PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.01

Curriculum: 2. Socio-Economic Risk and Impacts

Italian Inner Areas as Engine for Green Transition and Recovery

Reference Person: Arbolino Roberta (rarbolino@unior.it)

Host University/Institute: University of Naples ""L'Orientale""

Research Keywords:	Green Transition Circular Economy Inner Degraded Areas
Reference ERCs:	SH1_12 Environmental economics; resource and energy economics; agricultural economics
Reference SDGs:	GOAL 9: Industry, Innovation and Infrastructure, GOAL 11: Sustainable Cities and Communities

Description of the research topic

The coronavirus pandemic has driven a change in the relationship between Urban and Inner areas, posing the focus of policymakers and scholars on the need to redevelop and recover the latter from a social and economic point of view, still protecting their social, cultural and environmental heritage. Indeed, urban areas has proved difficult to live during those periods when movement restrictions were in force. Therefore, a partial and – if not properly supported – temporary change in user preference towards inner areas.

As highlighted by the National Strategy for Inner Areas (Strategia Nazionale per le Aree Interne), this broad group of areas gathers 60% of Italian surface, hosting less than 30% of population, despite a constant reduction. Together with demographic crisis, other problems characterize these areas: i.E., unemployment, land use, low levels of public and private service supply, social costs such as geological instabilities deriving from both abandonment and degradation of cultural and landscape heritage.

However, the renewed attention towards these areas is a fundamental opportunity to boost their socioeconomic recovery, in green and sustainable ways. Indeed, involving a mix of tradition, conservation and innovation, circular economy and sustainability might be the flywheels to spur economic recovery of inner areas. The policy framework set after the pandemic recognizes these potentials and offers a large set of fiscal, financial and policy instruments to boost these processes. On the one side, the National Plan for Recovery and Resilience (Piano Nazionale di Ripresa e Resilienza, PNRR) lists the enhancement of inner areas among its objectives, based on investments of about one billion on industries (through the Special Economic Zones), infrastructures, service provision, connectivity, modernisation and green transition. At present, fiscal incentives and other instruments for supporting

transition (such as improvement of the housing stock) are largely available in the "ordinary" legislation, incrasing the feasibility of green investments.

In this context, the present project aims at studying the potential of inner degraded areas to become the engine of Italian green and digital transition, as well as the flywheel of economic recovery.

To achieve this objective, an in-depth study of the potentially functional interventions in the current legislation is required, together with a mapping of those areas susceptible of interventions, by studying their social and economic features. These preliminary studies will be the basis for identifying strengths and potential criticisms of both internal areas and policy instruments, thus allowing to provide the policymaker with concrete suggestions to implement concrete and effective interventions. In doing so, the project aims at providing a quantification of the socioeconomic impact of both implemented and planned measures.

The main research output will be the modelling of methodological instruments to support policymakers in regulation improvement and punctual interventions realisation, together with an assessment of expected impacts.

Research team and environment

The PhD will take place at the Department of Social and Human science of the University of Naples L'Orientale. The student will be integrated in a multidisciplinary environment addressing different aspects of knowledge (involving geography, firms management, economics, anthropology, among others). In such an environment, the student will be given the opportunity to develop critical view on different aspects of development. However, the focus will be on economic aspects, thanks to the participation in the economic research activity of the department, with experience in policy evaluation, investment planning, sustainable investment selection, regional sustainable development, quantitative assessment of sustainability.

For this scholarship it is planned a period of internship at *Technova Consorzio Politecnico per l'innovazione S.c.a R.l., Napoli*

Suggested skills for this research topic

Ideally, a successful candidate should present a background in economic and policy analysis, together with strong ability to analyse and interpret data. Experience in data analysis (even through econometric modelling software) will be considered an additional asset. A strong interest for multidisciplinary research is required, as well as good knowledge of spoken and written English language.

Type of scholarship and obligations

The type of this scholarship is: Pubblica Amministrazione (Public Administration). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of

the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.02

Curriculum: 2. Socio-Economic Risk and Impacts

Developing innovative approaches for cascading effects to improve flood risk management actions with a specific interest on the functional vulnerability of critical infrastructures.

Reference Person: Aronica Giuseppe Tito (giuseppetito.aronica@unime.it)

Host University/Institute: University of Messina

Research Keywords:	Resilience and risk impact
	Critical infrastructures
	Sustainable engineering
Reference ERCs:	PE8_3
	SH7_6
	PE8_11
Reference SDGs:	GOAL 11: Sustainable Cities and Communities, GOAL 13: Climate Action

Description of the research topic

Risk analysis is central to Civil Protection activities and is the core element of risk management. Specific "Risk Management Plans" are needed to ready Civil Protection structures for tackling and managing an emergency. These identify the objectives that must be followed and achieved for the organisation of a desirable response by the Civil Protection when the event occurs.

The development of risk reduction strategies includes all aspects of risk management, from prevention to recovery. Civil Protection has a central role in ensuring a resilient approach for disaster risk reduction

The project aims at studying innovative approaches for the development of integrated flood risk scenarios taking into consideration critical specific issues of areas at risk and the consequences of high frequency/low damage events that affect them. High frequency floods still involve and require mitigation actions on the part of civil protection and citizens before floodwaters inundate the land and directly affect assets that can benefit from enhanced protocol development based on realistic scenarios.

In particular, the main idea is to develop a supporting decision tool for the comparative analysis of disaster reduction strategies in flood risk management, with a specific interest in

studying the functional vulnerability of critical infrastructures in order to preserve their efficiency during and after hazardous events.

This project will contribute to risk prevention addressing two challenging goals: firstly deriving consistent risk scenarios at the micro-scale, for frequent events, focusing on strategic infrastructures vulnerability; secondly defining effective strategies for managing emergencies, focusing on the individuation of areas at risk of isolation, best routes to reach populations, recovery areas, good practices to avoid the presence of citizens and cars in flooded areas.

The project also aims to support Civil Protection actions of risk reduction in at-risk territories during and after emergencies, keeping at-risk citizens safe, through both flood water avoidance and minimising disruption. Flood events cause both direct and indirect impacts, referring to the losses or disruption caused by the direct contact with flood water or due to the secondary effects.

For example. Transport infrastructures, can suffer structural (direct) damages after a flood event and, consequently, lead to an isolation of flooded and also not flooded areas (indirect effect). The efficiency of urban infrastructure is maintained if their disruption does not cause injuries and their functional role is substituted by other infrastructures following alternative routes. Identifying strategic buildings for citizen people recovery, defining the transferability transitability and partial transitability damage states and providing the alternative routes in both eventualities - including considerations on people behaviour, human resources and costs of alternative actions – is an important contribution to mitigate events' consequences by maintaining efficient infrastructures during and after disasters. Event management protocols benefiting from such considerations.

The main activity of the PhD student will be at the Water Engineering Research Group at the University of Messina, which will be integrated with two training periods, one abroad (6 months) at University of Bristol (one of the main European centres on the topic of the thesis) for an improvement of knowledge to flood resilience for the transport infrastructure and one at the Department of Civil Protection of the Sicily Region to improve the aspects related to disaster reduction strategies during and after hazardous events.

Research team and environment

TThe research activity wilt take place at the Department of Engineering, University of Messina. Within the Research Group of Water Engineering and Hydrology coordinated by Prof. Giuseppe T. Aronica. The Group includes an Associate Professor and other members (PhD students, Post-Docs, Research Assistants) and cover research topics related to flood risk management and flood defense design, flood propagation modelling, hydrological and hydraulic modelling of flash floods and debris flows, flood vulnerability and damage evaluation, pluvial flooding, sustainable urban drainage systems. Flood early warning, stochastic hydrology applied to the analysis of extreme hydrometeorological events. The research activities are supported by several national and International grants in the field of

flood risk assessment and mitigation, damage evaluation, development of disaster risk reduction strategies. The Research Group collaborates with several other research groups in Italy (University of Palermo,IUSS Pavia, Polytechnic Milan, University of Naples, and others) and abroad (University of Exeter, University of Thessaloniki, University of Bristol, Middlesex University, University of Sarajevo and others).

Suggested skills for this research topic

The ideal candidate shuold have a background in civil and environmental engineering studies, in particular in the field of urban and riverine flooding, flood vulnerability and damage evaluation.

Familiarity with programming languages such as Matlab, R, Fortran, will be positively considered, as experiences in statistics, data analysis and socio-economic modelling will be an added value. Fluency in English, both written and spoken is recommended. Finally, the candidate shuold be strongly motivated to work in a collaborative environment, with an interdisciplinary approach. A wllingness for international mobility is required

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.03

Curriculum: 2. Socio-Economic Risk and Impacts

A systemic framework for climate risk assessment and management

Reference Person: Arosio Marcello (marcello.arosio@iusspavia.it)

Host University/Institute: IUSS Pavia

Research Keywords:	Systemic climate risk
	Indirect climate impacts
	Graph and network theory
Reference ERCs:	PE8_3
	PE6_6
	SH1_6
Reference SDGs:	GOAL 8: Decent Work and Economic Growth, GOAL 9: Industry, Innovation and Infrastructure, GOAL 13: Climate Action

Description of the research topic

Assessing the risk of complex systems to natural hazards induced by climate and its change is an important and challenging problem. In today's intricate socio-technological world, characterized by strong urbanization and technological trends, the connections and interdependencies between exposed elements are crucial. In this context of complex relationships, the scope of this research will be a paradigm shift in collective risk assessments: from a reductionist approach (i.E., based on the sum of the risk evaluated individually at each of its elements) to a holistic one (i.E., the whole system is a unique entity of interconnected elements, where those connections are considered to assess risk more thoroughly).

The research will progress on the activities at IUSS on the development of an innovative holistic approach (Arosio et al., 2020, "A holistic graph-based assessment approach for natural hazard risk of complex systems") that allows to analyze risk in complex systems based on a graph, the mathematical structure to model connections between elements. The approach proposes to represent the exposed elements of the system and their connections (i.E., the services they exchange, doi:10.5194/nhess-20-521- 2020) with a weighted and redundant graph. By mean of it, it assesses the systemic properties, such as authority and hub values and highlighted the centrality of some "critical" exposed elements. Furthermore, it is possible to use the graph as a tool to propagate the damage due to extreme climate events into the system, for not only direct but also indirect and cascading effects, and,

ultimately, to better understand the risk mechanisms of natural hazards in complex systems. Finally, the graph can also account for the resilience characteristics of the system according to the United Nations General Assembly definition.

