CALL FOR SELECTION OF N. 10 VERA INTERNSHIP GRANTS AND N. 2 INTERNSHIP GRANTS IN MEMORY OF VALERIA SOLESIN AT THE DEPARTMENT OF ECONOMICS - A.A 2019/2020

Art. 1 – Scope
1.1 The Department of Economics, within the new Center VERA (Venice center in Economic and Risk Analytics for public policies), offers students enrolled in its Master's Degree Courses internship projects to promote the development of professional and research skills useful for their orientation and subsequent labor market integration.

1.2 Twelve grants are available. The maximum duration of the internship periods will be 4 months and a commitment of about 300 hours that will be agreed with the tutor of the project. The internships will take place between January and June 2020. The total funding for each internship will be € 1.843,31 (gross salary). Each internship project, including specific objectives, required knowledge and skills as well as the intern tutors, is described in Annex A, which is an integral part of this call.

1.3 The internship project n.17 and n.18, related to the role of women in the labor market and society, are dedicated to the memory of Valeria Solesin. In addition to the internship grant, the two projects forecast a study period abroad, at the University of Oslo. Students holding the two internship projects n.17 e n.18 will have the opportunity to attend the summer school on Gender Equality in the Nordic Countries, organized by the International Summer School of the University of Oslo (Norway), www.uio.no/english/studies/summerschool, that will take place in Oslo from 20 June -31 of July 2020. The grant for the enrollment to the summer school will be of Euro 2.953,33 (gross salary) and will cover the on campus fee of NOK 26,500 / USD 3,270 that includes room and board on campus, medical insurance and extracurricular activities. The grant will be paid in two instalments: the first instalment at the enrolment time and the second instalment once the student get back to Italy, and after having verified the results obtained during the study period abroad. The grant for the enrollment shall be withdrawn when the student for any reasons does not attend the summer school.

1.4 The internship will take place at the Department of Economics.

1.5 On request of the student, the internship activity can be validated as the compulsory internship to acquire university credits planned in the Department of Economics Master’s degree program to which the student is enrolled.

Art. 2 – Admission requirements
2.1 The call is reserved for students regularly enrolled in the Department of Economics Master's Degree Courses for the 2019/2020 academic year and for students regularly enrolled for the 2018 /2019 academic year that are committed to graduate by March 2020, during the extraordinary session of the 2018/2019 academic year.

2.2 If students already receive a grant economically incompatible with the grant of the present call, they can apply and, if the merit requirements are met, they can decide to carry out the internship project renouncing the grant. The total numbers of internships cannot exceed 14 (12 with grants and 2 without grants), therefore the acceptance of internship applications "without grant" should be subject to the compliance of such limits.
2.3 These requirements must be met by the deadline indicated in the following art. 3. Please note that the student status must be held also at the moment of internship acceptance.

**Art. 3 – Applications**

3.1 Applications must be submitted no later than **9th December 2019 at 12.00** by one of the following procedures:

   a) Delivery by hand to the Secretariat of the Department of Economics, San Giobbe, Cannaregio 873 (hours: Monday – Friday, 10 am - 1 pm); Contact for VERA Center, Marianna Morelli, office D.005;

   b) Sending to the following Address of Certified Electronic Mail (CEM): protocollo@pec.unive.it. Please consider that the message can only be sent by another Certified Electronic Mailbox; the application sent by a non Certified mailbox cannot be considered valid. Documents must be attached in PDF format only;

   c) Sending by ordinary e-mail to the following address: centro.vera@unive.it. Documents must be attached in PDF format only;

   d) Sending by certified mail with return receipt to the following address: Università Ca’ Foscari - Dipartimento di Economia, San Giobbe, Cannaregio 873, 30121 Venezia. In this case, please note that the date considered as proof is the date of receipt and **not the postmark date**.

3.2 The application form must include also the following documents:

   - Dated and signed Curriculum vitae
   - Self certification of exams taken (date of exams, marks and numbers of university credits – CFU, **Crediti Formativi Universitari**) as well as the weighted average exam marks
   - Motivation letter, using the format attached to this announcement
   - Scanned copy of a valid ID document.

