



## News

### NEW RESEARCHERS



Welcome to **Romain Ferrali**, who joined AMSE as an assistant professor. He studies how social networks influence political outcomes using game theory and a variety of quantitative methods.



Welcome to **Mathieu Lefebvre** who is now a professor of economics at AMSE. His research focuses on the determinants of social preferences and the impact of social policies on individual behaviour.

### DISTINCTIONS

**Eva Moreno Galbis** was appointed to the governmental expert group on the minimum wage.

### SUCCESS

**Guillaume Bérard**, PhD student at AMSE from 2016 to 2020, won the Ville de Marseille thesis prize.

**Alberto Prati**, PhD student at AMSE from 2016 to 2020, won the AMU thesis prize and the Ville de Marseille thesis prize.

### EVENTS TO COME

**21<sup>st</sup> JOURNÉES LOUIS-ANDRÉ GÉRARD-VARET**  
international conference in public economics

**LAGV 2022** - The 21st edition of the Journées Louis-André Gérard-Varet will take place from Monday, June 6 to Wednesday, June 8, 2022 at the Palais du Pharo in Marseille.

Keynote speakers will be : Myrna Wooders, Rabah Amir, and Marc Fleurbaey.

**Call for papers before January 24, 2022**

More info : [lagv2022.sciencesconf.org](http://lagv2022.sciencesconf.org)

**PET 2022** - The International Conference on Public Economic Theory is hosted by AMSE at the Palais du Pharo from June 8, 2022 to June 10, 2022. Keynote Speaker is Glenn C. Loury.

**Call for papers before January 24, 2022**

More info : [pet2022.sciencesconf.org](http://pet2022.sciencesconf.org)

**QFFE Spring School** - The Quantitative Finance and Financial Econometrics Spring School will be held June 14 and June 15, 2022

**QFFE International Conference** - The Quantitative Finance and Financial Econometrics Conference will be held June 16 and June 17, 2022. Keynote Speakers are Torben G. Andersen and Peter Reinhard Hansen.

**AMSE 3rd Summer School** - will be held from July 5 to July 7, 2022

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# Visiting researchers at AMSE

The Covid crisis led to a dramatic decrease in our social interactions. This helped us realize the central role they play in our personal and professional life. We are therefore very happy to welcome ten visiting researchers in the coming months.



**VERA EICHENAUER**

KOF Swiss Economic  
Institute - ETH Zurich

*From September 2021 to  
August 2022*

Vera Eichenauer is a postdoctoral researcher at the Swiss Economic Institute KOF at ETH Zurich in Switzerland. Her ongoing research projects study the motives and effects of screening foreign direct investments, the politics of reforms, fiscal federalism during Covid-19, and population sorting as consequence of regional autonomy.



**AURÉLIA LÉPINE**

University College London

*From September 2021 to  
February 2022*

Aurélia Lépine is an Associate Professor in Health Economics at University College London in the Institute for Global Health and a UKRI Future Leaders Fellow. She studies the health behaviours of vulnerable women in low-income countries and encompass several areas of global health (HIV/AIDS, nutrition, family planning and mental health).



**VOLKER HAHN**

University of Konstanz

*From October 2021 to  
November 2021*

Volker Hahn is a Professor at the University of Konstanz where he holds the chair of International and Monetary Macroeconomics. His research focuses on optimal monetary policy, central-bank bank communication, and price dynamics. Moreover, he studies committee-decision making.



**LUDOVIC RENOU**

Queen Mary University  
of London

*From October 2021 to  
December 2021*

Ludovic is professor in Economic Theory at Queen Mary University of London. His research interests include information, mechanism design and the theory of revealed preferences. He studies how a principal (seller, monetary authority, or government) optimally acquires and discloses information so as to influence the choices of individuals (consumers, investors, or voters).



### **YULIN HSWEN**

University of California  
San Francisco

*From November 2021  
to May 2022*

Yulin Hswen is an Assistant Professor at the University of California San Francisco. She studies the application of behavioral economic theories to enhance the acceptance and adherence of healthy behaviors and the willingness to share private data. Her work captures unfiltered conversations on online networks to further understand the connections between social experiences and health.



### **FABIO CERINA**

University of Cagliari

*From January 2022 to  
April 2022*

Fabio Cerina is Associate Professor in Economic Policy at the Dipartimento di Scienze Economiche e Aziendali of the University of Cagliari and researcher at the Center for North South Economic Research. He studies Macroeconomics, Spatial Economics and Political Economy.



### **JOAO CARLOS DE OLIVEIRA DE SOUZA**

Federal University of Piauí

*From March 2022 to  
February 2023*

João Carlos de Oliveira Souza is an Assistant Professor at the Federal University of Piauí. His research focuses on optimization, ranging from nonlinear analysis to practical applications. His interest lies in theoretical and algorithmic aspects of optimization in Riemannian manifolds, theory of monotone operators, multiobjective optimization, equilibrium problems and convex analysis.



### **FEDERICO REVELLI**

University of Turin

*April 2022 or May  
2022*

Federico Revelli is a Professor of Public Economics at the University of Turin and fellow of CESifo. In his research he empirically investigates the spatial features of decision-making processes in multilevel fiscal structures (local elections, tax interdependence, yardstick competition) and their consequences on a number of dimensions of decentralized government performance.



### **MIHIR BHATTACHARYA**

Ashoka University

*June 2022*

Mr Mihir BHATTACHARYA is an Assistant Professor of Economics in Ashoka University. His research focuses on social choice theory, decision theory and political economy, specifically the existence of constitutionally consistent voting rules, and representatively consistent voting rules which are immune to manipulative partitioning of voters by political parties.



### **GARANCE GENICOT**

Georgetown University

*From June 2022 to  
July 2022*

Garance Genicot is a Professor at the Department of Economics of Georgetown University. She uses microeconomic tools to study key issues in development economics such as aspirations, informal credit and insurance markets, intra-household bargaining, social networks, tolerance and inequality.

# Advances in growth and macroeconomic dynamics

## In memory of Carine Nourry

By **Raouf Boucekkine, Thomas Seegmuller & Alain Venditti**



**Raouf Boucekkine**

**Raouf Boucekkine** is Professor of Economics at Aix-Marseille University since 2011. He is honorary Senior Member of the Institut Universitaire de France, being nominated in 2014, and fellow of the Econometric Society since 2020. He was Director of the Institute for Advanced Study at Aix-Marseille (IMéRA) from 2015 to 2020, Scientific Director of the network of French institutes for advanced studies (RFIEA) from 2016 to 2020, and president of ASSET from 2017 to 2019. He obtained his PhD in economics from Université Paris 1 in 1993.