Based on the state of art, internal and external to the IUSS's team, the candidate needs:

- to critically review the most recent literature, tools and database of collective risk assessment, with focus on climate-related hazards;

- to develop a novel methodology for the climate risk assessment using a systemic approach;

- to collaborate both with IUSS research team and the research team of the other Universities in the PhD consortium in a multi-disciplinary context;

- to disseminate results at international conferences and workshops

Research team and environment

IUSS mission is to provide advanced education to undergraduate and graduate students, as well as fundamental and applied research in the fields of Science, Technology, Engineering and Mathematics (STEM), and Human, Social and Life Sciences. At IUSS, PhD candidates will find an open multidisciplinary environment offering real opportunities for developing academic and professional tools for facing the challenges arising from increasing complexity and fast changes in the society and the environment. IUSS is always and actively committed towards internationalisation, inclusion and diversity. The selected candidate will join the research centre on Climate change impAct studies for RISk MAnagement (CARISMA). The CARISMA team is composed by STEM and Social scientists working in the prism of climate change on: data analysis and modelling of Earth system and economic system processes; impact assessment of extreme natural events and anthropogenic activities on human and natural environments; risk management of natural and anthropogenic hazards; formulation and proposal of new economic, political and legal models of sustainable development.

For this scholarship it is planned a period of internship at *CRIF SpA, Bologna*

Suggested skills for this research topic

The ideal candidate will have experience with most of these topics: quantitative risk assessment, graph theory, statistical analysis and large dataset. Theoretical knowledge is mandatory and professional application could be an advantage. The candidate should be passionate on research topics, hardworking, self-motivated, have an open-mindedness to look for new solutions and methods of doing things and creativity in analytical thinking to extract meaning from sets of data. The candidate should desire to join a multi- and inter-disciplinary research team, open to learn new topics from other sectors and effectively communicate to colleagues with different background. Competence on programming languages is preferable.

Type of scholarship and obligations

The type of this scholarship is: Dottorati Innovativi (Innovative PhD course). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.04

Curriculum: 2. Socio-Economic Risk and Impacts

Sustainable mobility determinants in urban contexts: demand and supply analysis and policy design

Reference Person: Bergantino Angela Stefania (angelastefania.bergantino@uniba.it)

Host University/Institute: University of Bari "Aldo Moro"

Research Keywords: Urban sustainable mobility

Consumers preferences

Urban transport services

Reference ERCs: SH7_9

SH7_7

SH7_6

Reference SDGs: GOAL 11: Sustainable Cities and Communities, GOAL 12: Responsible Consumption and Production, GOAL 13: Climate Action

Description of the research topic

Reducing air pollution in urban areas is one of the most important urban planning challenges of recent years. Transport is responsible for around 25% of the planet's greenhouse gases, with over 70% of these produced by urban and peri-urban mobility by cars, buses, vans, etc. For the movement of people and goods EEA (2021). For this reason, the EU objective is to reduce greenhouse gas emissions from transport by 90% by 2050.

The research project aims to investigate how virtuous forms of urban mobility - such as active mobility, shared mobility, public transport services - and innovative organizational forms and means of transport – such as unmanned private/collective and urban air mobility vehicles - can offset the negative externalities linked to urban passengers and freight road transport. Considering also the role of mobility in relation to urban inclusiveness and accessibility to essential services, the research could assess how these forms of urban mobility could contribute to inducing a long-term reduction of the environmental footprint pursuing the UN Sustainable Development Goals (SDG11, SDG12 and SDG13).

The project will have a threefold approach: i) it will assess the factors that can support the transition toward less impacting forms of transport and urban mobility starting from the analysis of the state of the art of the supply (various forms and organizational structures of the new vehicles and fuels available or developing) and of the elements that guide demand

(individual and group behaviour in relation to the adoption of these solutions/technologies and to mobility and, more generally, urban environment perception), ii) it will define the elements for the design of public policies and incentives adopting a behavioural approach and provide a policy assessment and evaluation in terms of modal shift, spatial distribution of mobility, behavioural change and environmental impact; iii) it will yield insights for public/private operators active in this segment of the market still relatively unknown.

Considering the nature of mobility several research lines can be developed within this broad framework: i) identifying and assessing local factors that facilitate the diffusion of sustainable mobility practices – which include territorial factors (presence of urban mobility plans, structure of the city and distribution of services, state of the infrastructures), normative factors, demand factors (users' willingness to pay and use a sustainable form of commuting, socio-economic factors facilitating the modal switch) and supply factors (product design and mobility planning maximizing the use of sustainable commuting and last-mile logistics); ii) studying consumer's attitudes and preferences using stated preference/revealed preference and geospatial data provided by local service operators (demand-side analysis) for different forms of sustainable transport; iii) defining firms' opportunities (sharing services, unmanned vehicles, new fuels, last-mile logistics, etc); iv) develop guidelines for municipalities and policymakers to promote sustainable forms of mobility.

The demand side may be studied with analytical approaches such as multi-criteria analysis, agent-based models, discrete choice models and spatial econometrics using GPS data of current users and available satellite data. The candidate will also focus on the services provided by local transport operators (supply side) and the policies to support these services at the urban level (municipalities, metropolitan cities, regions), including urban planning and intervention on the spatial structure of the city. About the supply-side analysis, an overview of the service characteristics (pricing strategies, the density of service, urban policies, public funding, design, technologies, etc.) will be studied at the urban and national level, with a comparative overview of international best practices, to understand the main trends and innovations in the sector and their impact on the individuals' behaviour, on firms' strategies, on policy design.

Research team and environment

The research team is led by Professor Angela Stefania Bergantino, full professor of Applied Economics and Transport Economics at the University of Bari. Professor Bergantino has held and currently holds senior positions in the transport sector at the national level. She was president of the Italian Society of Economics of Transport and Logistics (2016-2021) as well as a member of the "Technical Mission Structure" of the Ministry of Infrastructure and Transport and consultant, over the years, for other Ministries and national and international research bodies. She sits as an independent in the Board of ENAV SpA (sustainability committee) and in Exprivia SpA. In the past, the team has already focused its attention on the role of sustainable territorial infrastructures and smart mobility as a driving force for

sustainable accessibility and the regional economy in general. The project proposal has a strong innovative content with respect to both the multidisciplinary composition of the working group and the ability to integrate heterogeneous aspects of the theme of sustainability declined on an urban scale. The research team is also composed by prof. Andrea Morone, Stefano Galavotti, Gabriele Tedeschi, Mario Intini, Ada Spiru (specialized in sharing mobility, transport economics, economics of public choices, experimental economics, environmental economics, econometric modelling, regulation) and several post-doc and PhD students in economics. The group cooperates also with Giuseppe Pirlo (informatics) and Alessio Pollice (statistics) on smart cities and specific analytical competences. The PhD candidate will use the laboratories, classrooms and research infrastructures made available by the Department. These are i) experimental economics laboratory (ESSE); ii) the Economics laboratory applied to transport, territory and businesses (LEATTI) – both equipped with computers, printers and simulation and statistical software specific to research activities.

Suggested skills for this research topic

Candidates should preferably have an academic background in economics and data analysis, analytical capabilities, the ability to handle and analyze large datasets and perform quantitative research in econometrics and social sciences. Fluency in English is recommended.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.05

Curriculum: 2. Socio-Economic Risk and Impacts

Climate Change Impact on Economic Systems and Policies for an Orderly Transition

Reference Person: Caiani Alessandro (alessandro.caiani@iusspavia.it)

Host University/Institute: IUSS Pavia

Research Keywords:	Climate Change Macroeconomic Modeling Physical and Transition Risks
Reference ERCs:	SH1_1 SH1_12 SH1_3
Reference SDGs:	GOAL 8: Decent Work and Economic Growth, GOAL 10: Reduced Inequality, GOAL 13: Climate Action

Description of the research topic

The candidate should have a background in economic studies, in particular in the field of macroeconomic analysis. His training and research activity will center on the study and development of models aimed at achieving a better understanding of the interactions between climate, the environment, and the economy. The focus will be on the effects of climate change on the real and financial spheres of the economy, with the aim of identifying the most suitable economic policies and the regulation schemes to mitigate the economic risks connected both to global warming and to the transition from a carbon-intensive to a low-carbon economy. The candidate will be encouraged to adopt a multidisciplinary approach and to use a wide range of tools such as dynamic heterogeneous-agent models (.E.G. Agent-Based Models), Integrated Assessment Models, econometric models, network analysis and machine learning techniques, behavioral and experimental economics methods. The research activity will be carried out in the research centre on Climate change impAct studies for RISk MAnagement (CARISMA) of IUSS.

Research team and environment

IUSS mission is to provide advanced education to undergraduate and graduate students, as well as fundamental and applied research in the fields of Science, Technology, Engineering and Mathematics (STEM), and Human, Social, and Life Sciences. At IUSS, PhD candidates will find an open multidisciplinary environment offering real opportunities for developing academic and professional tools to face the challenges arising from increasing complexity

and fast changes in the society and the environment. IUSS is always and actively committed towards internationalisation, inclusion and diversity. The selected candidate will join the research centre on Climate change impAct studies for RISk MAnagement (CARISMA). The CARISMA team is composed by STEM and Social scientists working in the prism of climate change on data analysis and modelling of Earth System and Economic System processes; impact assessment of extreme natural events and anthropogenic activities on human and natural environments; risk assessment and management of natural and anthropogenic hazards; and formulation/proposal of new economic, political and legal models of sustainable development.