3.3 Applications received after the deadline or applications received through other procedures, or unsigned applications will not be considered valid.

3.4 The University is not responsible for any failure to receive communications due to incorrect or incomplete indication of address by the applicant or to the lack of or the untimely communication of change of address, as well as possible postal mistakes not attributable to the fault of the administration itself.

**Art. 4 – Commission and selection of applicants**

4.1 A commission appointed by Decree of the Department Director will evaluate the candidates on the basis of their qualifications and motivation letters.

4.2 In a preliminary session, the Commission will define the evaluation criteria and the scoring rules for the professional and academic curriculum vitae and for the motivation letter, as well as the minimum threshold for grant eligibility.

4.2 The ranking list will be formulated on the basis of the following criteria:

   - weighted average exam marks;
   - numbers of University credits (**CFU, Crediti Formativi Universitari**);
   - evaluation of the Curriculum Vitae;
   - evaluation of the motivation letter that should set out in particular the student’s interests, the coherence between academic background and the activities and objectives of the internship projects, as well as the preferential qualifications/skills and knowledge required for each project (See Annex A).

4.3 Applications from candidates that were beneficiaries of the VERA grant in the previous call will be accepted but in the selection procedure priority will be given to candidates that never received the VERA grant.

4.3 The following applications will be excluded from evaluation:

   - Applications which do not comply with the admission requirements of the announcement
Applications which do not comply with the instructions indicated in art.3

Art. 5 – Ranking list
5.1 At the end of the evaluation process, the Commission will draw up a ranking list in order of decreasing scores of each candidate.

5.2 The ranking list will be published on the web site of the Department of Economics at the following web address www.unive.it/vera, Vera Academy section, no later than the 17 December 2019.

Art. 6 - Assignment of grants
6.1 At the end of the evaluation process, the Secretariat of the Department of Economics will notify the selected candidates, communicating the starting date of the internship grant.

6.2 The winners will have to send their acceptance (via e-mail to the following address: centro.vera@unive.it) within 5 days from notification. If a candidate turns down a grant, it will be assigned to the candidate ranked next.

6.3 Grants will be paid in one single instalment at the end of the internship after the submission of the final report approved by the academic tutor.

6.4 The assignment of Internship grants is subject to the possession of student status at the beginning of the internship period.

Art. 7 – Obligations for winners
7.1 Winning students, with the support of the "company" and academic tutors, must, as a condition of the grant, agree to carry out the approved procedures to set up their internship, to prepare training projects and all the related administrative procedures.

Art 8 - Incompatibility
8.1 The present grant can be received in conjunction with any other grants except in case of express incompatibility specified by applicable law, Regulations of the University and other specific calls in which the candidates participated (See Art. 2.2)

Art. 9 – Cross-reference
9.1 For any relevant matters not mentioned in the call, reference is made to the current University Regulation for the assignment of grants, study awards and incentives to students to sustain enrollment for courses and other specific learning activities.

Art. 10– Person in charge of the procedure
10.1 The person in charge of the selection procedure, within Law n.241/1990, is the Secretary of the Department of Economics, Ing. Silvia Lovatti. For further information concerning the selection procedure, please send an e-mail to centro.vera@unive.it

Art.11 – Processing and protection of personal data
11.1. Personal data sent by the candidates with the application forms will be processed according to national and European legislation (Italian Legislative Decree n. 196/2003 and Regulation EU 2016/679). For further information https://www.unive.it/pag/36610/.

Department Director
Prof. Monica Billio

Person in charge of the procedure
Ing. Silvia Lovatti
ANNEX A

1. INVESTING IN A SMART GRID UNDER UNCERTAINTY: THE PROSUMER’S PERSPECTIVE

PROJECT DESCRIPTION:
The fellow will support a research project aiming to evaluate i) the economic benefit that a prosumer of solar energy can derive from the exchange of energy with other agents present in the network and ii) its impact on his investment choices (plant capacity, investment timing, etc.). The fellow will be asked to collect data relative to buying and selling energy prices in the Italian electricity market. S/he will then test their consistency with respect to specific stochastic processes that are assumed to illustrate their diffusion. Further, in order to calibrate the theoretical model set up by the applicant, s/he will be asked to collect data relative to the installation costs of the technology to be purchased (photovoltaic system, devices for the smart node control unit, etc.). Once calibrated the model using the collected data, the fellow is expected to execute the final numerical exercise relative to the optimal investment choice.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Solid knowledge of Econometric and Statistical Methods. In addition, familiarity with the theory of option’s pricing would be appreciated. Practical ability in the use of i) a calculus software such as Mathlab or Maple and ii) an econometric software such as STATA, E-Views or SPSS.

