UNIVERSITÀ DEGLI STUDI FIRENZE

Finanziato dall'Unione europea NextGenerationEU

MUR

DEVELOPMENT ECONOMICS AND LOCAL SYSTEMS (DELOS)

Director prof. Donato Romano

CUP	D.M. 351/2022	B12B22000360007

D.M. 351/2022	Public Administration				
TITLE OF THE SCHOLARSHIP	**Effects on socio-demographic, nutrition and health indicators of health reforms and exogenous environmental, economic and conflict shocks**				
RESEARCH TOPIC	Shocks related to climate change, health and economic crises, and conflicts have become increasingly frequent in recent years. Such events usually produce adverse effects on the well-being of individuals, especially in contexts where insurance and credit markets are absent or dualistic, or where public social protection programmes are weak. The absence of formal institutions often leads individuals and communities to resort to informal institutions as a form of livelihood, which, in some cases (e.g. child labour, polygamous marriages, early marriage and pregnancy), have further medium- and long-term negative effects on human capital. The implementation of socio-economic or health reforms can limit these multiple effects. Using quasi-experimental or non-experimental econometric tools, and combining household survey data with geo-referenced climate and conflict data, this project aims to study the effects of health reforms, and exogenous environmental, economic or conflict-related shocks on socio-demographic, nutritional and health indicators by identifying possible heterogeneities within a given population. Furthermore, the underlying mechanisms that would explain such effects and possible heterogeneities will be researched.				
MANDATORY EXPERIENCES		**INTERVIEW**			
COMPANY / PUBLIC ADMIN. / RESEARCH CENTER (months)	**ABROAD (months)**	**LANGUAGE**	**DATE**	**TIME**	**MODE**
6	6	english	August 23rd 2022	09:30 a.m.	Remotely (videocall)

D.M. 351/2022	Public Administration
TITLE OF THE SCHOLARSHIP	**Learning and transfers of regional digital transition policies**
RESEARCH TOPIC	The digital transition requires strong policy support. In turn, policymakers need guidance for action, which to some extent can be based on the outcomes of evaluating past interventions. However, the results of evaluations of the same

		intervention to support the digital transition carried out at different points in time or in different socio-economic contexts might not be directly comparable, even if the beneficiaries of the incentive had very similar characteristics. Previous research aimed at identifying elements that had led to successful policy replication from one place to another has been mainly qualitative. Only in recent years, the literature has begun to examine methodological solutions to assess the transferability over time or across space of estimates of policy effects. However, this literature is still in its infancy and still lacks significant empirical applications. Our research project aims to fill this gap. We focus on the geographical transferability of the results of previous quantitative evaluations related to policies supporting the digital transition of firms, and we analyze: i) to what extent can impact estimates related to a policy implemented in places with certain characteristics be generalised or transferred to places with partially different characteristics? ii) How can policies be adapted from strong territorial contexts (e.g., clusters or regions that are leading the technological transition) to weaker ones? The empirical analysis will focus on regional policies adopted in Europe.			
MANDATORY EXPERIENCES		**INTERVIEW**			
COMPANY / PUBLIC ADMIN. / RESEARCH CENTER (months)	**ABROAD (months)**	**LANGUAGE**	**DATE**	**TIME**	**MODE**
6	6	english	August 23rd 2022	09:30 a.m.	Remotely (videocall)

D.M. 351/2022	Public Administration
TITLE OF THE SCHOLARSHIP	**Micro-macro modeling for development policy simulations and impact analysis**
RESEARCH TOPIC	Macroeconomic models (like computable general equilibrium – CGE) are often combined with microsimulation (MS) models to perform distributive impact analysis for fiscal or structural policies, or external shocks. This type of combined CGE-MS models has been used widely to evaluate the distributive impacts of macroeconomic shocks and policies such as public expenditures (changes in size or composition), tax/subsidy policies, structural reforms such as trade liberalization, privatization and labor market reforms, and global price and climate shocks. CGE (or other aggregate) models allow the modeller to focus on winners and losers at the sectoral level, and to estimate the impact on macroeconomic variables and general equilibrium price effects. However, they are not an adequate tool to perform distributional analysis given the lack of individual/household results and the representative agent assumption. On the other hand, MS models focus on household and/or individual behaviour. They are the key methodology to capturing distributional effects of a policy change due to heterogeneity at the household or