Suggested skills for this research topic

Background in Economic Studies

Good Programming Skills

Econometric & Statistical Skills

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.06

Curriculum: 2. Socio-Economic Risk and Impacts

Irreconciliable sustainabilities? The critical macro financial side of green transition; a macro modelling perspective

Reference Person: Caverzasi Eugenio (eugenio.caverzasi@uninsubria.it)

Host University/Institute: Università degli Studi dell'Insubria

Research Keywords:	Green transition financial sustainability AB-SFC models Macro Finance on public and private debt sustainability
Reference ERCs:	SH1_15 Public economics; political economics; law and economics PE3_15 Statistical physics: phase transitions, condensed matter systems, models of complex systems, interdisciplinary applications SH7_6 Environmental and climate change, societal impact and policy
Reference SDGs:	GOAL 8: Decent Work and Economic Growth, GOAL 12: Responsible Consumption and Production, GOAL 13: Climate Action

Description of the research topic

Macroeconomic research has tried, in recent years, to offer its contribution to the studies on the transition toward a more sustainable socio-economic system (see the Nobel prize to Nordhaus in 2018). The perspective applied until now focuses on the interactions between economic activity and pollution, and on the feedbacks effects on one-another: economic activity creates pollution which in turn increases temperatures, causing potentially devastating effects on the environment and this may be harmful to the economic system. In a nutshell, the question is: what is the level of GDP growth that we can maintain without excessively affecting the environment?

Recent publications cast doubts on this perspective (e.G. BIS, 2020; Keen et. Al 2021), underlying (i) how non-linearities and tipping points make forecasting unreliable in the medium run and, most importantly, (ii) how, due to the disastrous potential consequences, errors are simply unacceptable on this issue.

This project aims at proposing a different point of view. The goal is to understand how to make a green transition financially sustainable. Both the public and the private sector will be

involved in the transition, and both may rely on different sources of financing. Where to find the required funds? How to avoid bubbles and inflation? How to combine this with the current high level of public debt?

In order to provide answers to these questions, the model will rely on AB-SFC (Agent-Based Stock-Flow Consistent) models, a rather innovative macro modeling approach in which the bottom-up perspective of AB models combines with the comprehensive macro accounting of SFC models, which fully integrate the real and the financial side of the economy (Caiani et al. 2016). This gives the chance not only to simulate different financial and productive structures but also to assess the implications and feedback between the micro-level (where most policies must be implemented) and the macro-level (where the outcomes emerge); hence developing a complex system to inform policymakers and further research.

The financial side will be developed to assess the impact of the numerous proposals which are being put forward, related to monetary and fiscal policy on the one hand (Green New Deal, Green Quantitative Easing, Green Taylor Rule, Green Capital Adequacy Ratio), and on the financial system on the other hand (es. Green Bond, Green portfolios). The real side of the model will try to incorporate elements and data obtained by the collaboration with the other departments of the Uninsubria involved in the project (more on this below).

The problems that this project addresses have indeed self-evident implications in empirical and quantitative terms. Which are the foreseeable private and public debt levels? Which is the required speed of transition of financial portfolios? What is the level of investment and returns needed in order to avoid bubbles and financial crashes? These issues represent possible and highly promising extensions of this project.

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Caiani, A., Godin, A., Caverzasi, E., Gallegati, M., Kinsella, S. And Stiglitz, J.E., 2016, "Agent based-stock flow consistent macroeconomics: Towards a benchmark model", with Alessandro Caiani, . Journal of Economic Dynamics & Control, 69, pp. 375-408.

Keen, S., Lenton, Tm M. Antoine Godin, A., Devrim Yilmaz, D., Grasselli, M.Timothy and Garrett, J. 2021. Economists' erroneous estimates of damages from climate change,

Nordhaus W.D. 1991. The Cost of Slowing Climate Change: a Survey. The Energy Journal 12,

Research team and environment

The PhD student will have the chance to take part in a group of students and researchers collaborating on similar topics with Eugenio Caverzasi and his co-authors at the Università Politecnica delle Marche (Ancona), Greenwhich University, University Jaume I, (Castellon), Scuola Superiore Sant'Anna (Pisa).

The project will be carried out in collaboration with colleagues of the Department of Economics of the Università degli Studi dell'Insubria and with other members of the Board of the Ph.D. Program in Methods and Models for Economic Decisions (MMED), for which Eugenio Caverzasi is a lecturer and member of the board, with among others professor Elena Maggi, an active member of the PhD-SDC network.

For the modelization of the non-financial sector and of the impacts of economic activities on the environment, the Ph.D. Student will also have the possibility to collaborate with professor Mauro Guglielmin from the Department of Applied and Theoretical sciences and professor Nicoletta Cannone from the Department of Science and High Technology.

Moreover, the Economic team of the Department of Economics collaborates with several national and international universities, such as the Polytechnic University of Milan, the University of Padova, Venice International University, IUAV Venice, the University of Torino, the University of Milano-Bicocca, the University of Lugano, the Joint Research Center, the University of West of England Bristol, and with the Friedrich Schiller Universität Jena and the Hohenheim University, specialized in bioeconomy.

Suggested skills for this research topic

Ideally, the candidate should have a Master's degree in Economics, with good quantitative and programming skills.

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.07

Curriculum: 2. Socio-Economic Risk and Impacts

Innovative start-ups for a more innovative and sustainable economy

Reference Person: Colombelli Alessandra (alessandra.colombelli@polito.it)

Host University/Institute: Politecnico di Torino

Research Keywords:	Innovative start-ups Eco-innovations Digital technologies
Reference ERCs:	SH1_9 SH1_10 SH1_12
Reference SDGs:	GOAL 9: Industry, Innovation and Infrastructure, GOAL 12: Responsible Consumption and Production, GOAL 13: Climate Action

Description of the research topic

The research is positioned at the intersection between entrepreneurship and sustainable development. The project will analyse the trends and practices of innovative companies responding to the challenges of climate change and acting towards a sustainable economy within the context of the European Green Deal, focusing on the green strategies of innovative startups. The project includes three interrelated research themes:

1) INNOVATION: What is the role of start-ups for the generation and dissemination of green technologies in support of a more innovative and sustainable economy? Are these innovations linked to other relevant aspects of sustainability, such as diversity and inclusion, resilience (especially in the post-COVID world) and good governance?

2) PERFORMANCE: How can start-ups jointly leverage digital and green technologies and best practices to become more competitive while helping the transition to a more sustainable economy? What are the key trade-offs? Which companies are the most successful at linking climate risk management, eco-innovation and financial outcomes?

3) POLICIES: How much do regional, national and European policies and institutions encourage and protect the eco-innovative and sustainable activities of entrepreneurs? Are other policies that encourage green entrepreneurship (labels, reporting requirements, value

chain disclosure, anti-greenwashing actions) complementary to those targeting innovation systems?

Research team and environment

Beyond Prof. Colombelli, the closest research team includes another researcher RTD-A (Chiara Ravetti) who specializes in socio-economic sustainability and has already been working with Prof. Colombelli on the identification of green innovative start-ups in the Italian context; and another PhD student working on the research project "Sustainable business strategy, organization and innovation". Furthermore, the doctoral student will be part of the Department of Management and Production Engineering of the Politecnico di Torino, which concentrates economics and business expertise across numerous areas related to the research project (strategy, digitalization, industry 4.0, innovation, entrepreneurship, social innovation, incubators). Moreover, the PhD student will be part of the Entrepreneurship and Innovation Center (EIC), a knowledge-hub specialized in entrepreneurial and innovative ecosystem. During the PhD, the doctoral student will have access to the equipment of the Laboratory of Production and Economics (LEP) and, in particular, the following tools: software for economic-statistical analysis (Stata, Matlab), proprietary databases with characteristics of companies and patents such as Amadeus and Orbit, data on innovative start-ups, SMEs and particular cases of sustainable entrepreneurship (B-corporations).

Suggested skills for this research topic

The ideal candidate is a proactive, highly motivated and independent person, with an understanding of the economic and business challenges posed by climate change and sustainability transitions, capable of quantitative as well as qualitative data analysis (knowledge of econometrics and statistics constitutes a preferential skill, but is not a prerequisite)

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.08

Curriculum: 2. Socio-Economic Risk and Impacts

Environmental policies and consumption choices for low carbon and circular transitions

Reference Person: D'Amato Alessio (damato@economia.uniroma2.it)

Host University/Institute: University of Rome Tor Vergata

Research Keywords:	Environmental Economics and Policy
	Consumers behaviour
	Sustainability transitions
Reference ERCs:	SH_1_12
	SH_1_8
	SH_1_7
Reference SDGs:	GOAL 12: Responsible Consumption and Production, GOAL 13: Climate Action

Description of the research topic

The aim of this research project is to make advancements in the analysis of the barriers and drivers of the low carbon and circular economy transitions, adopting an economic and econometric lens but in a way that will be open to interdisciplinary approaches. The scrutinized transitions require actions both from institutions (EU, State, regional and local level) and from firms and consumers, in order to be feasible, and a significant number of potential complementarities and trade-offs needs to be addressed, in line with the multiplicity of objectives included both in U.N. Agenda 2030 and in the EU Green Deal. This project will contribute and provide food for thought both for research and for policy making, focusing specifically on the interlinkages between policies and consumers' behaviours. More specifically, the aims of this project will be twofold:

1. Highlight relevant (traditional and innovative) policies that are expected to enhance the transition, measuring at the same time the degree of implementation, and

2. Analyse empirically and rationalize theoretically the most relevant drivers of the low-carbon and circular economy transitions, by measuring consumers' attitudes and behaviours, and by understanding relevant drivers that may potentially improve or worsen policy and other interventions' results by triggering complementarities or trade-offs.

Under a policy perspective, a broad as well as case-study based approach may be adopted, focusing on interventions ranging from traditional ones (e.g. from environmental market

based approaches to demand side Green Public Procurement strategies), to "behavioural" ones, for example based on consumers' motivation and choice architecture. The overall outcomes of the project are expected to be high level research results, potentially worth consideration in highly reputed international journals or other publication venues, and will be presented in top conferences in the relevant fields (e.g. Ecological and Environmental Economics conferences). They are however expected to also produce policy relevant actionable insights.

Research team and environment

The project will benefit of the very lively and high level research environment of the Department of Economics and Finance (DEF), Faculty of Economics, at the Tor Vergata University. The high quality of research is, in general, testified (among other things) by the award of the 2018-22 Department of Excellence MUR funding. Also, research in Environmental Economics has a long tradition in the context of the Department's activities, and several relevant events have been hosted by the Faculty of Economics (including: the 2011 EAERE Annual Conference, the 2017 IAERE Annual Conference, the 2019 IAERE School on Green and Climate Finance, the 2021 SEEDS Workshop). Researchers from DEF that work in the fields of Environmental and Ecological Economics have been and are involved in high level publication efforts (including, among others, papers published in international journals such as Ecological Economics, Environmental and Resource Economics, European Economic Review, Resource and Energy Economics) on topics related to the project. Finally, project development will also benefit from the involvement of the University of Tor Vergata in the SEEDS inter-university network (www.sustainability-seeds.org). SEEDS units are involved in international projects, such as the 2022-26 ETC/CE - European Topic Centre on Circular Economy and Resources use, that supports the European Environment Agency (EEA) in designing strategies along the green and circular economy transitions.