TUTOR: Luca Di Corato (estimated start date: 15 February 2020)

2. INTELLIGENT SYSTEMS FOR FINANCIAL TRADING: NEW REWARD FUNCTIONS

PROJECT DESCRIPTION:
The objectives of the requested scholarship are the implementation and application of automated financial trading systems to portfolio management based on the machine learning technique known as Reinforcement Learning. In particular, one means to address the research on the reward function, that is on the function which gives a negative or a positive reward. The most used in the literature is the well known Sharpe ratio. Although such a ratio is a celebrated risk-adjusted performance measure, it is not able to capture both some aspects characterizing the current academic researches on these measures and the practices and rules taken into account by the portfolio management industry. Some simple reward functions alternative to the Sharpe ratio have been proposed, but they are insufficient. Because of all this, we intend to focus on the specification of reward functions which are jointly theoretically founded and operatively effective.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Familiarity with Matlab programming language

TUTOR: Marco Corazza (estimated start date: January 2020)

3. THE GENDER GAP AND THE ITALIAN MATHEMATICAL OLYMPIAD

PROJECT DESCRIPTION:
The student will support a research project aiming to analyse the causes of women’s lower representation in the STEM field. The project will include the preparation and analysis of a dataset containing the data collected in a field experiment run during the current year at the “Math Olympics” an annual competition organized by the Unione Matematica Italiana in several Italian high schools. The student will be asked to manage a dataset containing the answers given by about 10.000 students to an on-line Qualtrics questionnaire, according to the guidelines given by the research team. The dataset needs also to be merged with another dataset so experience in managing data and a good knowledge of Stata is required.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Experience in managing dataset of medium dimension (i.e. 10,000 units) is important. A good knowledge of Stata is required. Having familiarity with the functioning of a randomized field experiment is a plus.

TUTOR: Valeria Maggian (estimated start date: 13 January 2020)

4. NATURAL RESOURCES AND TERRITORIAL SUSTAINABILITY

PROJECT DESCRIPTION:
The project follows the previous research project “Enhancement of natural resources with a view to environmental sustainability”. In an increasingly frequent way, climate changes consequences, exacerbating the concerns of different regions and countries as an example within the European Union, require a deeper knowledge of existing local natural resources, of their strengths and weakness.
The aim of the research work is the reconstruction of the cognitive framework at different territorial levels through indicators (environmental, social, economic), necessary for identifying suitable sustainable strategies in a bottom-up perspective.
The research activity is developed in different steps:
1. updating of the existing bibliography on natural resources and construction of a summary scheme;
2. updating of databases and collection of existing data of natural resources in different territorial areas;
3. critical analysis of the methods used in the literature for the processing of the collected data (see the previous step);
4. identification of new methods for processing the collected data and application hypotheses.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
- have passed at least one of the exams of the list: Commodity Markets, International Trade of Commodities, Economics of Rural Development, Economia e Gestione dell’Azienda Agraria e Agroindustriale
- have passed at least one of the exams of the list: Optimization, Mathematical Models for Decision Making, Laboratorio sulle Scelte, Econometria, Laboratorio di Econometria, Econometrics, Nonlinear Models and Financial Econometrics.
- Advanced knowledge of Excel, knowledge of R or Matlab language and of territorial or primary sector issues.

