

THE TOULOUSE SCHOOL OF ECONOMICS MAGAZINE

TSE MAG

Living economics

#15
FALL
2017



Special issue

HEALTH

FOOD, DRUGS AND GENETIC TESTS

Daniel Chen
on data and
decisions

Fany Declerck
on high-frequency
trading

Stéphane Straub
on Macron's
opportunity

TSE turns 10:
celebrating
our success

It's the beginning of the academic year on the TSE campus, and the final term of an eventful calendar year, when France chose a new path and Europe has seemed a haven of stability. This is the perfect moment to celebrate 10 years of TSE, at a special celebration in Paris on October 11, where the Governor of the Banque de France is kindly hosting us at their magnificent premises for an evening event. It will be a unique occasion, an opportunity to look back over our history, as detailed in our new book *'TSE - une aventure humaine'* (TSE - a human adventure) by Benjamin de Capèle and Michaël Halimi. We can be proud of the work we have accomplished and continue to move our institution forward.



This new term sees us welcome several new members: Daniel Ershov, who works on industrial economics and digital platforms, and Cristina Gualdani, who is interested in structural models in econometrics, both join us as assistant professors. Anna Sankjohanser, in theoretical economics, and Helia Costa, in environmental economics, are coming to Toulouse as postdoctoral fellows. We are delighted with these new reinforcements, as well as with the 10 new postdoctoral fellows joining IAST, the multidisciplinary research center alongside TSE, which Jorge Pena has also joined as assistant professor. This year TSE is also welcoming numerous long-term visitors — including Richard Blundell, Matthieu Bouvard, Alfred Galichon, Matt Gentry, Laurent Miclo, Kaivan Munshi, and Tim Simcoe — thereby demonstrating the attractiveness of our institution.

Economists and social scientists are ever more important for understanding our societies, especially at the dawn of a revolution in medicine and healthcare. This TSE Mag dossier, dedicated to the economics of health, will hand you the keys to understanding a number of the core challenges in the field. The evidence of the benefits of healthy eating is undeniable, but how can we convince people to change their habits, and should we compel them? Pierre Dubois and Vincent Réquillart analyse various aspects of these questions and how to persuade us to make better choices. With technology gradually revolutionising medicine, David Bardey shows how the future of personalised healthcare will affect the economy. Lastly, Fiona Scott Morton scrutinises how the pharmaceutical industry is regulated.

We hope you enjoy the read!

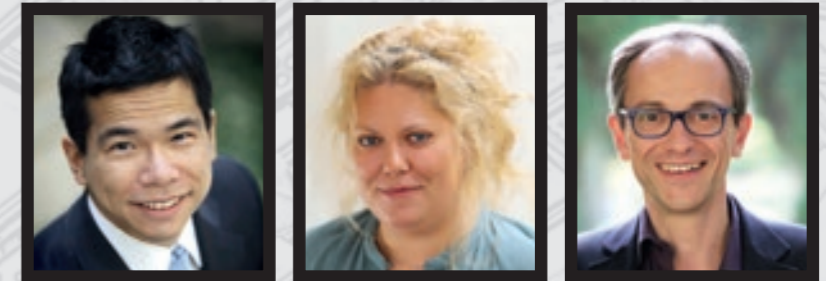
Ulrich Hege, TSE Director
Jean Tirole, TSE Chairman



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Appointments & prizes



Renato Gomes (TSE-CNRS) receives an ERC Grant

The research project PLATFORM "Competition and Regulation of Platform Markets" received an ERC Grant. TSE consolidates its hold on third place among European beneficiaries of ERC Grants, and is the only French institution to have won a new scholarship in economics.

This new ERC Grant brings to 18 the total number of grants hosted by TSE since the creation of this research fund, 11 of which are currently underway.



Astrid Hopfensitz & Milo Bianchi IUF 2017 appointments

Astrid Hopfensitz (TSE-IAST-CNRS) and Milo Bianchi (TSE-UTC) have been appointed for a five-year term of office as junior member of the Institut universitaire de France by the Minister of Higher Education and Research.



New ANR Grants

TSE researchers have once again been rewarded for their academic excellence through the launch of 4 new ANR-backed projects:

- **Thierry Magnac** (TSE-UTC): "Economics of Housing and Public Policy Evaluation"
- **Christian Gollier** (TSE-UTC): "Valuation of extra-long investments"
- **Frédéric Cherbonnier** (TSE-Science-Po): "Economy of disruptive innovation: the case of nanotechnology"
- **Renato Gomes** (TSE-CNRS): "Competition and Regulation in Platform Markets"

TSE currently hosts an impressive eight ANR projects.

TSE leaps into world top 20

TSE is the best economics university in continental Europe, according to the Shanghai rankings (ARWU). Moving up 18 places in the global rankings since last year, TSE is now in 17th place, securely established among the best in the world. Toulouse Capitole (ranked 45th) and TSE are the only French institutions in the top 50 universities in social science.

Awards

Bruno Biais

Bruno Biais (TSE-CNRS-CRM), Florian Heider and Marie Hoerova (European Central Bank) were awarded the 2017 best paper for their article "Risk-sharing or risk-taking? Counterparty-risk, incentives and margins" by the Europlace of Finance Institute during the 10th anniversary of the Risks Forum. This foundation is a networking organization promoting the excellence in economics and finance at European and international level.

Joanna Morais

Joanna Morais, PhD student under the supervision of Christine Thomas-Agnan, won the best presentation award for her article "Interpreting the impact of explanatory variables in compositional models" during the seventh "Compositional Data Analysis" workshop hosted in June, at Siena in Italy.

Giulia Pavan

Giulia Pavan, postdoctoral research fellow at TSE, was awarded the best doctoral thesis for her article "Essays on Empirical Industrial Organization".

TSE books win prizes

The French Economic Association (AFSE) has awarded its 2017 prize for "best essay" to Emmanuelle Auriol (TSE-UTC) for her book *'Pour en Finir avec les Mafias'* (Putting an End to Mafias) while TSE president Jean Tirole's book *"L'Économie du bien commun"* (*Economics for the Common Good*) has won the "best guidebook" category.

Debates

BlaBlaCar CEO meets TSE researchers

Frédéric Mazzella visited TSE to exchange with researchers on the latest research results on platforms and two-sided markets. The entrepreneur also engaged with Jean-François Bonnefon (TSE-IAST-CRM) on the ethics of self-driving cars at a local event gathering economic leaders and journalists in Toulouse.



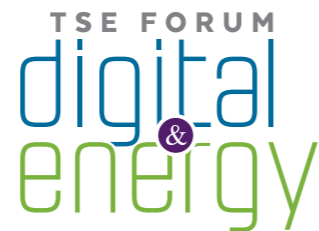
Wilfried Sand-Zantman discusses space economics

The TSE-UTC researcher exchanged with the CNES Toulouse director Genevieve Campan on space economics, public companies and the rise of Space X. The event, organized by La Tribune, gathered space industry specialists in Toulouse.



Frédéric Cherbonnier on unemployment in France

The TSE-UTC researcher discussed job creation with ATR supremo Christian Scherer at a local event organized by La Tribune. Frédéric's research detailed the major economic reasons for high unemployment in France, using graphs and data to support his observations.



“Solutions do exist”

World-class economists and industry executives offered their insights about the future of the digital and energy sectors at the TSE Forum in the Palais Brongniart, Paris, in June.