For this scholarship it is planned a period of internship at *SEEEDS, Ferrara*

Suggested skills for this research topic

The ideal candidate for this project has a degree in economics or related fields, and also features a good quantitative background (statistics and/or econometrics), together with knowledge of environmental and resource economics and a strong interest in learning advanced techniques for analysis. The interdisciplinarity of the project may also imply, in principle, the possibility of mixed approaches (quantitative/qualitative).

Type of scholarship and obligations

The type of this scholarship is: Pubblica Amministrazione (Public Administration). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.09

Curriculum: 2. Socio-Economic Risk and Impacts

The Dark Side of Innovation: Predicting and Assessing Patent Toxicity

Reference Person: Giuliani Elisa (elisa.giuliani@unipi.it)

Host University/Institute: University of Pisa

Research Keywords:	Innovation Patents Toxicity
Reference ERCs:	SH 1 SH1_9
Reference SDGs:	GOAL 3: Good Health and Well-being, GOAL 9: Industry, Innovation and Infrastructure, GOAL 12: Responsible Consumption and Production, GOAL 14: Life Below Water, GOAL 15: Life on Land

Description of the research topic

The proposed research project investigates the nature and dynamics of dark innovations, i.e. Innovations that possess intrinsic features that can damage human health and the ecosystems. Grounded in the broader area of innovation studies, the proposed research project aims at exploring the extent and modalities under which companies invent "dark" technologies and contribute to their diffusion and perpetuation in the market. The main unit of analysis is expected to be patent data as a key measure of innovation or firm-level innovation. More practically, the research project focuses on the chemical industry (or industries where chemical compounds are core e.g. Cosmetics or household products) and the successful candidate is expected to undertake advanced patent analysis. The proposed research will touch upon three thematic issues:

1) It will contribute to the measurement of the impact of patents on innovation by expanding the current spectrum of patent measures and by estimating patents' potential environmental and human health hazards. The focus is likely to be on chemical patents with the aim of using methods of computational chemistry (e.g. QSAR models) to assess their potential toxicity. Knowing well in advance how much a new chemical compound is toxic will help to predict future hazards and have a better understanding of the extent to which research conducted in R&D labs is helping (or not) to meet pressing environmental targets – which is a domain that has so far been almost completely overlooked by innovation scholars.

2) It will contribute to addressing environmental challenges and help meeting the EU Green Deal goal of a toxic free future. Questions about whether innovations on agro-chemicals or other chemical sub-industries will make us safer in the future are very important as growing scientific evidence is being produced about the nexus between exposure to given toxicants – even at low doses – and numerous of the dominant diseases of our times, including Alzheimer, autism and cancer. Hence, it is very important that we know more about the intensity, geography and ownership of the inventive activities of potentially highly hazardous chemicals. This project seeks to make an unprecedented step in this direction by combining patent analysis with methods of computational chemistry.

3) Third, the proposed project aims at assessing the impact of public policy and the regulatory landscape on patent production. In Europe there is a stringent but also relatively recent (2007) legislation on chemicals (REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals), but it is still not well known whether it works as intended, and this project will for the first time undertake an impact evaluation study on the efficacy of the REACH regulation to prevent toxic patents from being produced and their related products marketed in the European Union or elsewhere.

Research team and environment

The PhD student will be affiliated to REMARC. REMARC is part of the Department of Economics and Management (DEM) of the University of Pisa (UNIPI). Its primary goal is to conduct cutting-edge research on responsible management and sustainable development and to have an impact on managers, policy makers and other stakeholders. People at our centre work on three main focus areas – i.e. International Business and Human Rights; Communicating and Practising Corporate Social Responsibility and Societal Transition for a Sustainable Economy – and on a set of smaller related projects, including research on Responsible and Dark Innovation. Our team includes DEM faculty members and external collaborators from different disciplines including Economics, Management, Statistics, Political Science, International Law, Development Studies and Business Ethics. REMARC is part of the Sustainability Centres Community (SCC), hosted by the Network for Business Sustainability (NBS), and member of the BHRights Initiative. The center has strong international connections through the network of external affiliates.

Suggested skills for this research topic

Background in economics, management and related fields, or alternatively, background in chemistry, pharmacology or related fields, with an interest for innovation studies.

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research).This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT
AND CLIMATE CHANGE

Scholarship code

CU2.10

Curriculum: 2. Socio-Economic Risk and Impacts

Sustainable Tourism, impacts of the introduction of the eco-labels on family desitination choices

Reference Person: Guerriero Carla (carla.guerriero@unina.it)

Host University/Institute: Università degli Studi di Napoli Federico II

Research Keywords:	Household collective model of decision
	Sustainable Tourism
	Environmental Economics
Reference ERCs:	SH1_12
	SH1_8
Reference SDGs:	GOAL 11: Sustainable Cities and Communities

Description of the research topic

Climate change is the greatest threat humanity now faces, with profound implications for world peace and stability (United Nations, 2021). Yet climate scientists judge the resolutions of the latest COP26 as still insufficient to meet the targets of the Paris agreement (Masood and Tollefson, 2021).

Ecolabels (e.G. Bandiera Blu) identify the quality of touristic destinations amenities and have been shown to be environmentally preferable in their category, enabling consumers to make informed on tarvel destinations environmental performance (Schwartz et al., 2020). However, the effect of ecolabels on families' travel destination choices has not yet been studied (Potter et al., 2021).

Families with children may be more environmentally sensitive. Young people are not only victims of climate change; they can also be powerful agents, as FridaysForFuture demonstrates. But there is only limited evidence concerning the power of children in households' decision-making.

Sustainable Families addresses a set of research questions:

, Ä¢ Household members' preferences: how does introduction of ecolabels affect the choices of individuals from different generations on travel choice destinations? Do similarities/differences between members vary with the family's socioeconomic status?

, Ä¢ What decision-making power is wielded by each member of the family? Who is the ultimate decision maker when it comes to sustainable travel destination choices? When do children start influencing decisions on sustainable travel choices and how does their influence change with socioeconomic status?

Research team and environment

Dipartimento di Scienze Economiche e Statistiche offers a vibrant environment for international students. The diversity of research areas covered by the faculty allows students to write their thesis in several fields of economics and finance. Doctoral students are exposed to a vibrant research environment, by participating to the weekly seminars organized by CSEF (https://csef.it/), and interacting with its Research Fellows as well as the international visitors frequently present at CSEF.

For this scholarship it is planned a period of internship at *Legambiente Iride, Napoli*

Suggested skills for this research topic

The ideal candidate should have a strong background in microeconomics and statistics.

Type of scholarship and obligations

The type of this scholarship is: Transizioni Digitali ed Ambientali (Digital and Environmental Transitions). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.11

Curriculum: 2. Socio-Economic Risk and Impacts

Detecting SMEs' contribution to SDGs environmental challenges with big data

Reference Person: Lattanzi Nicola (nicola.lattanzi@imtlucca.it)

Host University/Institute: IMT School for Advanced Studies Lucca

Research Keywords:	Small and medium-sized enterprises Sustainable Development Goals Machine learning
Reference ERCs:	SH1_10 Management; strategy; organisational behaviour SH1_9 Industrial organisation; entrepreneurship; R&D and innovation
Reference SDGs:	GOAL 6: Clean Water and Sanitation, GOAL 13: Climate Action, GOAL 14: Life Below Water, GOAL 15: Life on Land

Description of the research topic

The research line is focused on the assessment of SMEs' contribution to the United Nations' Sustainable Development Goals (SDGs), analyzing big data collected from the Internet and online social networks with advanced methodologies (e.G. Machine learning, complex networks methods). Specific focus will be given to the assessment of SMEs' contribution to the environmental group of SDGs (namely, goals 6, 13, 14, 15). SDGs were established in 2015, and have put substantial pressure on international economies and firms to meet them by 2030. They are addressed to all players in society, but academics and professionals acknowledge the relevance of firms in particular. Although firms have increasingly been using the Internet to disseminate their activities concerning sustainability, few studies include websites and online social networks to understand the extent to which companies are contributing to SDGs. Specifically, this research line aims at developing an empirical investigation of firms' advancements towards SDGs in the post-Covid scenario, which pushed the need for companies to change their business models into more sustainable ones. It combines big data and naturally occurring information from the Internet and online social networks to collect information on firms' advancements towards environmental SDGs.

The ultimate target of this research line is the proposal of a solid and comprehensive methodology for the assessment of SMEs' contribution to environmental SDGs in a quick and low-cost way, which could support managers, entrepreneurs and policymakers when designing their strategies and decision-making.

Research team and environment

The IMT School for Advanced Studies Lucca is a Public University School for Higher Education and Research with a special statute that focuses on the analysis of economic, societal, technological and cultural systems. The campus includes spaces for research and laboratories, courses, and living and recreation. The PhD candidate will have the opportunity to work in collaboration with scholars affiliated to the Laboratory for the Analysis of compleX Economic Systems (AXES) of the IMT School for Advanced Studies Lucca. AXES is a research unit whose work spans different fields of economics: from economic theory to applied econometrics, from international economics to political economy, from spatial and urban economics to industrial organization and business economics. Researchers incorporate skills and tools from different disciplines, including graph theory, the physics of complex systems and data science. AXES hosts seminars and dissemination events on a regular basis, and the chosen PhD candidate will be expected to attend these events as well as be actively involved in the unit's dissemination and other research activities. Scholars affiliated to AXES have published in top journals including the Journal of Business Ethics, Scientific Reports, Journal of Small Business and Enterprise Development, PlosONE, and Machine Learning, among others. Website: https://axes.lmtlucca.it/.