TUTOR: Paola Ferretti and Bruna Zolin (estimated start date: January 2020)

5. INVESTING IN WATER DESALINATION UNDER UNCERTAINTY: A REAL-OPTIONS APPROACH

PROJECT DESCRIPTION:
The fellow will support a research project using stochastic dynamic programming to evaluate i) the net economic benefit of an investment in a water desalination system ii) the impact of system operational flexibility on the investment choice (plant capacity, investment timing, etc.).
The fellow will be asked to collect data relative to water prices in world markets. S/he will then test their consistency with respect to specific stochastic processes that are assumed to illustrate their diffusion. Further, in order to calibrate the theoretical model set up by the applicant, s/he will be asked to collect data relative to the installation costs of the targeted desalination technology and to the system maintenance costs. Once calibrated the model using the collected data, the fellow is expected to execute the final numerical exercise relative to the optimal investment choice.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Solid knowledge of Econometric and Statistical Methods. In addition, familiarity with the theory of option’s pricing would be appreciated. Practical ability in the use of i) a calculus software such as Mathlab or Maple and ii) an econometric software such as STATA, E-Views or SPSS.

TUTOR: Luca Di Corato (estimated start date: 15 February 2020)
6. ENTREPRISE RISK MANAGEMENT: THE IMPACT OF A DIFFERENT RISK MANAGEMENT APPROACH

PROJECT DESCRIPTION:
Enterprise risk management (ERM) has increasingly captured the attention of risk management professionals and academics. Differently from the classical approach to corporate risk management based on a “silos” setting, ERM enables firms to benefit from an integrated approach to manage corporate risks. It shifts the focus from primarily defensive to increasingly offensive and strategic management of the Enterprise risks.

This research will investigate the following areas:
1. Review of literature contributions on this risk management approach, considering, in particular, the “COSO Framework” (Committee of Sponsoring Organizations of the Treadway Commission).
2. Analysis of the various sectors, industries, and areas in which ERM is most effective and can be applied; evaluation of the effectiveness of ERM in terms of improved management of the firms adopting this technique.
3. ERM considers also credit risk; the analysis will also take into account ESG criteria for the evaluation of creditworthiness, which considers also the environmental aspect.
4. The ERM approach takes into consideration also the reputation risk for a firm; one of the goals of this analysis will be to explain how the climate component might influence the perception of the brand in an even more environment-friendly market.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Familiar with coding

TUTOR: Monica Billio and Giovanni Angelini (estimated start date: 15 February 2020)

7. BEHAVIORAL INVESTIGATION OF SOCIALLY RESPONSIBLE AND GREEN INVESTMENTS

PROJECT DESCRIPTION:
Given the increasing importance of ESG (environmental, social, governance) investments, it is important to investigate the motivations of investors with respect to social and environmental sustainability, especially for investments in mutual and pension funds.

We intend to carry out this investigation not only from the viewpoint of standard finance, but also through the lens of behavioral finance.

To this aim, the student will have to help:
- define and implement questionnaires administered online to a wide number of investors and others focused on fund managers;
- search for contacts (e.g. concerning fund managers);
- test the consistency of the responses and results and carry out a first analysis of the responses.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
- Have passed the following exams:
  1. An exam of advanced statistics or econometrics at second degree level
  2. An exam of advanced quantitative methods for economics or finance at second degree level
- Advanced knowledge of Excel (including the use of filters, tables and graphs) and familiarity with R or Stata or Matlab

TUTOR: Antonella Basso and Martina Nardon (estimated start date: February 2020)

8. HEALTHCARE AT THE END OF LIFE

PROJECT DESCRIPTION:
One of the consequences of population aging is that mortality has become increasingly concentrated at very old ages, and increasingly attributable to chronic conditions. The cost of treating these chronic conditions can be high. In recent years, the medical expenses that people incur close to death have attracted considerable interest from academics and policy makers, particularly in the United States. However, little is still known about end-of-life health care expenditures in Europe.
This research project studies out-of-pocket health care expenditures among older adults in Europe, focusing on variations across demographic groups, with particular attention paid to such spending near the end-of-life. The research assistance activity will follow the following phases:

1. Collection and analysis of the existing bibliography on health care expenditures among older adults, elaboration of a summary scheme.
2. Survey of existing sources and collection of data on end-of-life health care expenditures.
3. Critical analysis of the methods used in the literature for the processing of the collected data (see the previous step).
4. Identification of method(s) for processing the collected data and working hypotheses.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:

- Have passed the following exams:
  1. An exam of Health Economics at the second degree level
  2. An exam of Data Programming at the second degree level
  3. At least one exam of Statistics or Econometrics at the first degree level
- Have passed or be enrolled in the following exams:
  4. An exam of Statistical Surveys at the second degree level
  5. At least one exam of Statistics or Econometrics at the second degree level
- Knowledge of the English language
- Advanced knowledge of Excel and familiarity with R or Stata, or willingness to acquire the necessary knowledge

TUTOR: Enrica Croda (estimated start date: January 2020)

9. DETERMINANTS OF THE DECISION OF DIVORCING IN ITALY

PROJECT DESCRIPTION:
The research assistant will first survey the state of the art in the theoretical and empirical economic literature investigating the determinants of divorce around the world. The literature survey will place particular attention on the institutional frameworks governing divorces and separations in the contexts considered in the papers discussed as well as on the data and empirical specifications used. Next, the research assistant will be asked to carry out, followed by the project supervisors, an empirical investigation based on micro-data released by the Italian National Statistical Office (ISTAT) to study how the decision of divorcing in Italy is affected by individual characteristics and the legislation context.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
The research assistant will read scientific papers in the fields of microeconomics and applied microeconometrics. Familiarity with the programs of Microeconomics and Econometrics courses at the Master level is useful. Previous knowledge of the statistical software STATA is not necessary but it will be taken into account in the candidate evaluation.

TUTOR: Danilo Cavapozzi and Giacomo Pasini (estimated start date: February 2020)

10. INCOME AND WEALTH EFFECTS ON MENTAL HEALTH

PROJECT DESCRIPTION:
The research assistant is asked to review the economic literature studying the effect of income and wealth on mental health in order to describe the state of the art in this field. The review should place particular attention on the effect on income and wealth trajectories over the life cycle on mental health inequalities in the short and long run.

The output of this research will be a literature survey that clearly summarizes the theoretical economic models motivating the research question of interest and discusses the main results coming from empirical contributions by describing the country-specific institutional contexts considered (e.g. presence and structure of income support programs) as well as the data and the econometric specifications used in the papers.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
The research assistant will read scientific papers in the fields of microeconomics and applied microeconometrics. Familiarity with the programs of Microeconomics and Econometrics courses at the Master level is useful.

TUTOR: Danilo Cavapozzi and Francesca Zantomio (estimated start date: February 2020)

11. RENEWABLE ENERGY AND AGRICULTURE

PROJECT DESCRIPTION:
Two strategic objectives are at the base of the growing interest in renewable energy: to contribute to reducing energy dependency and counteract the effects of climate change.
In agriculture, there are other reasons. First of all, the sustainability of the agricultural development model: agro-energies represent a necessity for the sustainability of the European production model. On the other hand, they are an opportunity for the integration of incomes in agriculture, especially during periods of stagnation or reduction in commodity prices, avoiding abandonment phenomena.
The research assistance activity will follow the following phases:
1. Update of the bibliography previously collected and reworking of synthesis schemes on: a) renewable and non-renewable energy sources; b) relations between renewable sources and the agricultural sector;
2. Reconnaissance of any "new" sources and data on renewable energy sources in terms of production and consumption;
3. In-depth analysis of the methods used in the literature for the processing of the collected data mentioned in the previous point;
4. Identification of the most appropriate method(s) for analysing and describing the relationship between renewable energy and the agricultural sector;
5. Construction and analyses of a case study.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
- Have passed the following exams:
  1. An exam of advanced statistics or econometrics at second degree level
  2. An exam of advanced quantitative methods for economics or finance at second degree level
  3. An exam among the following: Commodity Markets, International Trade of Commodities, Economics of Rural Development, Economia e Gestione dell'Azienda Agraria e Agroindustriale;
- Advanced knowledge of Excel (including the use of filters, tables and graphs) and familiarity with R or Stata or Matlab

TUTOR: Antonella Basso and M. Bruna Zolin (estimated start date: January 2020)