**Thomas Seegmuller**

**Thomas Seegmuller** is a CNRS directeur de recherches at AMSE since 2013. He is the current deputy director of AMSE. He obtained his PhD from the University of Strasbourg in 2001. He was a CNRS chargé de recherche between 2004 and 2013 and joined AMSE in 2009.



**Alain Venditti**

**Alain Venditti** is a CNRS directeur de recherches at GREQAM-AMSE since 2003 and an associate professor at EDHEC in Nice since 2009. He is the current director of AMSE. He obtained his PhD from Université de la Méditerranée in 1994. He was a CNRS chargé de recherches at GREQAM-AMSE between 1995 and 2003.

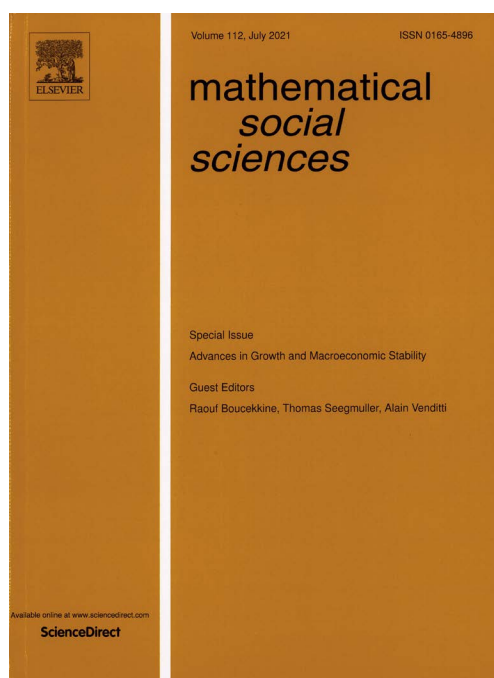
This special issue of *Mathematical Social Sciences* (MSS) compiles a selection of twelve original papers in four sections covering different topics in growth and macroeconomic theories, and key related normative and positive themes. It is published in memory of Carine Nourry, who was a close friend of many of the contributors.

### MACROECONOMIC STABILITY AND FLUCTUATIONS

Barinci, Cho and Drugeon consider general two-sector overlapping generations with a pure consumption good and an investment good. Preferences over a two-period life-cycle are based on endogenous leisure in the first period and consumption in the second period. Two stationary equilibria are shown to exist: a Wealth-to-Capital equilibrium where total private wealth is equal to the value of the stock of capital, and the Golden Rule. Both equilibria can be characterized by monotone convergence or endogenous fluctuations through the existence of local indeterminacy and quasi-periodic cycles.

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Human capital has been established as a major driver of economic growth. Increasingly, studies in sociology show that human capital affects welfare. Better-educated agents have a greater demand for health



and are more in control of their lives, as they live in healthier conditions. In line with this stream of research, Bosi, Loyd-Braga and Nishimura explore the implications of introducing different types of human capital externalities into the utility function, the production function, and the human capital accumulation of a Lucas-type model without physical capital. Growth no longer has to be balanced and the equilibrium can be globally indeterminate. A taxation policy based on constant tax rate may speed up the accumulation of human capital.

The last financial crisis and the recent Covid crisis generated dramatic increases in debt levels in most countries, raising the problem of debt financing. Yet the co-existence of varying experiences across countries suggests that debt financing is a complex question. Modesto *et al.* provide a theoretical exploration of these latter interconnected issues. They consider a small open economy with a credit constraint and a preference for domestic public bonds. Whatever the level of the debt-output ratio, there always exists a high growth balanced growth path (BGP) which features expectation-driven fluctuations. Moreover, if the debt-output ratio is low enough, global indeterminacy arises, as there is also a second BGP with a lower growth rate. But if the share of public debt held by domestic households is high enough, this second BGP is ruled out and global indeterminacy does not occur.

## EXISTENCE OF EQUILIBRIA

A central question is the financing of firms' investments when financial markets are incomplete. The contribution by Léon-Ledesma and Orrillo

studies an extension of the incomplete markets' general equilibrium model in which firms can default and therefore bankruptcy is possible. Their setting is characterized by endogenous production, and collateral constraints involve all the commodities available for consumption and production in the economy. Lenders have a portfolio of assets issued by producers but cannot anticipate the identity of the firm defaulting. Thus, lenders anticipate a default rate that depends on the average level of production and is therefore counter-cyclical. In this framework, the financial decisions of firms and their owners cannot be separated out, which implies that the real and financial spheres of the economy are not disconnected. Finally, because of an insurance premium, the equilibrium is constrained efficient.

Recursive utility describes classes of intertemporal utility functions that are tractable and extensively used in macro-dynamic models. When the model considered is sufficiently general, a relevant challenge is to find a class of utility functions that solves the Koopmans equation for a given aggregator. In their contribution to this special issue, Becker and Rincon-Zapatero develop a computationally-motivated methodology which offers a selection principle for numerical solutions of recursive macrodynamic models where theory suggests that there are multiple fixed points. They obtain a constructive result. They show that extremal fixed points exist, using successive approximations as soon as the conditions of the Tarski-Kantorovich fixed-point theorem are met.



## MIGRATION AND NETWORKS

A fundamental nexus between human migrations and economic growth is human capital accumulation, in particular via the inherent brain drain. In their contribution, Destrée, Gente and Nourry consider an endogenous growth model based on human capital accumulation where agents face an endogenous debt constraint to finance their education in the home country while they receive remittances from their emigrant children. Destrée, Gente and Nourry assume a non-commitment setting where individuals may choose to default on their debt and be excluded from the asset market. They show that remittances tend to tighten the borrowing constraints for a given level of interest rate, but may enhance growth at the equilibrium. Based on the existence of multiple equilibria, the model can replicate both negative and positive impacts of migration and remittances on economic growth.

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The crucial role of social networks has been highlighted to explain behaviors in the labor market and migratory patterns. However, the interplay between immigrants' informational network, job search activities, migration, and concentration in some specific industry has not yet been analytically addressed. In Domingues Dos Santos and Taugourdeau, social networks are considered in a matching model to illustrate the longstanding situation of Portuguese immigrants in the French labor market. The paper develops an original matching model revealing that the employment concentration of the Portuguese community can mainly be explained by their social network. Hence, the model explains the two main features of the Portuguese labor force in the French labor market: a low unemployment rate and high sector-concentration. It also highlights the intergenerational persistence of both these features.

The urban economics literature typically assumes that interactions are global. Augeraud-Véron, Marhuenda and Picard is the first theoretical attempt to cope with local interactions. Due to travel costs, economic agents may not find it optimal to interact

with all the others, and interactions remain local. In their spatial model, they study how a given mass of identical individuals locate in a given space assuming that utility in any location depends on consumption of both a composite good and land space, plus the so-called social surplus. The key finding of the study is that changes in population density at any urban location depend on the density at some specific distance to the left and right of this location.