Suggested skills for this research topic

A Master degree in economics, management studies, or a similar field is preferred. Because the project's methodological focus will be quantitative, it is highly required that the candidate has a strong background in statistics and/or econometrics. Familiarity with some statistical software packages (e.G., R, Stata) and/or programming languages (e.G., MATLAB, Python) is appreciated. Fluency in English, both written and spoken, is recommended. We cannot expect candidates to be proficient in most of the needed knowledge fields because the study is heavily inter-disciplinary. As a result, we want individuals who are eager to study how to use a wide range of tools and become familiar with a broad range of disciplines, including network analysis and machine learning techniques.

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.12

Curriculum: 2. Socio-Economic Risk and Impacts

The twin-transition geography: green & digital transitions across heterogeneous regions

Reference Person: Montresor Sandro (sandro.montresor@gssi.it)

Host University/Institute: Gran Sasso Science Institute (GSSI)

Research Keywords:	Green-transition Regional-eco-innovation Digital-transformations
Reference ERCs:	SH1_12 SH7_7 SH1_9
Reference SDGs:	GOAL 9: Industry, Innovation and Infrastructure, GOAL 11: Sustainable Cities and Communities, GOAL 12: Responsible Consumption and Production

Description of the research topic

The research project aims to investigate the extent to which the green and the digital transitions can be combined to make local economies evolve along smart, sustainable and inclusive patterns of growth. While not new, the debate about the so-called "twin transition" has been revived by the Covid19 crisis, with recovery plans making it an absolute priority, especially in Europe. However, this is occurring with scarce research on the enabling conditions of the twinning at stake and with little attention to its distribution across regions marked by heterogeneous levels of socio-economic development. In the absence of in-depth regional research on the topic, policy agendas might end up following dangerous "one-fits-all" recommendations, obtaining even perverse effects. More dedicated research appears therefore necessary.

Greenhouse gas emissions and the entailed raise of global temperatures are making the access to food and water uncertain, weather extremes and natural disasters more frequent, and the threats to international peace and safety more insistent. A green transition is necessary to "act forward". At the same time, the digital transition towards more powerful and empowering digital technologies needs to be intertwined with the green one. On the one hand, digital technologies pose serious environmental threats, which span from the depletion of rare materials in their production to the high energy consumption in their use. On the other

hand, digital technologies offer important environmental opportunities, both in improving green efficiency and footprint of current production and consumption modes and in facilitating the development of new green technologies for that to happen.

The research project at stake addresses the extent to, and the conditions on which these digital-green threats and opportunities are neutralize and exploited, respectively, across local areas that differentiate into core and peripheral, urban and rural, industrial and agricultural, to mention a few elements of socio-economic heterogeneity.

The research project builds on and extends recent research in the geography of eco-innovation field, in transition ecological studies, and in the literature about new green industrial path development. On this basis, it will address a series of more specific research topics, among which:

- Regional patterns of "green digital" and "digital for green" production and consumption.
- Regional knowledge recombination at the core of new green & digital technologies.
- Regional items and bundles of green and digital activities.
- The twin transition relation with regional cohesion and growth.
- The twin transition in-between societal challenges and policy making.

The research will be realized by assembling a new bunch of datasets that, mainly but not exclusively with respect to European regions, will collect and harmonize primary and secondary data, both micro geo-referenced and meso-ones, functional to the construction and econometric analysis of key variables and relationships in the relevant domains of the research, among which: local introduction and adoption of green and digital technologies, and of green and digital patterns of production and consumption; environmental impact of the local production and use of digital technologies; local policy initiatives across the digital and green domain and their detectable outcomes.

Research team and environment

The research will be carried out within the Social Sciences Area (SSA) of the Gran Sasso Science Institute (GSSI), located in L'Aquila.

The SSA team is made up of about 20 researchers actively involved in the GSSI mission of carrying out frontier research and high-level doctoral education in Regional Science and Economic Geography. In this field, the area offers its 4-year International PhD Program, whose faculty includes outstanding international scholars and whose program comprehends courses of relevance for the research project at stake and for the National PhD Program in

Sustainable Development and Climate Change (https://www.Gssi.It/education/regional-science-economic-geography).

The SSA research team is engaged with five research tracks: i) Inner Areas and Peripheral Development; ii) Disasters and Regional Resilience; iii) Human Capital, Migration and Local Labour Markets; iii) Culture, Tourism and Regional Urban Development; iv) Regional Policy Evaluation and Local Urban Governance; v) Business, Innovation and Environmental Sustainability Within and Across Regions. The research project at stake will mainly refer to research track v), but it will also intersect with the other four (i) and ii) in particular).

The candidate will have the opportunity to interact with the students of the PhD program of the house, and to get advised by top-scholars in regional and innovation studies in a truly interdisciplinary environment: both within the SSA, comprehending applied economists and economic geographers using heterogeneous approaches (https://www.Gssi.It/people/professors/lectures-social-science-gssi-cities), and with the other GSSI areas with which it regularly interacts, that is, Physics, Mathematics, and Computer Science.

Suggested skills for this research topic

The successful candidate is expected to have a good background of applied economic studies and at least an introductory level of knowledge of the main issues and concepts in regional and (eco-)innovation economics. Moreover, the candidate should have basic econometric and statistical skills and competencies in handling large databases, in particular about innovation proxies like R&D and patent data.

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.13

Curriculum: 2. Socio-Economic Risk and Impacts

Food system and biodiversity loss: a transition to more sustainable behaviors

Reference Person: Morone Piergiuseppe (piergiuseppe.morone@unitelmasapienza.it)

Host University/Institute: UnitelmaSapienza University of Rome

Research Keywords: Food system
Unsustainable consumption
Sustainability transition

Reference ERCs: SH1_12
SH1_7
SH7_6

Reference SDGs: GOAL 2: Zero Hunger, GOAL 12: Responsible Consumption and Production, GOAL 15: Life on Land

Description of the research topic

Europe is currently facing several environmental, economic and social challenges, aggravated by the COVID-19 crisis. However, the ongoing pandemic could provide an opportunity to rethink economic and business models and policy, to favor innovation and a Green Deal-oriented transition. In this regard, there is growing interest in the development of new production and consumption models. Such new models are crucial to address sustainability challenges and to support an economic model that is more resilient to exogenous shocks and able to address the , Äòjust transition' pillar of the Green Deal (e.G. Ingrao et al. 2018).

This need to deploy new consumption and production models also applies to the food system. Indeed, there is increasing recognition that the prevailing food system is environmentally unsustainable and socially unjust, a situation which has prompted different initiatives around the world to propose, reinvent or institutionalise more sustainable practices, from individual to global levels, and to develop more sustainable food systems (Allen, 2014).

Unsustainable mass consumption models have long characterized the European manufacturing sector and - since the mid-twentieth century - have also expanded to the food

system. The negative consequences of these mass consumption models are amplified in food systems by the difficulty to include negative externalities in food prices.

Another distortion which regards specifically the prevailing food system is food waste/surplus. The Food Loss Index of the UN Food and Agriculture Organisation (FAO) estimates that 13.8 % of the food produced in 2016 was lost , Äòfrom the farm up to, but excluding, the retail stage'. This waste is generated throughout the supply chain, from agricultural residues through industrial processing wastes to final household and catering consumption surpluses.

Unsustainability of the current food system regards also the growing demand for nutrients from meat-based Western food production and consumption patterns. This trend places enormous pressure on the environment and threatens biodiversity as intensive farming and husbandry is considered to be among the major drivers of biodiversity loss (Willett et al., 2019).

Against this background, this research project will be articulated along the following three research lines:

1. Assessing the impact of current unsustainable food production and consumption behaviors (specifica ttention will be given to biodiversity)

2. Identifying measures to prompt the needed changes in consumer behaviors (this will be done mostly through behavioral and experimental economics methods, including nudging techniques)

3. Measuring the existence of a green premium for biodiversity (both w.r.t. green consumption and green finance).

Research team and environment

Research at UnitelmaSapienza (a young online & distance learning University directly linked to Sapienza University of Rome) is carried out in various Laboratories, Research Centers and Research Groups. The Bioeconomy in Transition Research Group (BiT-RG) is involved in research concerning the emergence of a circular and bio-based economy relying on the use of renewable resources for the production of novel products for various applications.

The scientific coordinator of the BiT-RG is Piergiuseppe Morone, Full Professor of Economic Policy at UnitelmaSapienza. The group includes 14 additional members: prof. Donald Huisingh (honorary member), 12 researchers from prestigious Italian and foreign universities and 1 administrative technician from the Management Control and Research Area of the University

(professional profiles available at the following link: https://www.Bioeconomy-in-transition.Eu/people/).

Most of the BiT-RG research activities are channeled in the Sustainability Transition strategic area:

Modern society has a dire need of bringing together economic efficiency, low environmental impact technologies, and alternative feedstocks to conventional fossil fuel and raw materials. This need calls for an efficient management of biomasses. Bearing these facts in mind, a transition from a society heavily based on mass consumption, uncontrolled waste generation, and heavy fossil fuels exploitation toward one based on resource-efficiency, new production and consumption behaviours, waste reduction, reuse, and valorization, seems a desirable and much needed feat. This change involves a paradigm shift, which goes beyond technological change – it involves big societal and institutional changes as much as the development of radically new technologies.

Suggested skills for this research topic

Knowledge of quantitative and qualitative methods for empirical research in behavioural economics, including survey analysis for consumers and field and laboratory experimental economic analysis; interdisciplinary skills and motivations to create bridges between fields.

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT
AND CLIMATE CHANGE

Scholarship code

CU2.14

Curriculum: 2. Socio-Economic Risk and Impacts

Climate extremes and policy action. The role of social networks.

Reference Person: Palma Alessandro (alessandro.palma@gssi.it)

Host University/Institute: Gran Sasso Science Institute (GSSI)

Research Keywords:	Climate extremes Social networks Adaptation policy
Reference ERCs:	SH1_12 SH1_15 SH7_6
Reference SDGs:	GOAL 3: Good Health and Well-being, GOAL 8: Decent Work and Economic Growth, GOAL 11: Sustainable Cities and Communities, GOAL 13: Climate Action, GOAL 15: Life on Land

Description of the research topic

The effects of global warming are manifesting much in advance than previous forecasts. The formation of “climate extremes” such as drought, tornadoes, heavy precipitations and heat waves are the most concerning issue of global warming as their frequency, duration and intensity have dramatically increased over the last 5 years in a scenario that is becoming the ``new norm". While there is an urgency for a policy response, a tighter environmental regulation is difficult to achieve, especially in advanced economies, where the marginal cost of additional regulation is higher and difficult to be accepted by firms and consumers who are not directly exposed to climate risks. Still, climate extremes are increasingly manifesting in several EU countries, with Italy being one of the most affected regions. As a consequence, policy makers are struggling to find an effective strategy to rapidly adapt to the “new abnormal” and strengthen resilience of the socio-economic systems. Yet, recent evidence shows that policy action against climate change increases when the local population is directly exposed to climate risks. More informed and aware individuals would thus induce policy makers to take a more effective action but little evidence exists on this issue.