Platform monopolies are inevitable. How do we manage these and make the market competitive?
Jean Tirole – TSE



With continuous support to wind and solar power, we have overcapacity in Europe. The market is very sick.
Jean-Bernard Lévy – EDF



If we had a dollar to invest in the energy sector, what would be the most profitable investment in terms of driving development?
Catherine Wolfram
Institut Énergétique à Haas



Energy transition is no longer just a nice thing to think about – it's become the best economic option.
Antoine de la Faire – Engie



Decisions we make about policy today are likely to be around in 2050.
Richard Schmalensee – MIT



The collusion of platforms is very strong in the hotel sector. They are a monopoly, highly profitable and interdependent.
Pierrick le Masne – Accor



We feel very optimistic because solutions do exist.
Philippe Sauquet – Total



You can have access to energy and still be considered energy poor.
Stéphane Straub – TSE



We've succeeded in creating bridges between people who've never met each other before.
Frédéric Mazzella – BlaBlaCar



Network effects on online platforms are protecting natural monopolies.
Alexandre de Cornière – TSE

Newcomers

TSE is proud to welcome promising new colleagues:



HÉLIA COSTA is a new assistant professor. She comes from the European University Institute and works on applied microeconomics, environmental economics as well as political economics.

CRISTINA GUALDANI joins as an assistant professor from University College London. She mostly work on econometrics, applied microeconomics, and network economics.



DANIEL ERSHOV

joins as an assistant professor from the University of Toronto. His main research interests are firm competition, market regulation, and online markets. He recently worked on the effects of consumer search costs on entry, product design, and quality investment in online markets using unique data from the Google Play mobile app store.

ANNA SANKTJOHANSER

joins as a postdoctoral fellow from Oxford University. Her research interests are microeconomic theory and game theory.



ALFRED GALICHON

is a professor of economics and of mathematics at New York University, he joins us for a sabbatical year. Alfred's research interests span widely across theoretical, computational and empirical questions and include econometrics, microeconomics, and data science.



Save the date

16
NOVEMBER
2017

Distinguished Lectures:
Nicola Lacey (LSE) - The Gender of Crime
Toulouse

16 – 17
NOVEMBER
2017

Workshop: Economic analysis
of environmental food policies
Toulouse

7
DECEMBER
2017

Distinguished Lecture:
Suzannah Lipscomb (New College of the Humanities) - Passing God's Judgment: The Reformed Church and Women in 16th-Century Languedoc
Toulouse



Events by invitation only:
tse-fr.eu/events

Are US judges objective?

Daniel Chen joined TSE in 2016 from ETH Zurich and works at the crossroads between economics and law. Five years ago, he gathered an immense dataset on more than 380,000 US federal justice cases, and 1 million votes by federal judges. He has since worked tirelessly to exploit and understand this precious mine of information, revealing how economics, emotions and random events can influence judges' verdicts.

How do we make decisions? Do we consider only the consequences of our actions or are we acting per our moral values? This age-old philosophical question has yet to be answered but Daniel thinks he may have part of an answer. "In the US, judges are extremely respected and have a lot of decision power.

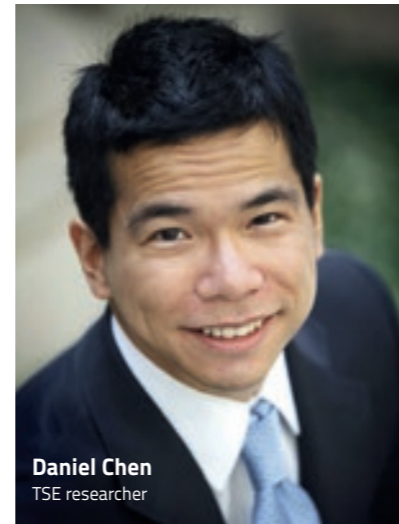
"Economics training changed judges' perception of their cases, but it also looks like external factors have a profound impact"

I tried to understand how they are making decisions and how those decisions are altered by outside factors," he explains. "For instance, when the US federal court ruled against Donald Trump's proposed travel ban, how did they make the decision which had a wide array of effects and consequences?"

The researcher and his colleagues targeted US federal court decisions since 1891 for analysis, in the belief that they represent a natural laboratory for the investigation of wider questions about human behaviour. The roughly 800 US federal judges are appointed for life and are randomly assigned to cases, along with two of their peers. "This is the perfect situation to monitor how decision-making evolves and how peer influence works," says Daniel.

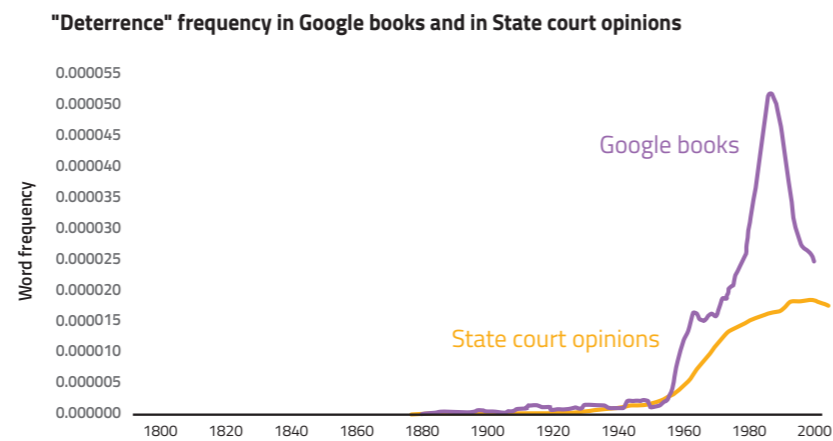
In 1976, US federal judges began receiving economics training, and by 1990, 40% of federal judges had attended those classes. Daniel's data suggests that these seminars may have had dramatic effects: judges subsequently favored more conservative verdicts and were more opposed to regulation. Daniel has also observed this trend in the decisions of judges who didn't receive any training but participated in the same cases as judges who did: "The fast pervasion of economics literature language, and especially of the word 'deterrence', into judicial reasoning in their written opinions is an incredible indicator of the impact those seminars had on judges."

With more than four terabytes of data and complex modelling, Daniel and his co-authors have shown that economics



Daniel Chen
TSE researcher

training can change the way we understand issues and make decisions. These changes also seem to be passed on to 'untrained' peers as soon as they work together. The spread of technical terms from economics into juridical verdicts is another indicator of the powerful, fast and lasting impact of economic knowledge on people's perspectives.



Mentions of "deterrence" in Google Books and in US state court opinions. The large increase in judicial use of this word, along with other economics terminology, indicates that economics seminars had a powerful impact on judges.

Daniel has also tried to understand what other parameters could play a role in influencing judges' verdicts: "The idea was to try to understand whether judges made consistent decisions or if their verdicts could be emotionally impacted."

"Our models can predict the outcomes of a trial much more precisely than with more traditional methods"

Across different courts, Daniel found evidence of many surprising details that can influence judges' decisions. For instance, judges were on average more lenient on the day after their favorite team won a match. Sentences of people who were tried on their birthday were systematically much lower, but only if the defendant was present during the trial. Even the level of masculinity of the lawyer's voice appears to influence trial outcomes. "It's clear that economics training changed judges' perception of their cases, but it also looks like external factors have a profound impact," Daniel concludes. "With all these factors considered, our models can predict the outcomes of a trial much more precisely than with more traditional methods."

Daniel will continue to work with this huge database: "Finding so many different correlations demonstrate that judges are indeed humans and that their emotions at the time of a verdict play a role. This hints that we make decisions both with a consequentialist point of view and a deontological one, and gives us a better understanding of the complexity of decision-making processes."