## INEQUALITIES AND INCOME DISTRIBUTION

The last section of this special issue is specifically devoted to the analysis of inequalities.

Benhabib and Hager propose a simple and appealing theory of income distributions with “revenue diversion”, which they further: i) connect to the historical debate, and ii) illustrate with some rough quantitative exercises. A key aspect of the theory is the allocation of talents across occupations, “talent” being interpreted broadly. If the distribution of talents were fully observable, the earnings distribution could be inferred from a given mapping of talents into earnings. However, the authors point out that talents are not fully observable: there is room for “revenue diversion”, in other words, revenue gains not strictly remunerating talents but diverted by a certain class of employees called “managers” (as opposed to “workers”). Benhabib and Hager's allocation of talent theory makes it possible to obtain that, with or without revenue diversion, the overall distribution of income is hump-shaped and is given by a Pareto distribution above the median.

Inequalities can be addressed in terms of the effects of pollution. By increasing absenteeism or affecting learning skills, the health effects of pollution have consequences on human capital and income when individuals become adults. Children with lower socio-economic status are more vulnerable and exposed to the health consequences of pollution. Constant and Davin develop an overlapping generations model where individuals have heterogeneous human capital.

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*Carine Nourry was Director of the School of Economics of Aix-Marseille, and Professor at Aix-Marseille University, specialising in the topic «growth and fluctuations».*

Children suffer from air pollution, but their parents can mitigate this effect by investing in health. If the production is highly polluting, inequalities will persist over time and the economy can even be relegated into an inequality trap. Indeed, pollution has a greater effect on poorer children, who will accumulate less and less human capital. Constant and Davin also study environmental and health policies that could reduce inequalities. Environmental maintenance financed by polluters can be a good tool when the initial inequality and the pollution emissions are not too high. Otherwise, adding a health policy consisting of health subsidies could be a relevant option.

Boucekkine, Desbordes and Melindi-Ghidi rely on the important work by political scientists who point out that a significant fraction of democracies is substantially departing from what is usually associated with the very concept of democracy, e.g. inclusiveness, income redistribution from rich to poor, strong welfare states. Boucekkine, Desbordes and Melindi-Ghidi identify conditions under which elite-biased democracies tend to arise as an economic-political equilibrium. The population is split into two groups, a minority and a majority, with the additional crucial ingredient that the minority enjoys preferential treatment or benefits from distinctive fiscal treatment under autocracy. As a result, the preferred tax rate of the majority member is likely to be significantly higher than under one source of income discrimination. Elite-biased democracies may then arise if one source of discrimination, distinctive fiscal treatment, is officially removed and replaced by a more acceptable coalition, even though the ensuing redistribution to majority members is lower than its counterpart under pure democracy.

The optimal population-size problem is an old normative problem that has been the subject of numerous contributions and approaches since the late 60's. A key issue arising in the standard welfarist approaches is that they ultimately involve evaluating the welfare of nonexistent people, because some people only exist in certain allocations. De la Croix and Doepke advocate a "soul's view" approach with introspection as the accompanying method for comparison of populations. The key to the problem is to find an interpretation "where being alive and being unborn are not mutually exclusive, but merely different states which are experienced by one and the same being over time". This can even be made operational: all it takes is to assume that the world is endowed with a fixed supply of souls who get reincarnated from time to time in different human bodies. De la Croix and Doepke elaborate on this conceptual approach, deriving a rich theoretical analysis, and discuss some applications to concrete problems involving long-term environmental risks.

## REFERENCE

*Advances in growth and macroeconomic stability*, eds. Raouf Boucekkine, Thomas Seegmuller, Alain Venditti, Mathematical Social Sciences vol.112, Elsevier, 2021.

# Air pollution in an urban world: A global view on density, cities and emissions

David Castells-Quintana, **Elisa Dienesch** & Melanie Krause, 2021, *Ecological Economics*, 189

“  
Based on our results, fostering denser urban areas could lead to lower emissions per capita. Similarly, as cities grow, a more spatially decentralized (*i.e.*, polycentric) structure should be encouraged.  
”



Elisa Dienesch

**Elisa Dienesch** joined AMSE as a research fellow in 2020. She obtained her PhD from the University of Pau in 2013 and has been an Assistant Professor at Sciences Po Aix since 2014. Her research focuses on the spatial dimensions of the labor market and the environmental impact of location choices.

## RESEARCH PROGRAM

Population growth and global warming are two of the most pressing challenges that humanity faces in the 21st century. Increasing populations and ongoing urbanization are leading to larger and, in many cases, denser cities. One alarming side effect of urban life is air pollution, which has serious consequences on human capital, productivity and health.

The evolution of emissions per capita, together with the population density-emissions relationship, is not straightforward and is likely to depend on several factors, including income levels and demand patterns, productive technologies, and infrastructures. Conceptually, one can distinguish the Malthusian (1798) from the Boserupian (1981) view: according to the first theory, population growth overexploits resources and raises emissions per capita. By contrast, the second holds that a growing population, due to agglomeration externalities, fosters innovation, for example in agricultural technology and energy-saving. Therefore, changes in the spatial distribution of population and economic activity are likely to play a decisive role in how emissions per capita evolve.

To study the effects of density and the spatial distribution of population on emissions, we build i) a large and unique dataset for more than 1200 (big) cities around the world with data for the last two decades, and ii) a large dataset for more than 190 countries with data from 1960 to 2010. We combine data from several sources, including air quality stations around the world (CO<sub>2</sub> and PM<sub>2.5</sub> for robustness), national and international statistics, and satellite imagery. In particular, we use city-level data from the European Commission's Global Human Settlement Layers (GHSL) from the Urban Centre Database and different measures of the urban form for our 1234 cities based on satellite data on night-time lights, as illustrated in Figure 1.

The two pictures present maps of Paris and Medellín (Colombia), illustrating the distribution of night-time lights across the pixels of the built-up area. Night-time





Figure 1. Night-time lights and city structure

lights in 2013 are depicted with respect to each city's maximum luminosity, with brighter colors (yellow, orange, red) denoting higher values and darker colors (purple, black) lower values. The urban areas of the city based on GHSL data for 2015 form the backdrop. Paris shows strong monocentricity (Moran's  $I$  of 0.9502) while Medellín (Moran's  $I$  of 0.7686) is rather fragmented.

We link and complement the insights obtained in our city-level analysis with an investigation at country level, paying special attention to a factor omitted from the literature to date, namely, density in urban areas. Population density in a country may differ substantially from density in urban areas. For example, Egypt has comparatively low population density overall, but very high population density in urban areas, driven by high density in its main cities such as Cairo.