This project investigates the causal effect of extreme weather events in Italy on two relevant dimensions: the damages generated and the individual involvement in addressing climate challenges at a local level. For the first dimension, it considers several outcomes such as public expenditures for recovery, health data and different proxies of local economic

activities to capture several aspects of the damages associated with climate extremes. The second dimension of the analysis relies on big data from social networks to examine how the local population responds to climate extremes, following the hypothesis that "climate awareness" and the population involvement increases as climate change manifests its effects. Especially in relatively less-exposed areas, individuals hit by climate extremes are expected to react on their social networks, disseminating information about risks and consequences of climate disasters, increasing the awareness and response of the local population and policy makers. This mechanism would increase the acceptability of new environmental regulation, reducing the gap between informed individuals and those with weaker beliefs, who represent a barrier to a more effective climate action.

The project employs three main data sources. First, daily georeferenced data on extreme events are obtained from the European Severe Storms Laboratory. Second, data on local effects include damage estimates (Protezione Civile and ISPRA), health outcomes (e.G. ISTAT mortality data, hospital dismissions), proxies of economic outcomes (e.G. Electricity consumption). Third, for the analysis of individual response, the project employs big data from social networks (Twitter and Facebook). Empirical methods rely on state-of-the-art causal inference techniques for suitable identification strategies (e.G. Event study analyses, diff-in-diffs and regression discontinuity) by exploiting exogenous variation of the climate extremes in a setting characterized by a granular geographical level and a high time frequency.

Research team and environment

The research will be carried out within the Social Sciences Area (SSA) of the Gran Sasso Science Institute (GSSI), located in L'Aquila.

The SSA team is made up of about 20 researchers actively involved in the GSSI mission of carrying out frontier research and high-level doctoral education in Regional Science and Economic Geography. The Area offers a 4-year International PhD Program, whose faculty includes international scholars and relevant courses for the research project at stake and for the National PhD Program in Sustainable Development and Climate Change (https://www.Gssi.It/education/regional-science-economic-geography).

The SSA is engaged with five research tracks: i) Inner Areas and Peripheral Development; ii) Disasters and Regional Resilience; iii) Human Capital, Migration and Local Labour Markets; iii) Culture, Tourism and Regional Urban Development; iv) Regional Policy Evaluation and Local Urban Governance; v) Business, Innovation and Environmental Sustainability Within and Across Regions. The research project at stake will mainly refers to research track v) and to research tracks iv and ii) to a lesser extent.

The candidate will have the opportunity to interact with PhD students of the house, and to get advised by top-scholars in climate change economics who will be involved as a part of the PhD program in a truly interdisciplinary environment along with the other GSSI areas (Physics,

Mathematics, and Computer Science). Additional advising and visiting opportunities may come from the following top-scholars: prof. Olivier Deschenes (UC Santa Barbara and IZA), prof. Claudia Persico (American University), prof. Joshua Graff Zivin (UC San Diego).

For this scholarship it is planned a period of internship at *SEEDS, Ferrara*

Suggested skills for this research topic

The successful candidate should have a strong background of applied economic studies and public economics, including some introductory knowledge of environmental economics. In addition, the candidate should have an intermediate level of econometric skills and a strong attitude in data manipulation (including large geo-referenced micro-data databases). A a good command of common statistical softwares for data analysis would be a key asset (R or Stata).

Type of scholarship and obligations

The type of this scholarship is: Pubblica Amministrazione (Public Administration). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.15

Curriculum: 2. Socio-Economic Risk and Impacts

Assessing droughts socio-economic impact combining social media and drought indexes

Reference Person: Pernici Barbara (barbara.pernici@polimi.it)

Host University/Institute: Politecnico di Milano

Research Keywords:	Droughts
	Social Media
	Socio-economic indicators
Reference ERCs:	PE6_10
	SH7_6
	PE6_11
Reference SDGs:	GOAL 10: Reduced Inequality, GOAL 13: Climate Action, GOAL 16: Peace and Justice Strong Institutions

Description of the research topic

Socio-economic costs of droughts are progressively increasing worldwide due to undergoing alterations of hydro-meteorological regimes induced by climate change. Although drought management is largely studied in the literature, traditional drought indexes (e.G. SPI, SPEI, SMRI, SRI, SSI) build on physical hydrometeorological variables and combinations thereof and might fail in detecting socio-economically critical events and quantify the actually perceived impact by society and associated distributional and societal equity. Besides, these indexes cannot be projected or forecasted and are thus useful for monitoring ongoing droughts, but cannot provide anticipatory capacity for managing future events.

This interdisciplinary research will develop a framework for collecting and analyzing information about droughts from different sources, supporting the study of drought management with new information extracted from social media to provide a richer set of information and methods for estimating socio-economical impact and costs and how they distribute spatially and socially. A data analysis pipeline to retrieve drought occurrences and perceived impact from social media will be developed. The goal of the social media analysis will be to extract visual information about drought events, developing innovative tools for an accurate selection of posts related to drought events and different types of impacts to be evaluated. Starting from a given goal of the analysis, the research will develop multilingual and location-based search mechanisms in social media. The pipeline will include methods for filtering and de-biasing extracted posts to gather visual evidence of drought events over the

years. From the collected information, the areas which are perceived as most critical in the posts will be identified and impact indicators will be assessed. The drought events and associated impact estimates retrieved from media will be contrasted with a broad range of physical drought indicator, including SPI and SPEI, and where available ad hoc indicators (Zaniolo et al., 2018) accounting for local regulation and water backup (e.G. Presence of snow, groundwater, or large storages). The focus will be on agricultural droughts at the EU continental scale using feature extraction algorithms for processing large, spatially distributed gridded datasets of candidate drought drivers and for constructing an ad-hoc index able to reproduce the drought impacts on agricultural production as captured by the Normalized Difference Vegetation Index, which is a remotely sensed index representing the crop growth state. The information derived from social media will be assessed, in particular in relation to possible biases, to completeness and uncertainty of information, combining inputs both from the physical drought indicators and an assessment of the indicators derived from the social media analysis. Improvement techniques for data collection from social media will focus on increasing the completeness of information, using also machine learning methods, in order to enrich the collected information to meet the final goal of this research to develop new indicators for the socio-economic impact of droughts.

Research team and environment

The research will be carried out at the Department of Electronics, Information, and Bioenginering (DEIB), Politecnico di Milano. DEIB is one of the major ICT university departments in Europe, with over 1000 members. DEIB facilities several high-performance computing facilities on site (PoliCloud) and free access to national supercomputing cores, and scientific publications. A large warehouse of case studies, models and software tools for planning and management of water resources is available. Beside traditional ICT areas, DEIB has a strong international reputation in cross-disciplinary fields, including the application of Systems Analysis and Control Theory to the field of water resources modelling, management and decision making. The selected candidate will conduct research between the Information Systems Open Lab (ISOLab, Prof. Barbara Pernici, who will supervise the thesis work) and the Environmental Intelligence Lab (EI-Lab, Prof. Andrea Castelletti, who will be a co-advisor for the thesis). The ISOLab activities include research themes on Big Data, Industry 4.0, and IS infrastructures. ISOLab provides access to several Cloud platforms and specific softwares (e.G., scientific simulations, social media analysis tools, such as VisualCit). ISOLab participates in and coordinates several EU-funded projects, in particular in the sector of social media analysis and data management and governance. The EI-Lab's mission is advancing environmental decision-analytics for supporting human decisions in complex engineering systems including multiple actors and exposed to evolving multisectoral demands and global change. EI-Lab participates in and coordinates several projects on topics relevant for the PhD programme in Europe, Asia, Africa, and North America.

During his research, the PhD candidate will collaborate closely and spend a period of 6 months at the Climate Observatory of the Regional agency for prevention, environment and energy of Emilia-Romagna (ARPAE) in Bologna, focusing the research on characterization and

management of extreme low waters using traditional indices, artificial intelligence and innovative digital tools (e.g. social media).

In addition a period of 6 months will be spent abroad at the Justus Liebig Universitaet Giessen, working on evaluating climate impacts. The university participates in the EU H2020 Project CLINT (Climate Intelligence: Extreme events detection, attribution and adaptation design using machine learning), coordinated by Politecnico di Milano.

For this scholarship it is planned a period of internship at *ARPAE Emilia-Romagna, Bologna*

Suggested skills for this research topic

Qualifications for this position include an M.Sc. in computer engineering or computer science. Candidates with a background in water resources engineering or other related fields of environmental engineering and environmental sciences are also encouraged to apply. Strong numerical and computational skills are required, as well as English language skills both in oral and written communication.