FANY DECLERCK ON HIGH-FREQUENCY TRADING

Finance, speed and opacity

Fany Declerck joined TSE in September 2001 from the University of Lille, following a stint as a visiting researcher at the Bourse de Paris stock exchange, where she was able to discuss her doctoral research with Bruno Biais, her former supervisor in Toulouse. As part of the Finance research group, she has been working on several topics, and in particular on high-frequency trading, company obligations and dark pools – the non-transparent exchange systems often used by uninformed investors. She tells us about her work.

When did high-frequency trading first appear?

The foundations of high-frequency trading were laid in the United States in 1969. There are three essential steps: 1969 was when the first electronic trading platform was created, in 1977 the first trading algorithm was written, and finally, in 1987, the first high-frequency trader was plugged into the Nasdaq.

“It’s looking as if high-frequency traders have a generally positive effect on the market”

The phenomenon then truly developed during the first years of the new millennium. In Europe, the practice only really took off in 2007. Nowadays, it represents between one and two thirds of the volumes exchanged in financial markets. It’s a tool that has grown enormously in a little over 10 years, and we are trying to understand the impacts. While numerous start-ups were appearing regularly in the early days of the phenomenon, we have seen significant consolidation in the industry in recent years.

What is the impact of this financial revolution?

It’s a very complex phenomenon to analyse. The big question economists are asking is about the ability, or inability of high-frequency trading to bring liquidity to the markets. We are working with Bruno

Biais and Sophie Moinas on this topic, using a huge database we have been able to obtain from the Financial Markets Authority, which contains all the 2010 financial transactions from Euronext.

We are beginning to see some results from the calculations launched using these 60 terabytes of data, and it’s looking as if high-frequency traders have a generally positive effect on the market, to the extent that they contribute liquidity and do not withdraw when price volatility is higher. Their speed enables them to stabilise the market, in other words to sell as soon a stock rises and buy as soon as it falls. What we are also showing is that prop traders, proprietary traders who buy and sell on the market for their own benefit, also provide liquidity without entering the speed race.

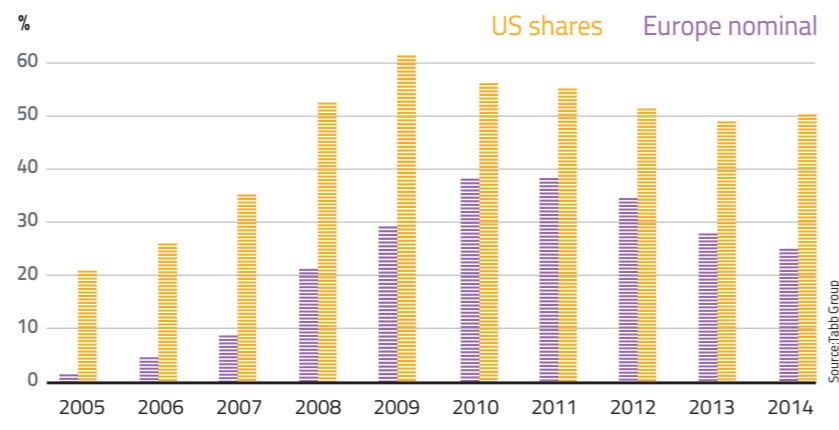


Fany Declerck
TSE professor

How were you able to obtain this data?

It took us several years, but it all began when Bruno Biais took part in a round table on the future of financial markets, just after the crisis. Certain journalists present were questioning economists’ forecasting ability, and Bruno replied that it was difficult to study financial markets without the data, warning against the high-frequency trading that was beginning to develop in Europe.

High-frequency market share



“The algorithms are confidential, even for the regulator, so the market is vulnerable to coding or configuration errors”

Does high-frequency trading involve other risks?

The algorithms are obviously confidential, even for the regulator, so the market is vulnerable to coding or configuration errors. The example of Knight Capital in 2012, which used a wrongly configured algorithm and lost over \$400 million in a few moments, is a clear demonstration.

What are your future plans?

We are going to work with Sabrina Buti, professor at the University of Paris Dauphine,

on the links between dark pools and high-frequency traders. The idea is to try to understand high-frequency trader strategy in an environment of fragmented markets. For example, are these opaque markets substitutes for more transparent central markets, or are they complementary? Do prop traders adopt the same strategies on all platforms? What effect does increased volatility have?

I’ve also begun to work with Régis Breton, from the Banque de France, and Jérôme Dugast of the University of Luxembourg, on the various order placement strategies used by financial intermediaries. We have obtained all the orders and financial transactions from 2005 in France, before the arrival of high-frequency trading. So it’s almost a historical finance paper, but these data present a dual advantage:

investment strategies are mostly the same, but in a market that is much simpler to analyse, and above all, by identifying each order and transaction, we can derive a much more detailed classification of the intermediaries. Our aim is to achieve a very precise dissection of the origin of liquidity. We believe that the results may give us a better idea of the differences between categories of investor, their strategies, and above all the conditions in which actors create and consume liquidity.

A last word about the Banque de France prize this year?

We are very proud of the prize-winners, and I am looking forward to getting them together for the ceremony and conference on November 14. I think it will be an excellent year for this prestigious prize. ■

STÉPHANE STRAUB ON MACRON'S OPPORTUNITY

Arrested development

International development often disappeared from the headlines during the political upheavals of the past year that culminated in the sweeping electoral victory of Emmanuel Macron. But Brexit and Donald Trump's isolationism offer a game-changing opportunity for France and Europe to take the lead on the global stage, says TSE and World Bank economist Stéphane Straub.

The arrival of a centrist and ardent pro-European in the Elysée Palace has lifted hopes that the tide is turning against populism after recent successes for opportunists such as Donald Trump and the leaders of the Brexit campaign. Many of Macron's supporters believe his success has avoided bleak near-term prospects for the EU. But it is striking that international development has largely been absent from the debate.

"The development equation is too complex to be solved by pouring money into inefficient and corrupt regimes"

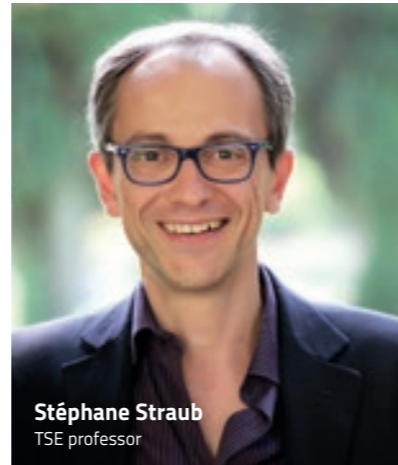
The new US government is retreating from commitments to multilateral organizations and withdrawing support for aid projects. Meanwhile, Brexit is likely to deal a blow to DFID, the UK development agency which is widely recognized as one of the best of its kind. This context might be a historical opportunity for France, and the European Union, to take the lead. The stakes are high, given the need for solutions to destabilizing conflicts and mass migrations, especially in neighbouring regions in Africa and the Middle East.

Fighting poverty

Controversy over the efficacy of development support is unlikely to disappear anytime soon. No one can be content today with generic policies, such as the UN's 0.7% target, that pledge a small portion of national GDP to foreign aid. Such commitments

are rarely honoured, and the development equation is too complex to be solved by just pouring money into often inefficient and corrupt regimes.