#### PAPER'S CONTRIBUTION

We document that denser cities show lower emissions per capita, as illustrated by Figure 2A. This negative relationship between city density and emissions per capita is robust to several controls, different estimation techniques and identification strategies. Using our global sample of cities, we also found evidence of the Environmental Kuznets Curve (EKC), suggesting that emissions per capita go up with income levels at early stages of development, but then decline as development proceeds. This is the first time that the EKC curve is reported in a global sample of cities.

Moreover, we find that the spatial structure of cities also plays an important role. On average, a monocentric (compact) city pollutes more than a polycentric (dispersed) one, and this is particularly true for large cities (Figure 2B). These results are consistent with the theoretical predictions of Denant-Boemont *et al.* (2018), who propose a mechanism related to transport emissions.

Our results at city level are supported by new insights gained here at country level. While higher total population density and urbanization are associated with higher CO<sub>2</sub> emissions per capita, the opposite applies when we look at urban population density: higher density in urban areas is associated with lower emissions per capita.

In terms of policy implications, our results suggest that policy-makers concerned with pollution should pay attention not only to population dynamics but also to the evolution of the spatial distribution of population, both at country and at city level. Based on our results, fostering denser urban areas could lead to lower emissions per capita. Similarly, as cities grow, a more spatially decentralized (*i.e.*, polycentric) structure should be encouraged.

#### REFERENCE

Denant-Boemont, L., C. Gaigné, and R. Gaté (2018). "Urban Spatial Structure, Transport-Related Emissions and Welfare." *Journal of Environmental Economics and Management*, 89, 29–45.

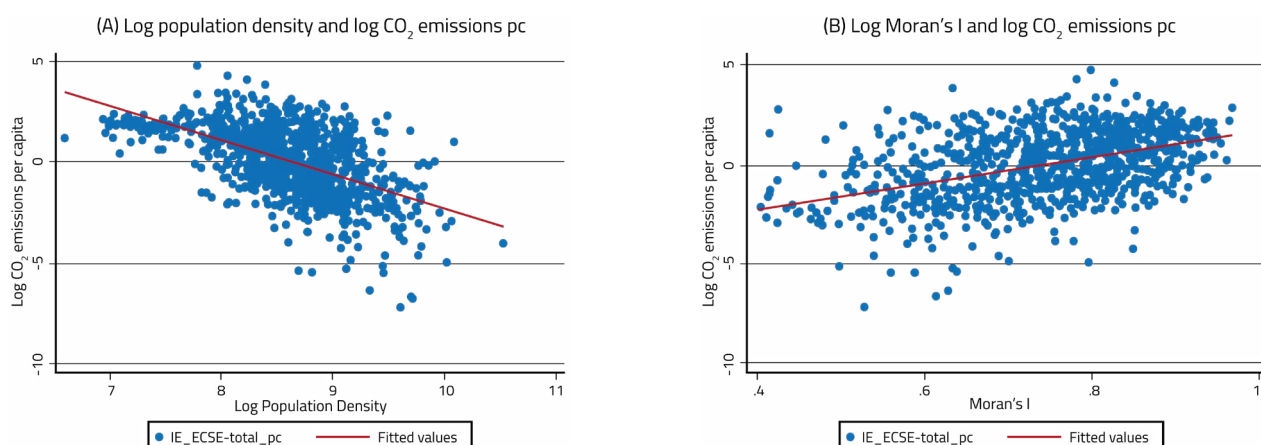


Figure 2. Scatter plots across 1328 cities for the year 2015

# Does demand noise matter?

## Identification and implications

Kenza Benhima & **Céline Poilly**, 2021, *Journal of Monetary Economics*, vol. 117, 278-295

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**We find that demand noise shocks explain 24% of output growth volatility, while supply noise shocks explain only 8%. Imperfect information on demand therefore has deeper consequences on economic activity than imperfect information on supply.**

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Céline Poilly

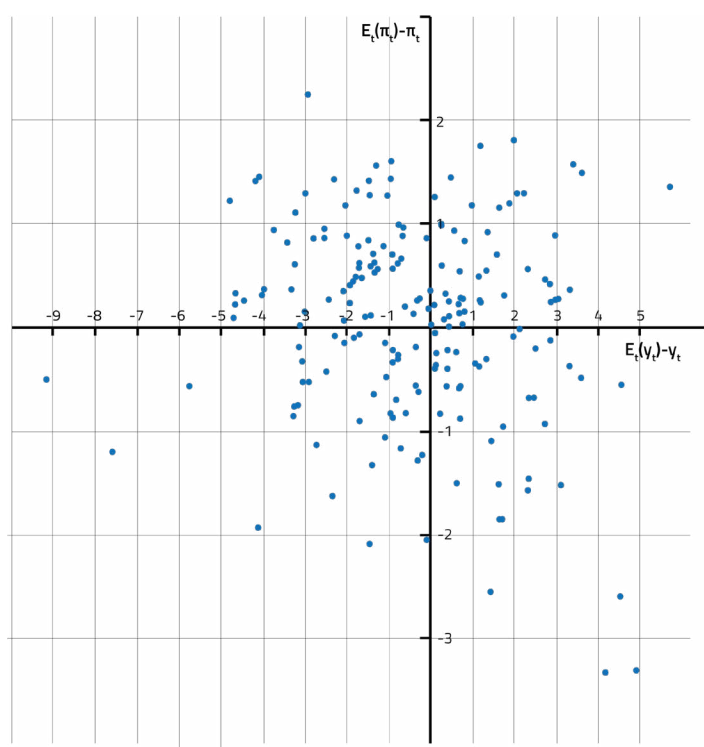
**Céline Poilly** is a professor of Economics at AMSE since 2016 and junior member of the Institut Universitaire de France. She obtained her PhD from the University of Cergy-Pontoise in 2008 and was assistant professor at University of Louvain-la-Neuve in Belgium (2008-2011) and University of Lausanne in Switzerland (2011-2016). Her research interests are monetary macroeconomics and macro-econometrics.

### RESEARCH PROGRAM

It is commonly accepted that expectations on economic activity can be important drivers of fluctuations by generating waves of optimism and pessimism. The recent events of the last decades –such as the Great Recession or the Covid crisis – are stimulating interest in analyzing the role of misperceptions in the business cycle. Misperception means that agents are badly informed about the state of the economy, receiving noisy signals. Survey expectation errors usually help to identify misperception shocks. When professional forecasters over-estimate output growth, this may reflect excessive optimism either about the state of supply or about the state of demand. A large part of the literature has focused on misperception of total factor productivity, called supply-driven noise shocks. It can be assumed that agents also receive noisy signals about aggregate demand. How can misperceptions about supply and demand be disentangled? We show in this paper that expectation errors regarding output growth and inflation are key information needed to identify supply-driven and demand-driven noise shocks and to quantify their contribution to the cycle.