Type of scholarship and obligations

The type of this scholarship is: Pubblica Amministrazione (Public Administration). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.16

Curriculum: 2. Socio-Economic Risk and Impacts

Environmental awareness in the framework of sustainable development goals

Reference Person: Polinori Paolo (paolo.polinori@unipg.it)

Host University/Institute: University of Perugia

Research Keywords:	The economics of climate change and social preferences analysis
	Analysis of the interactions between climate change and socio-economic system
	Exploring climate change risks impact on society
Reference ERCs:	SH1_3 Microeconomics, behavioral economics
	LS9_6 Food sciences
	LS9_6 Food sciences
Reference SDGs:	GOAL 7: Affordable and Clean Energy, GOAL 8: Decent Work and Economic Growth, GOAL 12: Responsible Consumption and Production

Description of the research topic

This project analyzes the notion of Environmental Awareness (EA) from different and complementary dimensions (theoretical, empirical, experimental). The aim is to identify policy suggestions to contribute to the implementation of the Sustainable Development Goals and of the Next Generation EU that also strengthens the EU agricultural budget for 2021-2027 in order to promote sustainable development and mitigate the climate change. The theoretical dimension focuses on construction and simulations of models, also in a bounded rationality context, of consumer preference schemes and of firms' investment behavior. The empirical dimension focuses on the nexus between what consumers declare and what they actually do in terms of sustainable behavior. The analysis will focus on consumers' and firms' willingness to pay or willingness to accept (WTP/WTA) for the green product. The experimental dimension focuses on the estimation of EA into several sectors of green products. The research program includes survey analysis and experimental analysis, offering a special focus on several issues connected to the EA, such as energy sector, green attitude-behavior gap, water conservations issues, waste recycling, circular economy, agricultural issues. The vision is multidisciplinary, while entailing economic, psychological and social perspectives. The project plans to develop high level research on theoretical, applied and experimental dimensions and to make obtained results applicable to our society

and economic system, with the goal to spread awareness to the young society, to make them capable of building up stronger values of respect for human and environmental health. In particular, the project is designed to be able to identify (i) effectively implementable policy suggestions, (ii) guidelines for consumers and/or institutions (i.E. Schools), measuring and promoting EA among segments of the population (especially young). Furthermore, the project is designed to provide policy suggestions, guidelines, informative campaigns and best-practices (e.G. For public administrations, corporate sector, utility companies, regulatory authorities non-governmental organization, consumers, young students.

Research team and environment

The research team is interdisciplinary drawing from the fields of energy economics (Department of Economics, Perugia), political economics (Department of Economic and Legal Studies, Naples) and agricultural economics (Department of Agricultural, Food and Environmental Sciences, Perugia). Team is focused on high-quality research with frequent exchange between team members, the members of the department, and external academics and professionals. Furthermore, our team collaborates with Universities, Government bodies, European and International institutions in the fields of economic growth, energy and environmental economics. They have collaborated with the T20 Italy. The members of the research group are internationally recognized and have published several scientific papers in the leading international journals in their fields. They have participated in numerous national and international conferences of scientific relevance. The academic environment in which our team works includes doctoral fellows, research fellows and professors in a broad variety of research fields such as energy and environmental economics, regulatory economics, econometrics, behavioral economics, political economics, agricultural economics, mathematical economics, circular economy and transport policy.

The research group studies tools to promote local energy autonomy and the energy transition, focusing on the energy sector. Our activities include participation to national and international research projects, seminars with doctoral fellows and visiting professors, PhD workshops, and conferences. Department includes computer labs and rooms for doctoral fellows. Database access and a large variety of electronic journals in the fields of economics, finance, business, and statistics are also available.

Suggested skills for this research topic

Candidates should preferably have an academic background in economics or agricultural economics, analytical capabilities, ability to handle and analyze datasets and to perform quantitative research in econometrics and social sciences. Fluency in English is recommended. Ideally the successful candidate should have solid research training in relevant disciplines, and intellectual curiosity

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.17

Curriculum: 2. Socio-Economic Risk and Impacts

Transition towards more sustainable production and consumption in agri-food systems

Reference Person: Raffaelli Roberta (roberta.raffaelli@unitn.it)

Host University/Institute: Università di Trento

Research Keywords:	Greenhouse gases emissions Mitigation policy actions Farmers' and consumers' preferences
Reference ERCs:	SH1_12 Environmental economics; resource and energy economics; agricultural economics SH1_7 Behavioural economics; experimental economics; neuro-economics
Reference SDGs:	GOAL 12: Responsible Consumption and Production

Description of the research topic

A transition towards more sustainable food systems that are economically viable, socially inclusive and environmental-friendly is urgently needed (Runhaar 2021). While the EU Green Deal and the Common Agricultural Policy (CAP) set the general policy framework to make this transition happens at EU level, each member state has to develop and implement its specific policy responses. Unfortunately, there is a large gap in the understanding of lock-ins and levers that determine the success or failure of such policy responses in changing the behaviour of economic agents operating in the agri-food supply chains (Kuhmonen 2018).

This project aims at exploring factors and drivers that influence the farmers' and consumers' acceptability of policy interventions that were already implemented or could be operationalized in the short-medium term to facilitate this transition in Italy.

The project will focus on policy initiatives that are designed to reduce the production of greenhouse gas emissions (GHGs) or enhance carbon sequestration (eg. "carbon farming"). This focus is due to the fact that agriculture is an important emitter of GHGs and emissions from agriculture were growing over the entire 2000–2018 (FAO, 2021).

Thanks to a detailed review of the policy initiatives that could be designed at national level to reduce GHGs due to agriculture in the short-medium term, the most promising policy initiatives will be selected. The project will investigate farmers' and consumers' perceptions regarding the performances of these policy initiatives in terms of economic, social and environmental sustainability as well as their preferences for such policy initiatives. The

ultimate goal of the project is to identify lock-ins and levers that could affect farmers' and consumers' acceptability of these policy initiatives intended to reduce GHGs and curb climate change. Ultimately, this project will provide important information to policy makers and help to realize EU ambitions in terms of climate neutrality.

To address this topic both qualitative and quantitative research approaches are needed and primary and secondary data will be collected. Primary data will be collected by using stated preferences methods such as discrete choice experiments and economic experiments. Discrete choice experiments are a survey-based technique which is extensively used in the literature to elicit preferences for alternative policy actions (see for example, Cerroni et al., 2019), while economic experiments are the core of experimental economics, a discipline which is increasingly used to explore public policies related to the agriculture and the environment (Colen, et al., 2019).

Cerroni S., Notaro S., Raffaelli R. (2019) Beliefs and preferences for food-safety policies: A discrete choice model under uncertainty, European Review of Agricultural Economics, 46(5), 769–799.

Colen, L., Gomez y Paloma, S., Latacz-Lohmann, U., Lefebvre, M., Préget, R., & Thoyer, S. (2016) Economic experiments as a tool for agricultural policy evaluation: Insights from the European CAP. Canadian Journal of Agricultural Economics, 64(4), 667–694.

FAO (2021) Emissions due to agriculture Global, regional and country trends 2000–2018. Source: https://www.Fao.Org/3/cb3808en/cb3808en.PdfKuhmonen, T., (2018). Systems view of future of wicked problems to be addressed by the Common Agricultural Policy. Land Use Policy, 77, 683–695.

Runhaar, H. (2021). Four critical conditions for agroecological transitions in Europe. International Journal of Sustainable Agricultural Research, 19(3): 227-233.

Research team and environment

The research team is composed by three experienced agricultural economists, namely Roberta Raffaelli (full professor), Simone Cerroni (associate professor), and Sandra Notaro (associate professor), and two environmental economists (Carlo Fezzi and Michela Faccioli). They have extensive experience in carrying out discrete choice experiments (both in field and online) and economic experiments in the lab. The team is deeply involved in the PhD program in Sustainability: Economics, Environment, Management and Society (SUSTEEMS). It is an interdisciplinary doctoral program which addresses the complex issue of sustainability form an economic, environmental, and managerial point of view. This PhD program involves economists, agricultural economists, engineers, professors in business and management, jurists, and a sociologist. This program offers to PhD students 300 hours of advanced courses and a stimulating and supporting environment for carrying out their research. The Department of Economics and Management also hosts the Cognitive and Experimental

Economics Laboratory (CEEL). CEEL is an interdisciplinary research hub, involving scientific competences from economics, cognitive psychology, consumer and business research. CEEL provides a computer network of 24 terminals located in isolated cubicles. Ad-hoc software solutions are adopted to design and run the experiments. 12 cubicles are also endowed with a system to collect physiological measures like galvanic skin response. The latter is measured via the BIOPAC MP 160. CEEL also employs a lab technician who oversees all lab-related activities. In the CEEL the PhD students can design and carry out economic experiments.

Suggested skills for this research topic

The candidate should have a strong background in agricultural and environmental economics, quantitative methods including survey based research and experimental economics.

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.18

Curriculum: 2. Socio-Economic Risk and Impacts

Water-in-food, conflicts, and migrations

Reference Person: Riccaboni Massimo (massimo.riccaboni@imtlucca.it)

Host University/Institute: IMT School for Advanced Studies Lucca

Research Keywords:	Virtual Water Conflicts Migrations
Reference ERCs:	SH1_2 SH7_2 SH7_6
Reference SDGs:	GOAL 2: Zero Hunger, GOAL 10: Reduced Inequality, GOAL 12: Responsible Consumption and Production

Description of the research topic

This is an interdisciplinary research project that analyzes the causes and consequences of the water-in-food trade and the socio-economic impact of water scarcity. Water is virtually embodied in many commodities, especially food and beverages. Therefore, international trade represents a way to transfer water across borders. In principle, the water-in-food trade could enhance water efficiency by saving water in water-scarce countries which can import virtual water. Also, human migrations might be beneficial to the water endowments of origin countries for reducing the pressure on local resources. In previous studies, we have found that this vision is over-simplistic since trade and migration patterns depend on complex economic, political, social, demographic, and environmental drivers. For instance, in Metulini et al. (2016) we show that migrants strengthen the commercial links between countries, triggering trade fluxes caused by food consumption habits persisting after migration. Sometimes, when the water suitcase of migrants exceeds the water footprint of inhabitants, migration flows turn out to be detrimental to the water endowments of origin countries. On the other hand, we find that water-in-food imports in water-scarce countries help in reducing conflicts and refugee movements (Metulini, Riccaboni, and Serti, 2020). Water availability is tightly linked to Food security, intended as the ability to meet the energy needs of the world population. At present, however, there is limited knowledge of how virtual water trade affects food security. The main goal of this project is to analyze real-world data (remote sensing, trade, migration, wars, and conflicts) to simulate future scenarios of virtual water trade and its impact on sustainability. More specifically, the main objectives are (a) a better understanding of the global dynamics of water-in-food flows and (b) the evaluation of the

impact of such flows on food safety and sustainability. The project aims to inform the policy agenda of international agencies (e.G., FAO, WTO, OECD) as well as regional and national authorities to reduce the water footprint of trade and to enhance sustainable trade.

