick? A Study of Stack Overflow Careers', co-authored with Tingting Nian and Luís Cabral.

http://misrc.umn.edu/wise/2014_Papers/90.pdf

# What makes mobile phone users switch tariffs?

How do mobile phone users choose among numerous possible payment plans? Research by **Christos GENAKOS** shows that having an 'expert friend' calculate the contract with the biggest savings is useful, but people's desire to avoid psychological losses helps even more.

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Mobile phones are the ubiquitous digital element in our lives – but how should we choose the way to pay for mobile services best suited to our personal usage? In the UK, for example, there are seven million payment plans available, which makes it likely that many users would be better off switching to a more appropriate tariff. But with so many contracts available, users face confusion and might avoid switching altogether, harming both themselves and the competitive process among firms.

Research by Christos Genakos and colleagues analyses data on 60,000 UK mobile users to explore how they select their contracts. The researchers have unprecedented access to Billmonitor.com (BM), the UK's leading price comparison site for telecoms.

Mobile users subscribe to monthly plans with a fixed payment component (the monthly rental), which includes allowances for call minutes, text messages, data usage, etc. On registration with BM, users receive personalised information on the exact amount they could save by switching to the best contract for them. This information is calculated by BM's optimising algorithm, which is allowed to look into past bills.

Many users could save substantial amounts of money by switching to the alternative plans that their 'expert friend' recommends. Users fall into two categories: those who happen to exceed their allowance and pay extra fees (known as 'overage'), and could therefore save money by switching to a higher, more inclusive plan; and those who could save money by switching to a lower, less inclusive tariff if their consumption is systematically lower than their allowance.

If the only problem was information acquisition, then users of both types should switch with the same probability on receiving their personalised information. But, the researchers conjecture, users may react differently to the two different situations because of 'loss aversion': people evaluate economic outcomes not only based on an absolute valuation but also relative to subjective reference points.

> Psychological pressure to avoid losses helps mobile users choose the best tariff plan

Paying more than the monthly rental (which serves as a natural reference point) is experienced as a loss. It should be a more 'painful' experience and therefore prompt users to switch with higher probability than they would if they could save the exact same amount by switching to a lower tariff.

Analysis of the BM data shows that potential savings are a significant determinant of switching. Indeed, having an expert friend to help calculate potential savings increases the probability that users will switch contracts.

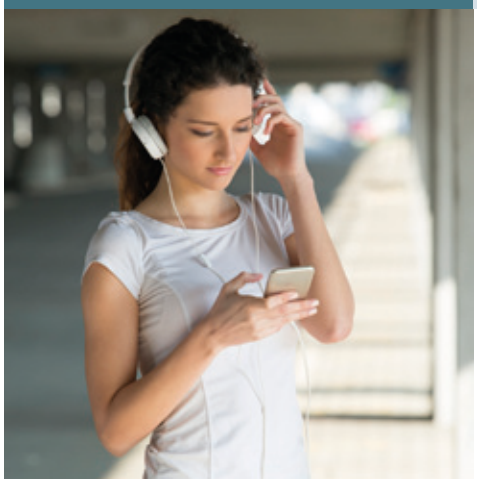
But more importantly, switching is six times more likely if the user is charged overage fees. In other words, the psychological pain of paying over and above what an individual expects to pay as a fixed monthly fee is an even greater motivator to switch. According to this study, savings are not necessarily the first thing even well-informed users are looking for: rather, they like a fixed reference point that leaves little room for nasty surprises on their phone bills.

**Christos GENAKOS** Christos GENAKOS is Assistant Professor at the Athens University of Economics and Business. More details on his research are available in 'Loss Aversion on the Phone', co-authored with Costas Roumanias and Tommaso Valletti.

http://www.cresse.info/uploadfiles/2015_pa3_p1.pdf

# Streaming reaches flood stage

What has been the impact of interactive streaming services like Spotify on the revenues of the recorded music industry? **Joel WALDFOGEL** investigates.



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Streaming music services have exploded in popularity in recent years, raising questions about their impact on the revenues generated by recorded music. While some observers hail streaming as the salvation of an industry dogged by piracy, others raise alarm about displacement of permanent downloads and low payments from streaming services. For example, musician disclosures of royalty statements led the New York Times to ask 'whether these micropayments can add up to anything substantial'.