		individual level. Similar ex-ante approaches can be particularly useful to assess the heterogeneous effects of economic reforms carried out to curb the impact of a health crisis (e.g., COVID-19 confinement measures) or to oppose a conflict crisis (e.g., interruption of gas import from Russia). Likewise, to invest public money effectively, they are also critically important to size the macroeconomic and distributive effects of recovery measures. This project aims to improve the use of such analytical tools and provide new evidence on the macro and microeconomic effects of socio-economic policies that are key to development.			
MANDATORY EXPERIENCES		**INTERVIEW**			
COMPANY / PUBLIC ADMIN. / RESEARCH CENTER (months)	**ABROAD (months)**	**LANGUAGE**	**DATE**	**TIME**	**MODE**
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MUR

INFORMATION ENGINEERING

Director prof. Fabio Schoen

CUP	D.M. 351/2022	B12B22000420007
	D.M. 352/2022	B12B22000570007

D.M. 351/2022	NRRP Research
TITLE OF THE SCHOLARSHIP	**Study of physiological correlates acquired through wearable systems**
RESEARCH TOPIC	**RESEARCH TOPIC:** For the past few years, what seemed like absolute certainties have been becoming sources of concern. The idea of steady progress, eradication of disease, peace and widespread prosperity is becoming a concern about the climate, successive economic crises, increasingly extreme social inequalities and, more recently, pandemic and war. However, difficult times can offer resilience and opportunity for people, communities and societies. We need to focus our efforts on increasing communities' economic, energy and climate change resilience. The conflict between Russia and Ukraine is directly and indirectly forcing a "rethinking" and redesigning the energy supply chain and consumption dynamics. This new era also offers an opportunity to reduce our impact on the environment and address climate change with an urgency never before experienced. Influencing citizens' environmental behaviors will provide concrete economic, distributed and collective benefits. The purpose of this research theme stems from a simple concept: instead of returning to the "old" fossil energy sources (coal, oil), thus abdicating the recent COP26 agreements in Glasgow, we should tap into the greatest potential the world has: social engagement. The ambitious vision of the fathers and mothers of "The Internet of Things" was to create a pervasive Internet capable of supporting end users in their daily lives, empowering them through the extraordinary computational power of artificial intelligence and machine learning and the exploitation of distributed information within their environments. Probably the most important missing pillar of the technological era of the Internet of Things, which has caused its partial failure, has been a "bad approach" to citizen involvement and participation. The adoption and diffusion of disruptive technologies (e.g., smartphones) involve complex social dynamics mediated by many factors, such as technological readiness and effectiveness, ergonomics (perceptual, cognitive, psychosocial), ease of use, and affordability. This overall vision necessitates the design and development of platforms to support the mitigation of sustainability, energy consumption, and climate change. Enabling the interaction of several key scientific fields, including psychology, cognitive science, computer science, bioengineering, and game design, facilitating linkage between academia and business in a multidisciplinary way to enable advanced immersive multi-sensory (XR) reality, the content of which will be able to support the reduction of energy consumption and environmental footprint of citizens, and enabling interaction with real-time contextual information triggered by intuitive sensory triggers (e.g., visual and auditory). Underlying the development is the understanding of the state of the subjects involved through the implementation of