### PAPER'S CONTRIBUTIONS

This paper builds a reduced-form model composed of decision makers (households and firms) and survey participants (“nowcasters”) to capture the effects of noise (misperception) shocks on output, inflation and the associated expectation errors. Importantly, decision makers are better informed than nowcasters, although they all receive a noisy signal about supply and demand. This information structure rationalizes the now common practice in the literature of using professionals’ expectations to uncover noise shocks. This stylized theoretical model provides key identification restrictions for the estimation of demand and supply noise shocks in the data: If demand (supply) shocks drive a positive (negative) correlation between output and inflation, they should drive a positive (negative) correlation between errors about output and about inflation.



*Figure 1. Nowcast error of real GDP growth and GDP deflator inflation in percentage points over 1968q1-2017q1.*

Based on these predictions, it is possible to disentangle demand and supply noise shocks in the data. We estimate a multivariate empirical model – namely a Structural Vectoral AutoRegressive model – on US data over the sample 1969q1–2017q1, including real GDP growth, the inflation rate and their

corresponding nowcast errors. Shocks are identified using the sign restrictions suggested by the reduced-form model. We find that demand noise shocks explain 24% of output growth volatility, while supply noise shocks explain only 8%. Imperfect information on demand therefore has deeper consequences on economic activity than imperfect information on supply.

Using a micro-founded New Keynesian model, we argue that the effect of demand noise shocks on output originates in a “monetary policy channel”. As the central bank receives a positive signal about demand, it expects a rise in inflation and increases the interest rate accordingly. This rise in interest rate then depresses aggregate demand, leading to recessionary demand noise shocks. This channel seems to be operational in the data, as we observe a rise in the nominal interest rate in response to a positive noise demand shock, *i.e.* higher misperception of demand.

#### FUTURE RESEARCH

This study opens up new avenues for future research. The central role that monetary policy seems to play in the transmission of noise shocks calls for further investigations of central banks’ information. This line of research could provide valuable input to the design of optimal policies that are conditional on both private agents’ and policy makers’ imperfect information.



# Externality and common-pool resources: The case of artesian aquifers

Hubert Stahn & Agnes Tomini, 2021, *Journal of Environmental Economics and management*, 109

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**We show that private users ignore their impact on overall water pressure, which leads to a greater number of wells in the long run for the same water consumption in both management regimes.**

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Hubert Stahn

**Hubert Stahn** joined GREQAM-AMSE as a Professor in 2003. He obtained his PhD from University Louis Pasteur 1991. He was Assistant Professor at BETA in Strasbourg from 1991-1994 and Professor at the same university from 1994-2003. His research focuses first on general equilibrium theory and games then on environmental and resources economics.



Agnes Tomini

**Agnes Tomini** joined AMSE as a CNRS researcher in 2014. She obtained her PhD from Université de la Méditerranée in 2009. She was a post-doc fellow at LEM in Lille in 2010, at Lameta in Montpellier in 2011-2012 and at the Bren School, University of California, Santa Barbara in 2013-2014. Her research focuses on environmental and public economics, especially natural resources.

## RESEARCH PROGRAM

The literature on common-pool resources has tended to examine all the externalities due to the two characteristics of common goods: non-excludability and rivalry. In particular, the literature on aquifers has focused on the external cost of stock reduction. But what if the aquifer never empties? This is especially likely with confined aquifers, where withdrawals are immediately replaced. Does this resource escape the “Tragedy of commons”? What makes such analysis even more important is the current debate over the need to implement water regulation. Many studies have argued that there may be no difference between the water table level under a laissez-faire scenario and the level under socially-optimal management in the long run. Welfare gains from regulation will consequently be negligible. This result is now known as the Gisser-Sanchez effect.

Confined aquifers have two properties. They are confined between an upper and a lower impermeable layer. Water naturally flows from a well, without any pumping, even above the land surface when the aquifer is artesian, but this water is simultaneously replaced by gravity discharge. Artesian aquifers can be found in many countries: The Great Artesian Basin (Australia), the Edwards Aquifer (Texas, USA) and the Northern Sahara Aquifer System in northern Africa are major systems providing water for millions of people.

## PAPER'S CONTRIBUTIONS

The main objective of our study is to understand how artesian aquifers may be over-exploited. Modeling such natural resources is our first contribution. We use the fluid mechanism to characterize the hydrodynamics of the aquifer and the interdependencies between water abstraction, recharge, and variations in water pressure. The water pressure of the whole aquifer actually rises with water coming from a distant recharge area and falls with exploitation. Contrary to the standard approach considering unconfined





aquifers, we do not look for the optimal amount of water to extract. Instead, we choose the number of wells. We can do this because we know the maximum amount of water flowing out of a well, which depends on the water pressure and the well's technical characteristics (e.g. diameter of the well).

We then characterize exploitation under an open-access regime and contrast this situation with the socially-optimal equilibrium. We show that private users ignore their impact on overall water pressure, which leads to a greater number of wells in the long run for the same water consumption in both management regimes. Economic agents therefore do not compete to appropriate part of the resource stock, but suffer from a reduction in artesian pressure as the number of wells increases. The extra decline in pressure that arises under open-access is what we refer to as the pressure externality. We introduce two measures to assess the impact of this externality: i) the yield reduction rate to depict the hydrological consequences and ii) the rate of increase in water cost to assess the economic consequences. Importantly, we show that the Gisser-Sanchez effect does not apply here, since welfare gains from optimal management depend on the size of the recharge area, not on the size of the aquifer.

We finally provide a state-dependent tax scheme that corrects this externality at the steady state.

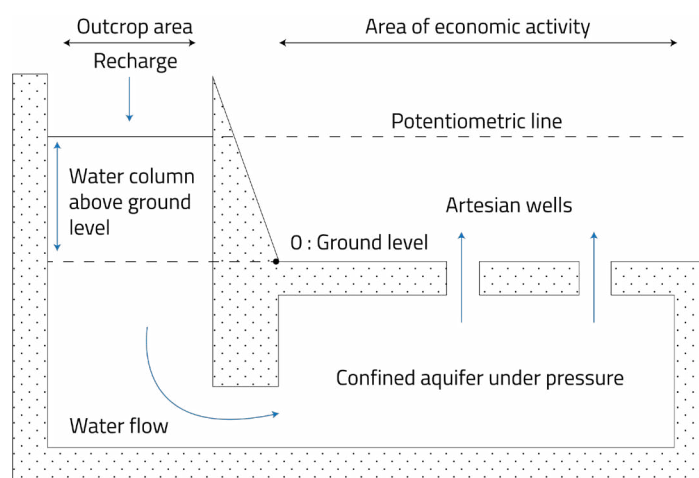
## RESEARCH PROCESS

This study was inspired by discussions with hydrologists from CEREGE on the Northern Sahara Aquifer System in northern Africa. It emerged that the vast majority of studies on groundwater economics assume unconfined aquifers that are depleted with exploitation, ignoring the other types of aquifers. This turned our attention to the

question of the depletion of artesian aquifers. The main difficulty lay in correctly characterizing such aquifers.