What guidance can economics offer on how to think about streaming? First, streaming offerings are bundles of products with zero marginal cost. Given that different consumers' valuations of songs are not perfectly positively correlated, streaming bundles hold the possibility of raising revenue and/or consumer surplus depending on how they are priced. Successful bundling would translate some of the interest in music not generating 'a la carte' sales into willingness to pay for the bundled offering.

> "Interactive streaming seems to be revenue-neutral for the recorded music industry"

Finding out whether streaming stimulates or displaces sales of recorded music is vital for understanding its impact on the industry. Some argue that streaming functions as music promotion, much like traditional terrestrial radio. If this is true, then demand stimulation would give streaming an unambiguously positive impact on revenues.

Others believe that streaming functions as a substitute for permanent downloads of music, muting the benefits. But even if streaming displaces sales, it does not necessarily depress revenues. That depends on whether the streaming payment is high enough to offset the reduction in revenue from forgone downloads.

In research with Luis Aguiar of the Institute for Prospective Technological Studies, Joel Waldfogel makes use of the rapid growth in the number of active Spotify users – from 15 to 60 million worldwide since 2010 – to measure the streaming service's impact on unpaid consumption and the sales of recorded music. The study finds that Spotify use displaces permanent downloads - 137 Spotify streams appear to reduce track sales by one unit – but it also displaces music piracy. Given the current industry's revenue from track sales ($0.82 per sale) and the average payment received per stream ($0.007 per stream), Waldfogel's estimates of the sales displacement effect show that the losses from displaced sales are roughly outweighed by the gains in streaming revenue. In other words, interactive streaming appears to be revenue-neutral for the recorded music industry.

As discussant of these findings at the January 2016 conference, the TSE's Paul Seabright suggested that streaming is not just about delivering music via an alternative platform nor is it just about bundling as a more effective mechanism for generating revenue. Rather, it is an improved technology for music discovery, in terms of the characteristics of both the music and the listener. By this way of thinking, streaming delivers superior social value than other music delivery mechanisms, such as radio, and provides incentives for songwriters to create songs with high 'discovery value'.

**Joel WALDFOGEL** is Professor at the Carlson School of Management, University of Minnesota. More details on his research with Luis Aguiar are available in 'Streaming Reaches Flood Stage: Does Spotify Stimulate or Depress Music Sales?'

https://ec.europa.eu/jrc/sites/default/files/JRC96951.pdf

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# Markets for scientific attribution

How is recognition for scientific contributions allocated among research colleagues? **Joshua GANS** explored this question in the Suzanne Scotchmer Memorial Lecture in Toulouse in January 2016.

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Nobel laureate Paul Samuelson once wrote: *'In the long run, the economic scholar works for the only coin worth having - our own applause.'* But how are the individual contributions of economists and other researchers recognised within their scholarly communities? In a series of studies, Joshua Gans has been exploring what he describes as markets for scientific attribution. Delivering the Suzanne Scotchmer Memorial Lecture at the TSE's January 2016 conference, he presented his latest research paper, co-authored with Fiona Murray of MIT.

The researchers note that scientists have developed a number of mechanisms that play a critical role in determining the allocation of recognition. One is co-authorship, which arises when two scientists each contribute a sufficient amount to a research output that they include both of their names in the contribution. In the simplest case, attribution is then equally shared. In some areas, norms beyond co-authorship potentially influence the attribution of relative contributions. One notable norm is name ordering or what Gans calls 'first author conditions'.

Another mechanism comes in the form of formal acknowledgement of contribution. To the extent that scientific work builds on the work of other scholars, that prior contribution is generally acknowledged in the form of a citation. But, even in this context, a citation can take a variety of forms; from the briefest mention of influence to a more extended discussion of the significance of prior work.

If researchers' actual contributions were observable, then the formal mechanisms of co-authorship and citation would not play a role in the allocation of scientific rewards. In reality, actual contribution is typically imperfectly observed and consequently, the signal provided by formal attribution assists the 'peer market' in assessing contribution. This suggests that attribution has a market value - and clearly it plays a major role when CVs are being evaluated for hiring, promotions and grants.

Gans and Murray's study analyses the division of credit in scientific collaborations in the context of a scientist-owned lab employing post-docs or graduate students. They demonstrate that a 'pioneer' or senior scientist's decision to co-author with a follower or junior scientist depends critically on market attributions as well as the timing of the co-authoring decision. This results in multiple potential outcomes, each with different implications for the expected quality of the research project.