A modern development policy for France and Europe must recognize first that there is no development without a strong, efficient state to provide the legal, regulatory and institutional framework that allows economic agents to thrive. This is a prerequisite to address the enormous demand for infrastructure to improve the provision of water, sanitation, electricity, transport, education and health in developing countries. There are already plenty of projects that have made a significant difference to the lives of the world's poorest. Indeed, effective policies have stimulated

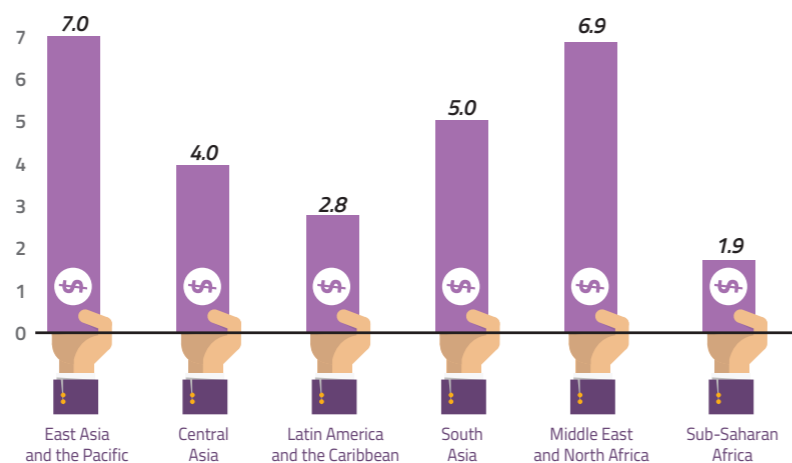


a dramatic decline in overall poverty over recent decades.

Magical solutions vs targeting efficiency

Next, development agencies should not be swayed by the current hype about attracting the private sector to finance projects such as roads, sewers or energy networks.

Infrastructure investment in developing regions
(public and private infrastructure investments, latest year available)



The private sector only provides about a tenth of infrastructure investment in developing countries.

Leveraging scarce public and concessional funds to harness trillions of dollars from pension funds and other institutional investors is touted as a magical solution to the problems of the poor.

"There is no development without a strong, efficient state that allows economic agents to thrive"

True, there are important and complementary roles for public and private actors in driving forward projects, from screening the good from the bad, to monitoring implementation. But the private sector only provides about a tenth of infrastructure investment in developing countries. And that's if you ignore that many public-private partnerships involve large taxpayer contributions, in the form of direct payments or guarantees. When public investment falters, the track record of private investors suggests they are unlikely to step up.

As my colleagues and I have argued in a recent World Bank report on infrastructure in Latin America, the true source of new financial, human and institutional resources lies in battered and inefficient public sectors. Depending on how one crunches the numbers, a modest 10% improvement in the efficiency of each dollar spent by public sectors could be equivalent to doubling private investments.

It's not just about "spending better". We also show that targeted measures to address the market failures that plague developing countries, from construction to service delivery, may have a disproportionate effect on policy effectiveness. Helping to secure such improvements needs to be at the heart of development agencies' agenda.



Lessons learned

Finally, development agencies also need to nurture the crucial synergy with research institutions to understand what works and what doesn't. In recent years, development economists have refined a large and invaluable set of tools: from theoretical models that expose market failures, to empirical models that can handle huge datasets and randomized control experiments that allow objective evaluation of projects. Academic expertise, combined with development agencies' experience, will be essential to design internal reforms and incentive schemes, and to choose and implement projects more efficiently.

Lessons learned through rigorous, fact-based policies and evaluation can have huge benefits for policymakers, researchers and partners in the developing world. They also generate valuable spillovers that help address problems in developed countries, which are no strangers to poverty and inequality.

It is time for France and Europe to seize the chance to rethink international development, enhance their own security and prestige, and improve the lives of the world's most vulnerable.



Special issue

HEALTH

FOOD, DRUGS AND GENETIC TESTS

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PIERRE DUBOIS ON CRISPS AND CONSUMERS

Is it time for a ban on junk food advertising?

Junk-food markets tend to be dominated by a small number of firms, selling multiple brands and advertising heavily. Would a ban on advertising junk food – such as sweets and soft drinks – help to tackle rising rates of obesity? Crunching the numbers for potato crisps, TSE professor Pierre Dubois has examined the complex effects of advertising on prices and consumer behaviour.

The World Health Organization and other policy organizations have called for restrictions on junk food advertising. The success of such restrictions in promoting healthier diets would be determined by the ways in which advertising affects consumer choice, and how firms respond to an advertising ban. The size of the impact depends on how much advertising for a brand stimulates demand for other brands, and whether the overall effect changes the size of the market. It also depends on whether advertising makes demand more sensitive to price, and whether firms respond to restrictions strategically – for instance, by lowering prices.

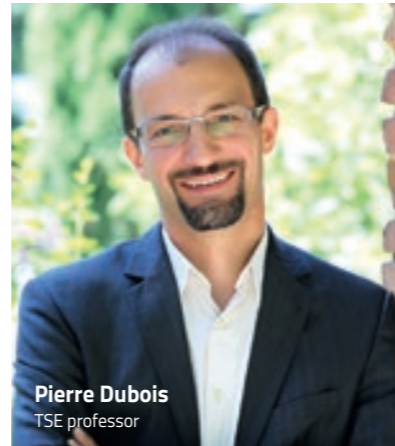
In a recent paper, Pierre estimates how demand for different brands of crisps in the UK is affected by advertising. Together with co-researchers Rachel Griffith and Martin O’Connell, he uses the estimates to simulate the impact of an advertising

ban, considering both consumer response and price changes.

Persuasive, informative or complementary?

Economists have long been interested in the mechanism through which advertising affects consumer choice. ‘Persuasive’ theories argue that advertising makes demand less elastic, distorting consumer decision-making. ‘Informative’ theories suggest that advertising helps consumers overcome costly search. The ‘complementary’ view highlights how advertising can enhance the value of a good by, for example, improving its social prestige.

To empirically assess the impact of an advertising ban on consumer switching, prices and health, Pierre needed a model



Pierre Dubois
TSE professor

that accommodates all the ways that advertising might alter the shape of demand. This could be done while remaining agnostic about how advertising affects consumer utility: for instance, persuasive and com-

“The health gains of a ban will be limited by firms lowering prices; and by consumers substituting crisps with other junk foods”

plementary advertising can have empirically indistinguishable effects on consumer demand. To make statements about the impact on consumer welfare, however, a more definitive view was needed.

Estimating effects

To obtain robust empirical estimates of the causal effects of advertising on consumer choice, Pierre examined the extent to which individuals were exposed to advertising of



© Juha Remes

“Advertising lowers consumers’ willingness to pay for healthier crisps, and encourages them to switch to larger pack sizes”

crisps, looking at the time and TV station chosen by different brands, and consumers’ viewing behaviour. Panel data on purchases allowed Pierre’s team to control for several potentially confounding factors. Brand advertising may be predatory, taking market share from rival products; or it might be cooperative, so that more advertising for one product increases demand for other products. Pierre’s demand specification allowed for the possibility that advertising was either predatory, cooperative or both.

People are unlikely to instantly forget adverts they see, so Pierre also allowed for the possibility that advertising effects demand both now and in the future. His price-setting model allowed him to capture how firms would adjust prices in response to a ban.

Consumer demand

Pierre’s research shows that advertising lowers the willingness of consumers to pay for healthier crisps. It also lowers the price sensitivity of demand and encourages people to switch to larger pack sizes. He finds evidence of both predatory and cooperative advertising. Overall, advertising expands the size of the market.

If advertising were banned and firms did not respond by changing prices, Pierre estimates that the total quantity of crisps sold would fall by around 15% – leading to similar falls in energy, saturated fat and salt from crisps. These health gains would be partially mitigated by people switching to other junk food, which was found to be more likely than adopting healthier snacks.