## FUTURE RESEARCH

We use a very simple setting to isolate the pressure externality, only considering the two polar management regimes, without addressing strategic externality. We also introduce a schematic characterization of the aquifer, although more complex dynamics are observed in the real world (e.g. endogenous infiltration rate, leakages or multi-cell system). Finally, we exclusively look at situations where artesian properties are held long-term. It could be interesting to analyze situations in which these properties disappear, that is, when an artesian aquifer becomes an unconfined aquifer in the long run and pumping is required.



*Schematic representation of an artesian aquifer under exploitation*



# Land is back, it should be taxed, it can be taxed

Odran Bonnet, Guillaume Chapelle, **Alain Trannoy** & Étienne Wasmer, 2021, *European Economic Review*, 134 (C)

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**If wealth levels rose again in the second half of the 20th century and partially regained their values of the previous century, it is because housing became a major component of wealth.**

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## RESEARCH PROGRAM

Uniform taxation of wealth is making a comeback as a response to rising public debt and increased inequality in most Western countries. This paper enters this debate from the striking observation that the housing component of national private wealth explains the spectacular rise of wealth relative to national income in several countries. Rising housing wealth is in major part due to the rise in land prices. Figure 1 represents the historical evolution of wealth-to-income ratios in France and the UK, using Piketty's decomposition into housing, agricultural land, net foreign assets and other domestic assets.

The drop in total wealth at the beginning of the 20th century as compared to the 19th century was largely due to the secular decline in agricultural land and was accelerated by the decline in physical capital after WWI in France and the UK. If wealth levels rose again in the second half of the 20th century and partially regained their values of the previous century, it is because housing became a major component of wealth. Given the heterogeneity in sources of wealth and their diverging trends, applying one uniform wealth tax could be sub-optimal, especially considering the differences in supply elasticities. We assess the merits of differentiated taxation of wealth and compare land taxation, housing income taxation and physical capital taxes.

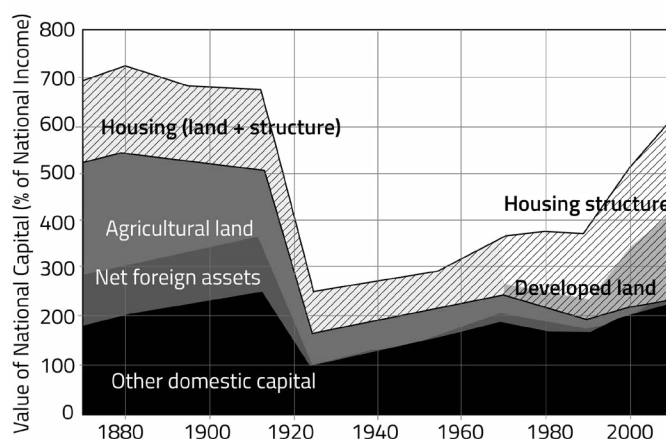
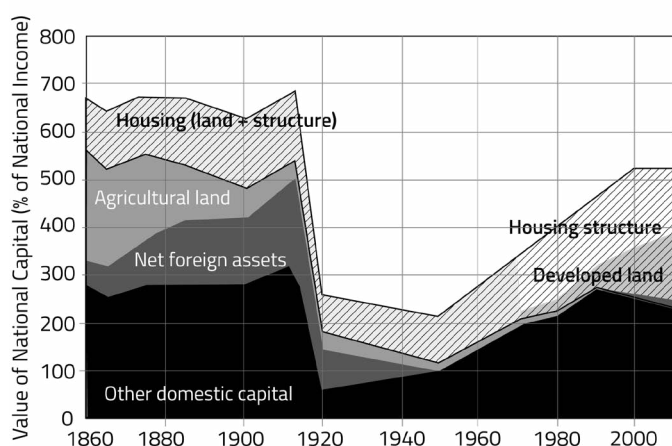
## PAPER'S CONTRIBUTIONS

We extend a Judd-type model of capitalists and workers, an appropriate framework to study redistributive capital taxation, by introducing land, housing structures, housing consumption and the housing rental market. Actually, the Judd-Chamley framework represents a turning point in the literature discussing capital and wealth taxation issues. The literature has explored certain tax areas: e.g. taxes on labor and capital income, labor and dividends, or taxes



**Alain Trannoy**

**Alain Trannoy** is a research professor at EHESS and a member of GREQAM-AMSE since 2002. He obtained his Doctorat d'Etat in 1986 from the University of Rennes 1, where he became a professor in 1988. He was also a professor at the University of Cergy-Pontoise from 1991 to 2002.



*Figure 1. The role of land and housing in the secular variations in the wealth-to-income ratio. France and UK*

on consumption, labor and pure rents. In this paper, we turn a new corner, exploring taxes on capital, land and housing and thus contributing to the literature by widening the scope. We perform this analysis both in first-best and second-best settings, under full commitment.

A uniform land tax is theoretically enough to achieve the first best. We discuss cases and levels at which land taxes are feasible, and notably propose a formula for a property tax on land that will reach the social planner's objective. This tax will compensate wage-earners for having no property rights on capital and land. When land can actually be taxed at the first-best level, taxing productive capital is not necessary. The quantitative and theoretical importance of a fixed factor, land, is reminiscent of the so-called Georgist view.

However, taxing land raises implementation issues and is seldom put into practice. Furthermore, land is difficult to distinguish from housing structures that are themselves elastic, and in order to reach the first best, static and dynamic distortions must be addressed. Therefore, we consider richer schemes that may and actually do preserve the first best. Indirect land taxation via the taxation of housing income is possible, but it cannot be implemented alone to reach the first best. A tax on rent therefore needs to be supplemented by i) a tax on land differentiated according to use of land - less on rented land and more on owner-occupied land - and ii) a specific subsidy on investments in rented structures. Without this specific combination of tax/subsidies, the first best cannot be achieved. However, based on the two distortions introduced by the tax on rent, one to land use and the other to the dynamics of the structures, our simulation reveals that the latter is much more critical quantitatively.

The upshot is that a rent tax supplemented by a structure subsidy does almost as well as a land tax

in improving social welfare. The discussion illustrates the non-triviality of a tax scheme attempting to overcome the non-feasibility of an optimal uniform land tax. This set of instruments provides a rare example of the usefulness of the theory of the second best (Lipsey – Lancaster), combining three distortive instruments to mimic the impact of a non-distortive instrument.