As discussant of the paper, Yossi Spiegel of Tel Aviv University asked what are the empirical puzzles on which it tries to shed light. One became a big news story shortly after the TSE conference, when Justin Wolfers reported research by Harvard PhD student Heather Sarsons in the New York Times. Her study presents evidence suggesting that the underrepresentation of women in economics reflects a systemic bias in the marketplace of ideas: a failure to give women full credit for collaborative work done with men. This is certainly an empirical puzzle that needs explanation.

**Joshua GANS** is Professor at the Rotman School of Management, University of Toronto. More details on his research with Fiona Murray are available in 'Markets for Scientific Attribution'. His commentary on the study by Heather Sarsons is on the Digitopoly blog:

**http://www.digitopoly.org/2016/01/12/gender-discrimination-in-scientific-credit/**

# IN SHORT

## Using social media in political campaigns

Political campaigns benefit from having a presence on social media, according to research by **Pinar YILDIRIM** of the Wharton School, University of Pennsylvania. Analysing data on over 6,000 US politicians over the period 2007-14, she finds that joining Twitter leads to a substantial increase in weekly political donations.

Until recently, politicians' efforts to connect with the electorate consisted mostly of investing in traditional outlets such as print and broadcast media. With the advent of social media, a lot of political communication has moved to platforms like Twitter and Facebook, which offer easy and inexpensive ways for politicians to promote themselves to the public. This is the first study to find evidence of the benefits of such activities for political campaigns.

## Optimal crowdfunding design

Crowdfunding platforms like Kickstarter have sharply reduced the costs for entrepreneurs wanting to pitch their projects to a wide range of potential funders before having to sink the costs of production. Research by **Matthew ELLMAN** of the Barcelona Graduate School of Economics analyses how the strategic interaction between entrepreneurs and funders determines outcomes for consumer and producers.

The study finds that the main social advantage of crowdfunding in its ability to adapt production and prices to the 'crowd's information' about market demand. The research also identifies how the design of crowdfunding platforms can limit any downsides and make this financial innovation an effective complement to standard methods of financing new ventures.

## The economics of mobile apps

Could Microsoft break the duopoly of Apple and Android as platforms for mobile apps? It's not likely, according to research by **Pai-Ling YIN** of Stanford University, which examines the even split between Apple and Android in this marketplace and what, if anything, could tip the balance.

Mobile app marketplaces currently feature an extremely high supply of products, creating intense competition to get noticed by consumers. This gives corporate developers an advantage since they have the existing marketing infrastructure to promote their apps. In the United States, popular developers are building apps for both the Apple and Android platforms, allowing the continued co-existence of these platforms, even at the expense of other big technology firms.

## Experimenting with online search behaviour

Online search algorithms continue to evolve to provide results that are a better match for individual tastes, raising concerns about 'filter bubbles' - the idea that personalised search yields opinions that confirm users' prior beliefs rather than providing balanced and objective information. A field experiment set up by **Neil GANDAL** of Tel Aviv University is testing what drives online search behaviour and whether certain types of content or user characteristics lead to filter bubbles.

The experiment allows users to explore a collection of Ted Talks based on their topic and/or their popularity with other users. Among the early findings is an association between high reported sociability among users and a tendency to 'follow the crowd' by placing stronger reliance on popularity information in search. Users who are 'opinion leaders' are more likely to search by topic and to invest more effort in their searches.

# ITSEI digital FORUM

## Changing Organisations in the Digital Age

## 16 JUNE 2016 / 9:30 - 14:30 - PALAIS BRONGNIART PARIS

Toulouse School of Economics brings together world-class economists and high-level policymakers to debate the latest digital society issues:

- The digital revolution and the evolution of organisations
- The communication revolution in organisations

The debates will be followed by a networking lunch.

### Key Speakers:

- **Wouter Dessein** *(Columbia Business School)*
- **Luis Garicano** *(London School of Economics)*
- **Andrei Hagiu** *(Harvard Business School)*
- **Augustin Landier** *(Toulouse School of Economics)*
- **Raffaella Sadun** *(Harvard Business School)*
- **Jean Tirole** *(Toulouse School of Economics)*
- **Marshall van Alstyne** *(Boston University, MIT)*

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## THE JEAN-JACQUES LAFFONT DIGITAL CHAIR

*KEEP IN TOUCH*


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