Firms’ response

Firms would face incentives to change their prices following any advertising ban. Advertising makes demand less elastic, so a ban raises the sensitivity of demand to prices, and encourages firms to lower prices. This is intuitive, says Pierre: banning competition in advertising intensifies price competition.

The response of firms to the ban offsets the reduction in demand for crisps that results directly from the absence of advertising. Prices in the market fall by 4% on average, and therefore in equilibrium the ban lowers demand for crisps by around 10% – which is two-thirds the reduction if prices were held constant.

Food for thought

Pierre’s research shows that a ban on crisp advertising would lead to health gains from lower consumption. But these health gains will be limited by firms lowering prices, which leads to an offsetting increase in demand; and by some consumers substituting crisps with other junk foods. His analysis relies on carefully modelling the channels by which advertising can influence consumer demands. To take the analysis further and make welfare statements, he says researchers need to be more precise about whether advertising is persuasive, informative or complementary.

In addition to advertising regulation, Pierre and his co-authors recommend careful analysis of the efficiency of junk food taxes, examining how they might be targeted to improve consumer behaviour. ■

Taxes work best

Drawing on a related study by Pierre, the French government has encouraged the use of color-coded Nutriscore tags on certain food products since April. His research suggests that these nutritional labels could be better at promoting healthy eating than a junk food advertising ban, but probably less effective than taxes.

Read his interview (in French) with UTC magazine: magazine.ut-capitole.fr

FIONA SCOTT MORTON ON US DRUG PRICES

How Big Pharma evades competition

Professor at Yale University School of Management, Fiona Scott Morton has also worked in the Antitrust Division of the US Department of Justice. She is a regular and highly valued visitor to TSE, and has written articles with TSE members on the economics of developing biomarkers and other pharmaceutical innovations. Drawing on research from her recent working paper, 'Enabling Competition in Pharmaceutical Markets', she highlights the problems facing regulators in this fast-changing sector.



Fiona Scott Morton
professor at Yale

The United States, unlike many other industrialized nations, does not regulate the price of pharmaceutical products directly. There are advantages to this approach. The US generic market is one of the world's most dynamic and cost-effective. The inventor of a socially valuable patented drug may charge high prices, and the ensuing pro-

but instead a lack of market discipline, sometimes exacerbated by regulations. When manufacturers can earn high profits by lobbying for regulations that weaken competition, or by developing mechanisms to sidestep competition, the system no longer incentivizes the invention of valuable drugs.

medications; thus, without effective rules and frameworks provided by the government, they face difficulty in creating market forces on their own. Without market pressures, drug makers may sell at arbitrarily high prices to insured consumers.

"Regulatory barriers have been used by brands to prevent the entrance of traditional generics"

fit incentivizes innovation that benefits consumers. Competition between substitute therapies can then push down these prices over time. Generic entry after patent expiration pushes down prices even further. Prices that reflect value create exactly the incentives society desires for innovation. However, if competitive forces weaken, high prices for drugs may not reflect value

Biologics on the rise

Over the past two decades, pharmaceutical innovation has shifted from chemically-synthesized small molecule drugs toward more complex, bioengineered treatments grown from living tissue that are known as biologics. The development of biologic medicines has represented a boon to many patients suffering from severe diseases such as cancer, hepatitis, haemophilia, multiple sclerosis and various autoimmune disorders.

Written with my colleague Lysle Boller, the first focus of our paper is on biologics, the fastest growing segment of drug spending which now (along with specialty drugs) represents more than one third of total spending. Regulatory delays have left the US without competitive biosimilars – biologic entrants analogous to generics – that create price competition. There are only two biosimilars on the market in the US while there are more than 20 in the EU. This delay carries a hefty price tag.

"When manufacturers can weaken or sidestep competition, the system no longer incentivizes the invention of valuable drugs"

Regulatory barriers are likely to inhibit biosimilar competition even after approval by the Food and Drug Administration (FDA). These barriers have also been used by brands to prevent the entrance of traditional generics, and include pay for delay schemes, abuse of orphan drug classifications, and REMS requirements meant to increase drug safety. These barriers have also slowed the market response to price hikes in small generic markets. In conjunction with the FDA's slow progress on biosimilar approval, these tactics have led to a decline in the fraction of pharmaceutical expenditure exposed to significant price competition.

Our paper also studies the demand-side imperfections of market participants. Pharmacy Benefit Managers (PBM), which are increasingly consolidated, may face agency problems that undermine their stated goal of bargaining for lower drug prices. PBMs may use rebates as a tool to

increase profits by keeping a share of the high prices paid by patients. Additionally, product-hopping schemes instituted by brands and suboptimal Medicare reimbursement policies undermine patient incentives to opt for cheaper drugs. These problems are exacerbated by the ability of brands to provide kickbacks in the form of coupons, financial assistance, free meals, patient care, and other benefits.

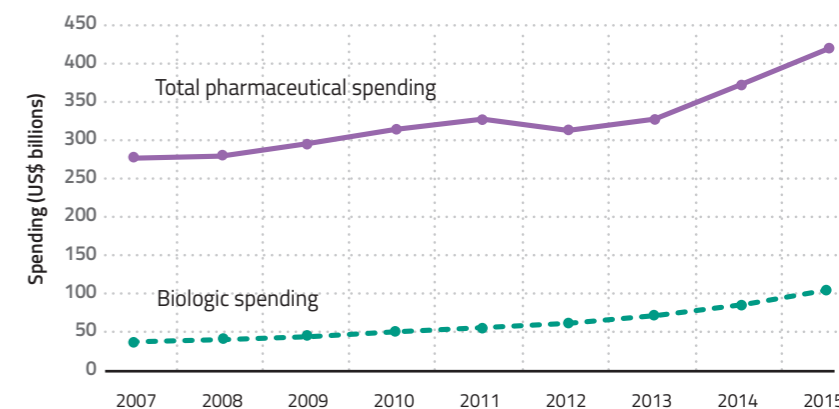
It is very difficult to devise price regulation that encourages innovation in a fast-changing industry. Regulators may be uninformed about valuable research, be captured by the industry, or lack the resources to keep up with changes in science or the cost of production. Because innovation is hugely valuable to consumers, we are hesitant to recommend government regulation of pharmaceutical prices.

The first step toward bringing down prices would be to enforce existing rules that

encourage competition. For example, speedy and effective entry of generic products, and financial incentives for consumers to choose treatments that have offered significant discounts are supposed to be encouraged by the existing regulatory framework. Both result in lower prices but these forces have been greatly attenuated or stymied by tactics undertaken by incumbent drug manufacturers.

US regulators need to act now if they would like to see lower prescription drug expenditures; our paper proposes specific policy and legislative changes for both federal and state authorities. For example, almost every biologic product faces no meaningful competition in the US today, resulting in high and increasing prices in this increasingly important sector. A competitive marketplace has worked for the US in the past and is a promising avenue for reducing pharmaceutical expenditures today. ■

Pharmaceutical sales in the United States

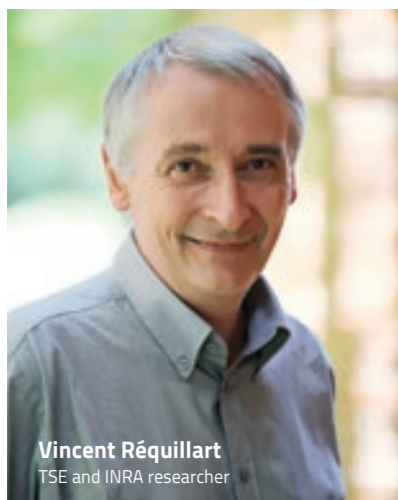


In the US, biologics have grown from just 13% of pharmaceutical spending in 2006 to 27% in 2016. Although total pharmaceutical spending has been increasing rapidly, utilization has remained roughly constant. This indicates that increased spending can be attributed to increases in the price of the average bundle of drugs consumed, caused both by price increases and consumption of more expensive drugs.