Research team and environment

The research will be conducted in an interdisciplinary environment at IMT School of Advanced Studies in Lucca. The research team is made up of the members of the AxES research unit at IMT Lucca (axes.Imtlucca.It) led by Prof. Riccaboni. The Laboratory for the Analysis of CompleX Economic Systems (AXES) is a research unit whose work spans different fields of economics: from economic theory to applied econometrics, from international economics to political economy, from spatial and urban economics to industrial organization and business economics. We all share a common interest in original socio-economic research that provides information critical to policy-making with a problem-solving approach. In our research, we incorporate skills and tools from different disciplines, including network theory, the physics of complex systems, data science, decision science, or political science. In fact, we believe that a modern approach in economics requires considering the solution of economic problems more important than sticking to academic disciplines. Under such a multidisciplinary perspective, we strive to utilize the most recent developments in big data and machine learning, seeking to combine them with more traditional econometric approaches in our research.

Suggested skills for this research topic

The ideal candidate has a background in economics, social or political sciences with an interest in international studies and sustainability. Good command of statistics, econometrics, or numerical methods will be a plus.

Type of scholarship and obligations

The type of this scholarship is: Transizioni Digitali ed Ambientali (Digital and Environmental Transitions). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.19

Curriculum: 2. Socio-Economic Risk and Impacts

Sustainable mobility: models, methods and case studies.

Reference Person: Rotaris Lucia (lucia.rotaris@deams.units.it)

Host University/Institute: Università di Trieste

Research Keywords:	Sustainable logistics Acceptability of sustainable mobility policies Sharing mobility
Reference ERCs:	SH7_9 Energy, transportation and mobility SH7_6 Environmental and climate change, societal impact and policy SH1_12 Environmental economics; resource and energy economics; agricultural economics
Reference SDGs:	GOAL 11: Sustainable Cities and Communities, GOAL 12: Responsible Consumption and Production, GOAL 13: Climate Action

Description of the research topic

Improving the sustainability of the transport system is a major challenge for the EU since a quarter of EU's greenhouse gas emissions are due to transport activities whose environmental footprint continues to rise as transport demand grows. The EU goal is to reduce by 90% the greenhouse gas emissions produced by the transport sector by 2050. The research project should be focused on how production and consumption models should change to reach this ambitious goal and on the policies that should be introduced to support this change. The acceptability of such transport supply and demand management measures should be tested and evaluated taking into account the producers' organizational and resource constraints and the consumers' socio-psychological constructs and latent attitudes.

The research project could also assess the environmental impact caused by both the production and the consumption of transport services analyzing which technological or organizational innovations could reduce it. The wide spreading paradigm of the sharing economy is significantly changing the way in which transport services are supplied and used both in densely inhabited urban areas and in peripheral rural areas. However, very little is known on the impact that these cooperative forms of transport services produce in terms of social inclusion, environmental impact, public transport use and car ownership. The research project should further explore these issues.

The research project could be aimed at studying how innovative systems for collecting, integrating, sharing and distributing products and information could be designed in order to optimize the agri-food supply chains, a sector where the adoption of the circular economy paradigm seems more promising. With reference to this specific sector, best practices of short supply chains and alternative food networks, besides the estimation of local food demand and "food miles" could be studied. The research should be aimed at analyzing how to increase the value shared by all the members of the supply chain (with particular attention to farmers' income) while improving the environmental and social sustainability of the agri-food sector. A special focus could be made on reverse logistic activities, since they allow to increase material productivity while reducing the environmental impact by ensuring that end of life products and materials used to transport inputs, components and final products that are reintroduced into the business system. Indeed, logistics service providers are increasingly looking at reverse logistics as an additional business opportunity.

An additional research topic could deal with the use of biofuels, e-fuels and green and clean energy vehicles within the supply chains for freight transport. Indeed, cost-benefit analysis and life cycle assessment of the environmental impacts produced by sustainable reverse logistics and clean energy freight vehicles of critical supply chains such as the agri-food one is seldom performed and should be further studied. The role played by consumers in fostering the transition of the supply chains and the logistic activities toward more sustainable models should be studied too.

Research team and environment

The research team is interdisciplinary drawing from the fields of transport economics, political economics, regional economics and agricultural economics. Our team is focused on high-quality research with frequent exchange between team members, the members of the department, and external academics and professionals. The unique academic environment in which our team works includes doctoral fellows, research fellows and professors in a broad variety of research fields such as economic geography, labour economics, behavioral economics, international macroeconomics, financial economics, econometrics, business management and organization, statistics and mathematics. Our activities include participation to national and international research projects, seminars with doctoral fellows and visiting professors, PhD workshops, and conferences. The recently renewed building hosting the Department and located within the main campus of the University of Trieste includes computer labs, three thematic labs in Innovation and Technology Transfer, Merceology and Economic and Political Geography, and rooms for doctoral fellows. Database access and a large variety of electronic journals in the fields of economics, finance, business, and statistics are also available.

Suggested skills for this research topic

Candidates should preferably have an academic background in applied economics, analytical capabilities, ability to handle and analyze datasets and to perform quantitative research in econometrics and social sciences. Fluency in English is recommended.

PhD SDC
SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE

Scholarship code

CU2.20

Curriculum: 2. Socio-Economic Risk and Impacts

The role of Public Administration in the transition towards a sustainable and circular bioeconomy: policies, practices and assessment methods.

Reference Person: Salomone Roberta (roberta.salomone@unime.it)

Host University/Institute: University of Messina

Research Keywords:	Circular bio-economy
	Public administration
	Sustainability assessment
Reference ERCs:	SH7_6 Environmental and climate change, societal impact and policy
	SH1_10 Management; strategy; organisational behaviour
	SH1_9 Industrial organisation; entrepreneurship; R&D and innovation
Reference SDGs:	GOAL 7: Affordable and Clean Energy, GOAL 12: Responsible Consumption and Production, GOAL 13: Climate Action

Description of the research topic

Achieving a sustainable and circular bioeconomy (BE) is among the EU's priorities. The link between BE and the circular economy is highly emphasized and often associated with the implementation of a sustainable production model, but the effects that new processes and new cascade recycling applications could have in terms of GHG and other emissions are not yet fully known. In fact, it is not taken for granted that circular BE strategies always and in any case involve an improvement in sustainability performances.

In addition, a sustainable and circular bioeconomy requires innovative technical solutions, but also a proper policy structure and administrative guide able to stimulate a change of production and consumption patterns and the use of waste and recycling material, taking into account possible rebound effects. Thus, understanding the Public Administration (PA) role in the transition towards a sustainable and circular bioeconomy is key because PA should promote, facilitate and enable the transition to a circular and climate-neutral economy. Indeed, PA should ensure a system change across decision-takers, as well as define proper assessment methods able to measure the sustainability of circular bio-based products and processes able to capture complexity and interdependencies, and provide a comprehensive

and objective balance useful to address the sustainability of integrated production and consumption systems.

Candidates are invited to present research proposals which may investigate one or more of the various areas of the bio-economy, may refer to different levels of Public Administration and government approaches (local, regional, national, international), and may have various object of analysis (cities, materials, technologies, etc.), but should always focus the attention on the sustainability assessment of the investigated circular bio-economy strategies/options and how PA can promote, facilitate and enable the transition.

Thus, the main goals of the proposals within this call should be oriented in the understanding of: a) circular bioeconomy initiatives and approaches, adopted by the PA in their operational and strategic activities; b) successful policies and practices able to accelerate the transition; c) assessment methods useful in measuring the extent of the sustainability of circular bio-economy strategies/options. Other related goals could be explored only if focused on the organization and strategic management of PA for the development of an integrated territorial system of circular bio-economy supply chains.

Research team and environment

The research will take place at the Sustainability Lab, of the Department of Economics of the University of Messina. The Sustainability Lab is a study and research laboratory for corporate sustainability and Life Cycle Management, equipped with 5 computers, 4 printers, 1 server. Software: SimaPro Analyst, GaBi Professional, Adobe Acrobato 20 Pro, DeltaGraph, Nvivo, Vensim Pro, VOSviewer. Database: Ecoinvent 3 for SimaPro, Social Hotspot Database (SHDB) for SimaPro, Product Social Impact Life Cycle Assessment (PSILCA) for SimaPro, Ecoinvent 3 for GaBi. At the moment the researchers working at the Sustainability Lab are involved in the following projects: CRESTING CiRcular Economy: SusTainability ImplicatioNs and Guiding progress - Marie Skodowska Curie (MSCA) Innovative Training Network - European Commission (2018-2021) G.A. No 765198 - UNIME partner - http://cresting.Hull.Ac.Uk ELETTRORIGENERA Regenerative electrolysers for the conversion and accumulation of surplus electricity from renewable sources in hydrogen and efficient reuse of energy in residential applications - P.O. FESR SICILY 2014/2020, Action 1.1.5 - UNIME partner - PRIN 2017 "Promoting Agri-Food Sustainability: Development of an Italian Life Cycle Inventory Database of Agri-Food Products" (ILCIDAF) - PRIN 2017EC9WF2_002 - UNIME partner THALASSA - TecHnology And materials for safe Low consumption And low life cycle cost veSSels And crafts - PON "Research and Innovation 2014 and 2020" and FSC - Progetto ARS01_00293 - CUP B46C18000720005

Suggested skills for this research topic

We are looking for candidates with a background or experience within at least one of the following areas: Sustainability Management, Industrial Ecology, Industrial Management, Environmental Sciences, Sustainability Assessment. The person we look for is expected to

have: Good command of written and verbal English; Proficiency in advanced computer skills including Microsoft Word, Excel, PowerPoint and Outlook, as well as other products included in Microsoft Office 365 Business; Ability and willingness to work in collaborative, multi-disciplinary environment, with an inter-disciplinary approach and interest, and preferably with documented experience of both quantitative and qualitative research work; availability to stably work in Messina but also to travel and move whenever required; knowledge and understanding in environmental systems analysis, like life cycle assessment, is seen as a merit; proven record of designing and writing scientific publications is desirable but not required.

Type of scholarship and obligations

The type of this scholarship is: Ricerca PNRR (PNRR Research). This scholarship is funded by the Italian National Recovery and Resilience Plan (PNRR) of the Next Generation EU Fund. The definitive assignment of the scholarship is subject to the positive verification of eligibility and to the final confirmation by the Ministry of University and Research (MUR). The acceptance of the scholarship entails additional obligations as set out by art. 9 of the announcement.