	models for the interpretation of electrophysiological correlates that will allow an investigation of the activity of autonomic and central nervous systems, which combined with game-based learning, Artificial Intelligence (A.I.) and Machine learning models, and visualization tools, biosensing systems, and distributed computing will be able to: (1) improve the immersiveness, accessibility, engagement, and participation of end users.(2) employ new technologies to address complex societal problems (e.g., climate change) in line with the European Green Deal program. One of the most challenging goals will be to improve the robustness and accuracy of current mapping and positioning systems (in real and virtual environments). The main measurable outcomes of the research should aim to develop models to describe cognitive load, sustained and focused attention, fatigue, emotional load, valence and arousal, immersiveness, readiness to change, and implicit attitudes. This will allow for a fundamental assessment of the affordance and ergonomics of the users' extended reality (XR) experience and produce a plethora of biofeedback from users that is critical to creating an A.I. designed to support the user and adapt the XR. **PhD project:** Specifically, the doctoral project should aim to assess the psychophysiological state of users to infer the level of cognitive load, engagement, fatigue and emotional response. Research results have shown many studies on emotional detection in social contexts. These results were achieved due to significant efforts in developing new technologies and advanced biomedical signal processing methods to correctly measure internal user reactions (e.g., emotions) exploited by humans in specific situations.Such technologies have been instrumental in noninvasively measuring the central and autonomic nervous system (CNS and ANS) response induced by human reactions. The project should investigate the CNS through electroencephalographic acquisition systems and information acquired from eye pattern (i.e., gaze and pupil size dynamics). At the same time, the ANS can be examined through physiological signals (e.g., HRV, SpO2, blood pressure). Furthermore, the literature suggests that the evolution of cognitive and emotional dynamics is often neither predictable nor linear, revealing a complex structure of hidden inter-individual relationships. Indeed, many biological systems have been described as nonstationary, and the biological processes that regulate cognitive load, attention dynamics, emotional state, and fatigue in humans follow the same rules. It is noteworthy that human emotions have been studied using Dynamic Systems Theory (DST), often applied to describe complex, nonlinear biological phenomena (i.e., where complex mathematical laws can characterize the cause-and-effect relationship). The project through the application of DST to physiological data should aim to discriminate cognitive load, attention dynamics, emotional state and fatigue over time. The results will be the input to AI models for psychophysiological assessment. Specifically, the project will need to design Machine Learning and Deep Learning models, based on physiological results, for recognition and prediction of users' levels of engagement and attention of emotion, and to study the direction of information transferred during game-based experimental phases.Causality and complexity relationships will play a crucial role in 'AI learning during the dynamics of cognitive and emotional engagement of humans during gamification. In addition, new information technologies (especially social media), it is now possible to harness the intelligence of huge numbers of people, and games ("serious games") are beginning to be used with the purpose of social change. Literature has shown how

		these games may be able to educate and guide players' behaviors, especially when new technologies widely used by citizens support them (e.g., smartphone apps). Some of them ncluded learning about complex systems and increased concern about climate change (e.g., World Climate Simulation; ClimateKids; ClimateChallenge). With this in mind, the research project will be able to leverage research findings to create experimental conditions based on gamification in virtual or extended reality contexts. These may focus on specific issues related to climate change and energy conservation			
MANDATORY EXPERIENCES		**INTERVIEW**			
COMPANY / PUBLIC ADMIN. / RESEARCH CENTER (months)	**ABROAD (months)**	**LANGUAGE**	**DATE**	**TIME**	**MODE**
-	6	italian/english	August 25th 2022	09:30 a.m.	Remotely (videocall)

D.M. 352/2022	Scholarships co-funded by Companies
TITLE OF THE SCHOLARSHIP	**Advanced Doppler echographic methods**
RESEARCH TOPIC	Esaote is an international company involved in the research, production, and marketing of technological solutions for applications in the healthcare field. Today Esaote is a leading industrial group that supplies medical imaging systems for ultrasound and magnetic resonance, integrated with Information Technology solutions for healthcare. The company, based in Italy, has production sites and research and development laboratories in Genoa, Florence, and Maastricht (Holland). Furthermore, through an international network of branches and distributors, it operates in more than 80 countries around the world. Esaote dedicates about 20% of its resources to the research and development department, which has a long experience in ultrasound technology, and in the development of new imaging techniques. The proposed research topic, in line with Esaote's interests, has the general goal of studying, developing, and implementing advanced Doppler-type signal processing methods on ultrasound systems. In particular, the focus will be on ""ultrafast"" flowmetry and vector Doppler. Research topics of interest include: 1) the definition of multi-angle transmission and coherent recombination strategies in reception for high frame rate imaging 2) the development of post-processing algorithms for the quantitative estimation of the direction and speed of blood flow and the generation of two-dimensional maps over an extended area 3) the implementation of these algorithms on commercial ultrasound scanners 4) the test of the new algorithms, through simulations and experiments based on phantom and, where possible, on pre-clinical tests (in vivo tests)
COMPANY	ESAOTE Spa

MANDATORY EXPERIENCES		INTERVIEW			
COMPANY (months)	ABROAD (months)	LANGUAGE	DATE	TIME	MODE
6	6	italian/english	August 25th 2022	09:30 a.m.	Remotely (videocall)