VINCENT RÉQUILLART ON FOOD RECOMMENDATIONS

Should we be told what to eat?

Vincent Réquillart is a leading thinker at TSE and INRA, Europe's top agricultural research institute. His innovative work on the impact of dietary and nutritional recommendations on consumer welfare, health and the environment suggests that public information campaigns need to be stepped up. His team is the first to analyze their impact on a consumer's overall diet.



Vincent Réquillart
TSE and INRA researcher

✂ Changing diet is rarely easy

Information campaigns aimed at raising awareness of food-related health issues generally have positive effects on consumption but are relatively modest in scope. Campaigns such as "5 a day" might contribute to a 5-8% increase in the average consumption of fruit and vegetables. This moderate impact is not surprising as many studies show it is "costly" for consumers to change eating habits. Consumers choose the diet based on their taste preferences, prices, income, time, family environment, and so on.

Adopting a recommendation can have long-term health benefits, but often appears as a loss of "well-being" in the short term if new foods are perceived to be less tasty or require more preparation. This loss of well-being must be compared with health and environmental gains to determine whether recommendations are cost-effective.

Adopting a particular recommendation can lead to a change in the overall diet. For example, an increase in fruit and vegetable consumption can lead to a decrease in the consumption of dairy products for dessert. Foods within an individual's diet are connected by complementarity and substitution relationships that must be characterized to evaluate the effects of a recommendation on the overall diet.

✂ Impact on diets

Using a consumer behaviour model, Vincent's team simulate how the whole diet is modified in response to a recommendation. To assess the impact on health, they use an epidemiological model to quantify the effect of dietary changes on the mortality associated with a set of chronic diseases. The impact on the environment is assessed using emission factors for the main foods consumed in France. Finally, a cost-benefit analysis uses monetary equivalents to compare the variation in consumer welfare with health and environmental impacts.

Vincent and his colleagues assume that, as a result of an information campaign, consumers increase their compliance with a recommendation by 5%. They consider five different recommendations aimed at improving public health:

- Eat more fruit and vegetables
- Consume fewer soft drinks
- Eat more fish and seafood
- Eat more fresh dairy products
- Eat less cheese, butter and cream

Two other recommendations are justified by environmental considerations:

- Eat less meat (as emissions from animals are higher than those of plants)
- Eat less red meat (as emissions from ruminants are higher than those of other animals)

The results show that adopting a recommendation has effects on the overall diet. For example, a 5% increase in consumption of fruit and vegetables translates into lower consumption of red meat, partially offset by increased consumption of other meats, and lower consumption of dairy products.



"Food can be responsible for up to 30% of greenhouse gas emissions in developed countries"

Interestingly, compliance with this recommendation is driven by consumers eating more processed (rather than fresh) fruit and vegetables. Eating less cheese, butter and cream leads to increased consumption of meat.

✂ Health vs environment

The impact of the recommendations on health and emissions varies considerably.

All have positive effects on health, especially the fruit and vegetable recommendation. In terms of emissions, the strongest impact comes from eating more fruit and vegetables and to a lesser extent from reduced meat consumption.

Most of the recommendations have compatible health and environmental effects. In the case of cheese, butter and cream, however, a decrease in consumption has a positive effect on health but a negative effect on emissions, largely due to the associated increase in meat consumption.

Except for the meat recommendation, the effect on health is about 10 times the environmental impact in terms of monetary value.

✂ Recommendations are often cost-effective

The costs borne by consumers vary greatly according to the recommendations: the more food categories affected, the greater the costs. Reducing red-meat consumption, for example, has little effect on other products. Conversely, an increase in fruit and vegetable consumption affects many other products.

Eating more fruit and vegetables is clearly desirable: the costs borne by consumers are largely offset by the health and environmental benefits. The recommendations to eat more fish or less red meat are cost-effective, but to a lesser extent. As for reducing consumption of all meat, the benefits of this recommendation are of the same order of magnitude as its costs.

✂ Future research

These results should be considered with caution, Vincent warns. Environmental impact is measured only in terms of emissions and does not consider other potential impacts such as eutrophication, acidification or land use. The wide range of health and environmental impacts of products from each food group, linked for example to production methods, also needs to be considered.

Vincent's novel approach will be supplemented by further work aiming at a more complete assessment of the impact of dietary changes.

"The costs to consumers of eating more fruit and vegetables are largely offset by health and environmental benefits"

Many countries use information campaigns to encourage a healthier diet with less fat, sugars and salt and more fruit and vegetables. Studies have also shown that food can be responsible for 15% to 30% of greenhouse gas emissions in developed countries, leading many experts to recommend more ecologically sustainable diets that include less meat.

Impact on health and the environment of each recommendation

Consumption changes	Fruits / Vegetables	Non-alcoholic drinks	Fish	Red meat	Meat	Fresh-milk products	Cheese, butter, cream
	↑ +5%	↓ -5%	↑ +5%	↓ -5%	↓ -5%	↑ +5%	↓ -5%
Fresh fruits & vegetables	↑ +4,8%	↑ +0,2%	↑ +0,4%	↑ +0,4%	↑ +1,0%	- 0,0%	↑ +2,2%
Processed fruit and vegetables	↑ +20,4%	↑ +0,7%	↓ -0,5%	- 0,0%	↓ -3,3%	↓ -2,7%	↑ +0,6%
Meat	↓ -1,2%	↑ +0,3%	↓ -0,4%	↓ -1,0%	↓ -5,3%	↓ -0,7%	↑ +3,3%
Red meat	↓ -10,1%	↑ +0,1%	↓ -0,9%	↓ -7,5%	↓ -8,5%	↓ -1,5%	↑ +0,5%
Fish	↑ +9,9%	↑ +0,5%	↑ +5,3%	↑ +1,6%	↑ +7,1%	↑ +0,2%	↓ -0,7%
Fresh-milk products	↓ -4,7%	↓ -0,1%	- 0,0%	↑ +0,7%	↑ +3,2%	↑ +5,0%	↓ -1,1%
Cheese, butter, cream	↓ -3,2%	↓ -0,5%	- 0,0%	↑ +0,1%	↑ +4,1%	↑ +0,2%	↓ -5,0%
Ready-made food	↓ -12,6%	↓ -12,6%	↓ -2,9%	↓ -1,1%	↓ -3,7%	↓ -1,26%	↑ +1,4
Impact on health (% of avoided premature death)	↑ +3,8%	↑ +0,2%	↑ +0,6%	↑ +0,3%	↑ +0,4%	↑ +0,4%	↑ +1,1%
CO ₂ impact (% of CO ₂ avoided)	↑ +2,8%	- 0,0%	↑ +0,4%	↑ +0,5%	↑ +0,9%	↑ +0,3%	↓ -0,5%

Source: INRA

DAVID BARDEY ON PERSONALIZED MEDICINE

Testing times for insurers

Genetic testing may lead to spectacular medical advances, but it also presents huge challenges for the future of health insurance. Together with TSE's Philippe De Donder and former IAST researcher César Mantilla, David Bardey (University of Los Andes) developed a theoretical model which they tested in an experiment to compare regulations for genetic health information. Here, we summarize findings from their recent working paper.

The development of ever cheaper and more informative genetic tests has led to the emergence of personalized medicine. These tests allow individuals to obtain very detailed information on their genetic predisposition to several diseases, as well as prevention strategies and treatment.