Adopting a second-best Ramsey logic, where the social planner acts under the rationality constraints of agents, we next assume that a land tax is not feasible but that there is a rent tax. We then explore how the results in the steady state extend on dynamic convergent paths to the steady state. We obtain new results regarding the dynamics of capital taxes in the Judd economy with and without land, as well as results on the rent tax when it can be introduced.

## FUTURE RESEARCH

A follow-up to this article is a book in French, written with Etienne Wasmer, to be published in January 2022 and possibly followed by an English translation.



# The M2 EBDS track of the Master's in Economics open to apprenticeships since September 2021

By **Elisabeth Barthélemy**, Head of communications and school administrative support at AMSE

**Apprenticeship allows students to continue their studies and learn a trade, alternating between university and a company, under dual student and employee status. It is available to students aged between 16 and 29 who wish to pursue a degree while acquiring professional experience.**

The M2 Econometrics, Big Data, Statistics (EBDS) track of the Master's in Economics has been open to apprenticeships since September 2021. Apprenticeship was chosen by nearly 30% of the students enrolled in this track. Why is this access to apprenticeship good news for AMSE students? How are the apprenticeship and follow-up managed? We asked Mathieu Lefebvre, the faculty member in charge of the EBDS apprenticeship, and Marie Bruguet, a student in M2 EBDS who chose it, to tell us about their experience.

## BUILDING A CAREER PLAN

Using apprenticeship to meet personal professional objectives is a key motivation for students, as Marie Bruguet confirms "I chose apprenticeship because I thought it would be the best way to know more about what I want and what I don't want in my future job. It is also the best way to gain experience, and that really counts when you're looking for a job a new graduate. Another advantage is obviously the fact that you get paid and that the company pays the university tuition fees. I had already done two internships before this apprenticeship, and they help me make my decision: I liked working with a team on concrete and challenging project". "Apprenticeship is a form of education that is increasingly in demand by students, especially those with a specific career plan" says Mathieu Lefebvre.

## CLOSE SUPERVISION OF STUDENTS

Thanks to the apprenticeship, students can get a foot in the 'real world', as they call it, without getting left behind by the school. AMSE pays close attention to the follow-up of its apprenticeship students, as Mathieu Lefebvre points out: "Apprentices receive dual supervision throughout their master: that of the company's apprenticeship supervisor and that of a

university tutor. The latter, appointed from among the AMSE teachers, ensures that the apprenticeship runs smoothly throughout the academic year and that the internship report is completed. The tutor also makes two visits to the company. As Head of Apprenticeship, my mission is to supervise students who choose to do an apprenticeship in M2 EBDS. Working closely with the CFA (apprentice training centre), I ensure that the apprenticeship contracts are signed and that the tools for monitoring the apprentice are put in place. I also ensure that university tutors are appointed. Throughout the year, I act as an interface between the students, the CFA and the company, and in the future, I will also be there to help apprentices find a company".

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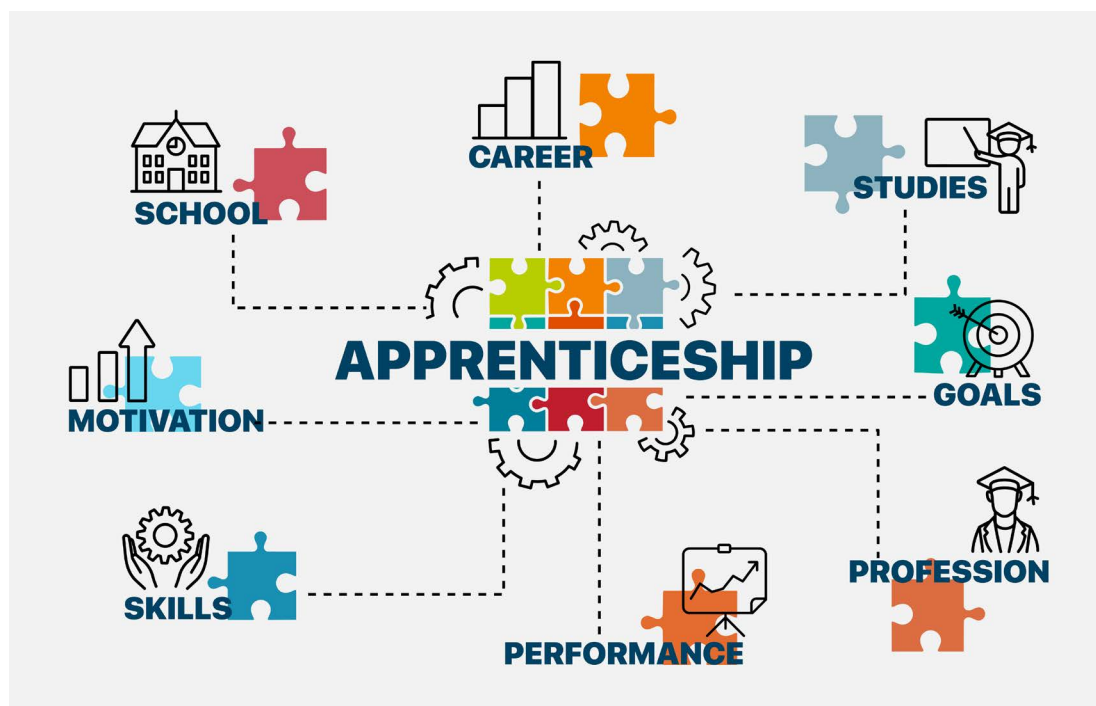
**Apprenticeship is a form of education that is increasingly in demand by students, especially those with a specific career plan**

”

**Mathieu Lefebvre**

## ASSIGNMENTS

Companies and public institutions increasingly need economists who understand the environment they operate in, and who are equipped to anticipate its demands. Our students meet these two criteria: not only are they economists trained in the techniques of economic analysis, but they also master quantitative methods enabling them to make the most of the mass of information available to decision-makers. The assignments offered to students are at least as diverse as the number of employers. Students can apply and carry out their work-study programme in both private and public sectors. The only requirement



is that the assignment be validated by the head of apprenticeship, to ensure that the knowledge and skills of the student match the assignment proposed by the company.