"If individuals are obliged to pass on test results to insurers, those with a genetic predisposition to disease are likely to face hefty premiums"

Genetic tests exacerbate a difficult trade-off for health insurance regulators. If individuals are obliged to pass on test results

to insurers, those with a genetic predisposition to disease are likely to face hefty premiums. This discrimination risk may reduce incentives to take the test, resulting in the loss of precious health information.

Alternatively, if disclosure is not mandatory, individuals may hide any bad information they discover. This leads to adverse selection, putting insurers at a disadvantage as less healthy people choose more generous plans.

The model

Regulations of genetic health information vary a lot across countries. David and his colleagues compare Consent Law (CL), which allows information to be withheld from insurers, and Disclosure Duty (DD),



David Bardey
University of Los Andes professor

which mandates disclosure. This allows them to focus on the trade-off between adverse selection and discrimination risk. Agents can be of two genetic types: type L have a low probability of developing a disease while type H have a high probability. Agents are uninformed about their type, unless they take a genetic test. These tests are costly to individuals, because of their monetary cost but also because some agents may dislike knowing more about

their genetic background. After deciding to test or not, individuals buy health insurance on a competitive market.

Under DD, individuals pay an 'average' premium if they do not test, a low premium if they test as type L, or a high premium if type H. Under CL, agents show their test results to insurers if they test as type L; otherwise, they pretend to be uninformed. In light of the current low test take-up rate, the researchers assume that insurers offer a pooling contract to all who say (truthfully or not) that they are uninformed. The (zero profit) premium attached to this contract reflects the intensity of adverse selection at play.

"As test costs decrease in the future, a painful spike in insurance premiums could destabilize political support for consensual regulation"

Test results

The researchers' model produced three hypotheses that they successfully tested in Toulouse with an experiment in which subjects had to make several choices between a lottery and a sure payoff:

1. Test take-up rates decrease with the test cost under both regulations, and are higher under CL than under DD. Subjects seem very sensitive to the discrimination risk, since most of them do not test under DD, even when the test cost is low.
2. The test take-up rate under CL increases with the amount of adverse selection. Agents try to escape the more expensive

Supporting science

Set up in April 2009, the French National Alliance for Life Sciences and Health (Aviesan) groups together the main stakeholders of life and health sciences in France. David, Philippe and César gratefully acknowledge financial support from the Health Chair (a joint initiative by PSL, Université Paris Dauphine, ENSAE and MGEN under the aegis of the Fondation du Risque), from ANR's 'Multi-disciplinary Study of Emergence phenomena' grant and from IAST.

contract by obtaining the cheaper contract associated with good genetic information.

3. Agents prefer CL when the test cost is low, and DD when it is high. They fare better under DD than under CL if they choose not to test, because CL is costlier due to adverse selection.

The experimental results also shed light on the intensity of the trade-off between adverse selection and discrimination risk. In the first stage, they assume that the level of adverse selection (used by insurers to compute their break-even premiums) is exogenously given, and not affected by the test cost.

In a second stage, they use their experimental results to work out the equilibrium (steady state) amount of adverse selection as a function of the test cost, by looking at the proportion of agents who test (and then claim to be uninformed if they receive bad news) under CL. They find that testing (and hence the adverse selection level) is quite insensitive to the test cost when the latter is either low or large, but very sensitive when it is intermediate.

Difficult balance

Personalized medicine is currently in its infancy, with genetic test costs still large

but falling at an impressive rate. As these costs decrease in the future, the researchers' analysis predicts that we could observe a sudden increase in the amount of adverse selection under CL. This would cause a painful spike in insurance premiums and destabilize political support for consensual regulation of genetic testing.

However, the alternatives for regulators are pretty bleak. If disclosure is mandatory, David's research suggests that the advent of personalized medicine would not be translated into better informed prevention decisions, since very few people would perform the necessary genetic tests. ■

Find out more

- See David's working paper: 'How is the Trade-off between Adverse Selection and Discrimination Risk Affected by Genetic Testing?'
- See Abrahams and Silver (2010) for a history of personalized medicine

“TSE is a unique success”

Founded 40 years ago by Jean-Jacques Laffont, TSE has become one of the very best research institutions in the world and celebrates its 10th anniversary, a new milestone in the long rich history of economic sciences in Toulouse. We asked our partners and academic colleagues to share their views on this fantastic journey.

Susan Athey

2007 JOHN BATES CLARK MEDAL WINNER

STANFORD UNIVERSITY

“TSE experts have successfully designed an excellent institution for young researchers.”



Olivier Blanchard

FMI EX-CEO

MIT

“TSE is one of the very best departments in the world.”

Pierre-René Lemas

CEO

CAISSE DES DÉPÔTS

“The Caisse des dépôts group is proud to support TSE. Our partnership facilitates exchanges between TSE researchers and CDC collaborators and aims at developing the academic attractiveness of our country in the field of research.”



Jean-Laurent Bonnafé

CEO

BNP PARIBAS

“TSE not only became a world-class research center in economics, but also an excellent school at the masters and PhD level which attracts the very best students from all over the world.”

Isabelle Kocher

CEO

ENGIE

“The research led by TSE is directly linked to the challenges facing our group and the energy revolution. How can we support this revolution? How can we understand our changing world? This work helps us to shed light on the public debate with scientific rigor.”



Philippe Brassac

CEO

CRÉDIT AGRICOLE

“Congratulations for these 10 years which have transformed TSE into a leading institution in the fields of academic research and education. We are proud to have been supporting TSE since its beginning and to associate our name to its quality and scientific rigor.”

Thomas Buberl

CEO

GROUP AXA

“We are proud of our partnership with an institution that contributes to a better understanding of the risks our societies face and thus helps us to fulfill our mission as an insurer. I congratulate TSE for these 10 fantastic years and wish them the best for the future.”



Fabrice Brégier

CEO

AIRBUS

“As a member of the School Administration Council, it has been an immense joy to have seen it blossom into a leading research institution.”



Jean-Bernard Lévy

CEO
EDF

“ EDF has been a proud partner of TSE since its creation. In the coming years, the energy transition and the challenges it brings will be at the heart of this partnership.”



Eric Maskin

2007 NOBEL PRIZE
HARVARD UNIVERSITY

“ TSE has become a world-class research and education center.”



Philippe Wahl

CEO
LA POSTE

“ Regulation has become fundamental for modern economies and the work of TSE researchers has allowed us to better understand the mechanisms of these regulations.”



Preston McAfee

CHIEF ECONOMIST
MICROSOFT

“ TSE is one of the very top economics faculty and is incredibly strong in the areas of mechanism and market design.”



François Villeroy de Galhau

GOVERNOR
BANQUE DE FRANCE

“ Our shared ambition is to support excellence in economics in France. TSE is also a unique success in terms of education, bringing international excellence into the university system and economic rigor into action.”



Léone Meyer

CHAIRMAN
PHISON CAPITAL

“ TSE is a place of exchanges, ideas and research for the best economists in the world and has been actively educating tomorrow's talents. I am convinced economics should be taught very early to allow everyone to better understand the world we're living in.”



Amartya Sen

1998 NOBEL PRIZE
HARVARD UNIVERSITY

“ TSE is without a doubt one of the best research and training centers in the world.”



Yves Perrier

CEO
AMUNDI

“ Amundi supports the development of this excellent institution with a partnership on environment issues which Amundi knows very well from an investment point of view.”



Stéphane Richard

CEO
ORANGE

“ Orange has been supporting TSE since its creation 10 years ago. I am particularly glad of this partnership allowing us to strengthen our own academic research.”



Patrick Pouyanné

CEO
TOTAL

“ Total is proud to support TSE. The academic excellence TSE brings on energy and climate challenges will help Total and everyone. Long-term relationships with innovating institutions and thought-leaders is of strategic importance for Total in terms of development, research and recruitment.”



Training tomorrow's policymakers

Each year, TSE trains numerous public actors who are required to make or guide decisions at various levels within the state – in ministries, local and regional authorities, or public and semi-public companies – as well as on the European and international stage. TSE's dean, Stéphane Gregoir, tells us more about public economics, and then TSE's teacher-researchers professors use examples from their courses to explain analytical tools used in the public context, and their fields of application.



Stéphane Gregoir
TSE's dean

The classic theory of general equilibrium is too limited a framework for addressing a set of phenomena observed in reality, such as the role and nature of state intervention in the economy, or the diversity of services, such as a police or justice service. The role of public economics is to study

the justifications for the existence of the state (in the broad sense), its means of intervention and their consequences. In normative terms, it's a matter of defining the role of a state and what its objectives should be. Traditionally, as a minimum, the state protects the individual from violence and holds the power of legitimate violence. In the economic context, its actions relate to failures of the market and the question of redistribution.

Market failures are situations where the rules of pure and perfect competition do not apply. They occur, for example, when some actors can impact the market through their size, or are in possession of inside information that enables them to manipulate the market in their interest. They may also be linked to goods or services produced for the general good, but for which production and consumption

conditions are such that they generate little profit for an actor. A lighthouse is an example that can illustrate this type of situation. It isn't worth it for an individual navigator to pay for the facility alone, given the benefit received, nor is there an interest in offering this service to other users. Finally, these market failures are associated with the presence of external factors where consumption, or production by an actor, has an impact on the general good, without the relevant interaction being subject to an economic transaction.

“Teaching at TSE endeavors to train the diverse range of public actors through a series of general and specific courses”

Examples include pollution and traffic congestion. In all these cases, an actor given specific legitimacy must intervene to regulate or organize a market in the interests of the general good.

These state actions are based on ideas of the general good that take multiple forms



and lead to differing political choices. The notion of general well-being, as a reflection of the aggregate of all individual preferences, or those of the least fortunate individuals, naturally leads to different actions. The incomplete information available to the public decision-maker, particularly on the preferences of their co-citizens, and the impossibility of defining an optimal framework for choosing, creates a legitimate space for political debate.

From a positive perspective, state action would involve "nudges" to encourage the consideration of external factors. More

prosaically, it introduces a legal framework and direct or indirect taxes to produce collective services or achieve a redistribution objective, it sets costs for using a public asset, and puts regulatory authorities in place equipped with appropriate powers. These actions must be careful to generate the minimum inefficiency, an area of constant analysis and political controversy.

Faced with this complexity, teaching at TSE endeavors to train the diverse range of public economy actors through a series of general and specific courses, enabling

them to grasp the practical framework of public action. Numerous areas of application are studied, such as the environment, health or development.

For example, on the environmental economy course taught by Ingela Alger and François Salanié, students analyze the impact of human activity on species and ecosystems, so as to draft the most suitable policy. The use of tools like econometrics and experimental economics is also widely demonstrated in numerous courses offered by TSE, as explained by Ana Gazmuri and Astrid Hopfensitz. ■



“Environmental policies are becoming ever stricter all over the world, and in France particularly, as we see in the debates about GMOs or antibiotic resistance. The “Environmental Policy” course taught at TSE offers students a suite of tools with which to analyze the sources of external factors, and to understand which policy instruments are most effective in which situation. Ecological models are presented alongside more traditional economic tools and examples of effective and ineffective public policies.”

Ingela Alger
TSE researcher and CNRS research director



“The science of experimental economics complements our study of public economics in numerous ways. Experiments carried out in the lab or the field have the advantage of enabling the researcher to control the environment and limit changes to a single variable. They can give us answers to questions of cause and effect. One can, for example, randomly assign participants to two versions of the world, with or without a given institution. Or offer two voting methods, to observe how the results differ. These experiments can also test new economic mechanisms and observe their impacts.”

Astrid Hopfensitz
TSE-IAST professor and researcher



“The Applied Econometrics course topics cover general econometric tools that are used to study a broad variety of economic problems. One of the main objectives of the course is to introduce students to public policy evaluation. This is conceptually complex, since ideally we would be able to observe what would have happened in the absence of the reform in question. Modern econometric tools enable us to zero-in more effectively on the consequences, by using statistical methods and studying institutions.”

Ana Gazmuri
TSE assistant professor

FOCUS ON

TSE and the future of teaching

While teaching at TSE has always been directly linked to theoretical frameworks, we are actively implementing more and more innovative teaching techniques. Interactive, small-group learning gives the students a different vantage point, bringing them a clear understanding of the issues they will face in their real-world jobs tomorrow. The tools used for these new kind of classes include team projects, brainstorming, case studies and data challenges. Here is a glimpse of the different examples already in use:



Projects in Applied Econometrics

"Preparing students to real-world issues"

François Poinas

The aim of the Applied Econometrics project is to address an economic question by using econometric data and techniques.

In groups of three, students must define and justify a question, generate data to provide an answer, adopt a suitable empirical approach to best answer the question, and finally present the results obtained. The work is completed by writing an article, followed by an oral presentation.

It should be noted that businesses place a high value on this experience when recruiting.



Serious games

"Games are particularly useful to teach complex theoretical concepts"

Philippe Alby

These games are used especially in the integration week for students beginning their third undergraduate year. They adopt an entertaining approach to applying the economic mechanisms and theoretical models that the students have been, or will be studying. The students are part of the game; they are actors within it and so are motivated to master and understand the mechanisms which will enable them to win the game.

There are also game-based management exercises in the first and second years of undergraduate study, which involve running a company.



Project-based learning

"Skills acquired by your own effort are better understood, better rooted and more durable"

Philippe Alby

The project-based learning used in the third undergraduate year has several objectives: it helps students to learn more about themselves and teaches them to work in a group, as well as how to apply theoretical knowledge and statistical data. They learn to set a problem themselves (in the labor market, for instance) and develop skills to pull together a project summary, then present their work orally. They must also judge for themselves what can be achieved in the allotted timeframe.

This sort of teaching makes the link between the "real" economy and what they have been learning since the first year in more theoretical terms, as well as applying their knowledge of statistics, micro and macro-economics.



TSE Challenges

"By offering active learning to our students, we are developing an essential skill for their future careers: the ability to learn by themselves."

Anne Ruiz-Gazen

A challenge is organized as part of the Big Data course in the second master's year: student teams compete internally, but also with teams from other universities and national schools of engineering, on a specific topic (this year, on the availability of bicycles in the VéloToulouse scheme).

The results and team rankings are then presented at a "Big Data Day" conference event organized by one of the participating schools (this year it was TSE!).

TSE Challenges

- Econometric games, Amsterdam
- Data science Game
- Energy trading simulation challenge, London

Should the food industry be more strictly regulated?

GIVE YOUR OPINION ON TSE-FR.EU/DEBATE



RECENT POLL RESULTS FROM TSE DEBATE:

64%

think the next energy revolution will be real-time production or high-capacity storage

54%

think that economic growth is necessary to eliminate extreme poverty

88%

believe that tomorrow's Europe will be federal

debate.tse-fr.eu



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tse-fr.eu/fr



Shanghai: TSE ranked 17th worldwide

Distinguished Lecture IAST

Video highlights of the new academic
year

A new IGC Starting Grant awarded to
Bernard Coes