Marie Bruguët is an apprentice at the Ministry of Ecological Transition, Housing and Construction within the Department of Statistics (Service de la Donnée et des Etudes Statistiques, SDES): "I am working on the national housing survey of 2020. Thousands of households were surveyed about a wide range of topics regarding their current housing but also their general experiences of housing. This produces extensive data at the end of the survey process because there are thousands of variables for each household collected from their answers. The two major statistical missions consist in: recoding the data to ensure continuity with the last survey, and attributing weights to the observations to provide a truer and more stable overview of the French housing stock. The goal is to be able to deliver a clean data base as soon as possible. I also have ancillary missions that are closer to economics, for example detecting household stability across time, constructing indicators of overpopulation, or distribution of wealth depending on type of housing, and so on. Once the database is exploitable, I hope to be able to run a more targeted econometrics study on housing, but I need to wait and see how the project will evolve over the months".

#### REAL RECRUITMENT / REAL JOB

Applying to an organisation for an apprenticeship contract requires as much determination and rigour as applying for a job. The student must prepare a CV and cover letter, and for the interview. "I found the position on the PASS website that lists all the internships and apprenticeships offered by the French civil service. I contacted the person listed in the offer, as required, by email with a c.v. and a cover

letter. They answered within a day, offering me a first (remote) meeting with my current tutor. Then I had a second meeting with a supervisor from the office a few later. Both meetings were centered on explaining the project to me, to make sure it would interest me" says Marie Bruguët.

Once the apprenticeship was approved and the contract signed, like any other student-apprentice, she committed herself to behaving like a real employee, working in accordance with the existing operating procedures, being assiduous and of course investing herself in her studies. The employer undertook to allow her to obtain significant professional experience, to respect the course and examination schedule, to integrate her into the team, and naturally, to pay her a salary.

#### CONCRETE BENEFITS

In a few months' time, we will be able to assess this first year of apprenticeships with the students. From his experience, Mathieu Lefebvre states that "the enormous advantage for the students is experiencing greater professional integration while obtaining a diploma identical to that obtained by the other students, a concrete and often very operational application of the knowledge and skills acquired during their master's degree. In addition, they benefit from dual company/university supervision. Students have the status of company employees, and therefore have the same rights (holidays, unemployment benefit, pension rights) as other employees. The advantage for AMSE lies in diversifying its training offer and keeping us with the significant development of apprenticeships in higher education".

AMSE is working on opening another of its M2 tracks to apprenticeship in September 2022. To be continued!



# Alberto Prati

Postdoctoral research fellow at the Wellbeing Research Centre, University of Oxford and associate researcher at the London School of Economics.

Interview by **Aurore Basiuk & Lucien Sahl**



Alberto Prati did his PhD research at AMSE between 2016 and 2020 in behavioural economics, under the supervision of Stéphane Luchini and Olivier Chanel. His thesis, “Memory and Subjective Well-Being. Empirical Analysis of Workers’ and Consumers’ Endogenous Recall Behaviors” earned the Aix-Marseille University and the Ville de Marseille PhD Dissertation prizes. Today, he is a postdoctoral research fellow at the Wellbeing Research Centre, University of Oxford and an associate researcher for the London School of Economics.

## WHAT WAS YOUR BACKGROUND BEFORE JOINING AMSE AND WHAT LED YOU THERE?

I completed my thesis in 2016 in health economics, I am Italian but I moved to Paris after secondary school to study philosophy and economics at Sorbonne Université. After my master, I did one year in the US but came back to Paris. I worked for a short time at the Organisation for Economic Co-operation and Development, OECD. I wasn’t sure if I wanted to work in research so I did an internship, which ended up being a job, as a consultant. That was when I decided that it was really research that I wanted to do.

For my PhD, I wanted to stay in France. One of the options was AMSE, mostly because I had heard very good things about it. What struck me during the interview was how friendly people were. I arrived feeling a little stressed and everyone was incredibly friendly and smiling, saying things like “oh do you want a coffee”, “do you have any questions”, etc.

Being so welcoming and friendly is more unusual that you might think. The few days spent in Marseille made me appreciate the city and I would say that my first impression was right. When I joined AMSE, the friendliness and inclusiveness of the place were confirmed.

“

**AMSE is absolutely extraordinary in terms of social relationship and how cheery this environment is. On top of the human aspect, there were also very good professional aspects.**

”



## WHAT ARE YOU WORKING ON CURRENTLY?

I'm researching different things, but several which are related to my thesis work. One topic is the relationship between memory and decisions. In my PhD, I focused on the relationship between memory and judgments, so evaluations. Evaluations are also what, at the end of the day, lead to decisions. I am now exploring how these two relate.

I'm also studying well-being judgments and how to improve them. If I ask you how satisfied you are with your life today, and then I ask you again in two years, how do I know that you're using the same scale? These kinds of methodological issues are very important and I'm trying to approach them based on what I learned in my PhD.

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**When I joined AMSE, the friendliness and inclusivity of the place were confirmed.**

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One thing that I'm doing at the moment involves people answering an online survey. It is a research I have been doing about the Covid vaccines based on a survey that we're running in the UK. There's been a lot of debate about the safety and the efficiency of vaccines. We surveyed people in June about how safe and how efficient they thought each legal vaccine was. People had different opinions about this. Then some of them decided to get vaccinated, and we are interviewing them now asking them again which vaccine they think is the safest and most efficient, and what they thought back in June, when we interviewed them the first time. The interesting thing is that, in the UK, you cannot choose the vaccine you receive. Therefore, if their opinions and memories shifted it would not happen because of their decision of getting a specific vaccine. But the research is still ongoing.

What we expect to find should be in line with the mechanism of people basically learning and remembering what they want to learn and remember. Different forces are at work there. Sometimes you want to learn something because it's useful to you, which is called instrumental

motivation. Sometimes you want to learn something just because it makes you feel better, which is called hedonic motivation. There are different reasons for wanting to learn different information and remember different information.

## HOW DO YOU FEEL ABOUT YOUR TIME AT AMSE?

I had a very good time, it was a very good experience and the friendliness that I mentioned at the beginning is something which really affected my time there. During your PhD, you spend three to four years obsessed with your very tiny research topic... so it's very important for that to happen in a good environment. AMSE is absolutely extraordinary in terms of social relationships and its very cheerful environment.

On top of the human aspect, there were also very good professional aspects.

First of all, I was left very free to explore my research. That doesn't necessarily happen, it was largely due to my supervisors. Because I work on behavioural economics, not a major field at AMSE, it was unusual to recruit someone working on this topic and just leave him free to explore it, but that's what happened. At the same time, the advantage was having a somewhat different background from the economists working around me, and also having access to a wide variety of seminars. These seminars were not on behavioural economics topics, but from very different fields of economics, which allowed me to obtain a wide view while working tightly on my topic. I think this was really good.

Another important thing was the great conditions: having a desk (which might sound obvious, but it's not true of many departments), being able to go to conferences, meet people, see how people work in other departments, think and exchange with other departments... I was given a lot of encouragement to do all this, and I think it did me a lot of good.

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If you want something done, ask a busy person.

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