12. HIGH PERFORMANCE COMPUTING SYSTEMS AND PARALLEL COMPUTING IN ECONOMICS, FINANCE AND INSURANCE

PROJECT DESCRIPTION:
Academia and industry are actively developing new technologies and approaches for dealing with large scale and complex computational problems. In this respect, high performance computing systems (HPC) have become an essential ingredient in many academic areas of economics, finance and insurance. The project intends to investigate the advantages of using parallelization strategies in computationally demanding numerical problems. The aim of the research is:
- to review the literature on the use of HPC in data science and mathematics for economic and financial problems;
- to study the computational gain of parallel computing on HPC wrt standard sequential computing for a set of benchmark problems, such as numerical optimization and integration, with financial and insurance applications;
- to write a final report which provides: i) an introduction to parallel computing in MATLAB (or R or Python); ii) the code description for a set of illustrative instances; iii) discussion of the main comparison results.
Keywords: HPC, parallel computing, numerical techniques.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Knowledge of statistical inference methods and programming in MATLAB, or alternatively R or Python; having received very good grades in at least one of the following fields: mathematics, statistics and econometrics.

TUTOR: Antonella Basso and Roberto Casarin (estimated start date: January 2020)

13. BIG DATA ANALYTICS FOR FORECASTING TOURISM FLOWS

PROJECT DESCRIPTION:
Accurate tourist flow forecasting is always the most important issue in tourism industry. The availability of big data (such as TripAdvisor data) allows for improving destination management organization’s decision support. The aim of the research is:

• to review the literature on the use of big data and social media-generated big data, for decision support in the tourism sector;
• to extract and analyze social media-generated big data following various methods such as network analysis tools;
• to forecast tourism flows by applying time series models to the media-generated data;
• to write a final report where methods and results are presented and discussed.

Keywords: Big data, Forecasting, Network analysis, Smart tourism, Time series analysis.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Knowledge of statistical inference methods and programming in R or alternatively MATLAB or Python; having received very good grades in the exams of statistics and econometrics.

TUTOR: Jan Van der Borg and Roberto Casarin (estimated start date: January 2020)

14. RANDOM FOREST AND PROBABILISTIC FORECASTS IN TIME SERIES ANALYSIS

PROJECT DESCRIPTION:
Forecastings of time series analysis are often given as probabilistic forecast, which provides more information than point forecasts about the future realizations of the variable of interest. When large set of observations are available machine learning methods, such as random tree and random forests, can be used to cope with the dimensionality and to define flexible forecasting models. The aims of the research are

• to provide a review of random tree and random forest methods used in large dataset of time series analysis;
• to extend the methods to generate probabilistic forecast on multiple-horizon and on multivariate models
• Write the code and develop an application to time series
• Write a final report where methods and results are presented and discussed.

Keywords: Big Data, Machine Learning Methods, Statistics, Time Series.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Knowledge of statistical inference methods and programming in R or alternatively MATLAB or Python; having received very good grades in the exams of statistics and econometrics.

TUTOR: Stefano Tonellato and Roberto Casarin (estimated start date: January 2020)

15. META-HEURISTIC GLOBAL OPTIMIZATION ALGORITHM FOR MONEY AND FINANCIAL MARKET ANALYSIS

PROJECT DESCRIPTION:
When we face the problem of global optimization, and we are not usually able to obtain an analytic solution, we are forced to resort to numerical methods. Several metaheuristics have been proposed in the literature and the main approaches could be connected with biology and physics. The biology-inspired algorithms mimic the evolution of species (Genetic Algorithm) or the behavior of large group of animals (for instance the Particle Swarm and Ant Colony algorithms). On the other hand the “physics” metaheuristics are linked to physical laws (for instance the gravitational law or electromagnetism-like algorithm).

The objectives of the internship can be summarized in the following four steps:
First: exhaustive research on the metaheuristic algorithms proposed in the literature.
Second: review of the R libraries for the global optimization algorithms and their functions.
Third: implementation of one or more optimization algorithms not yet implemented in R.
Fourth: application of the implemented algorithms in money and financial market analysis.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Knowledge of R or other object-oriented programming language

TUTOR: Claudio Pizzi (estimated start date: January 2020)

**16. ARTIFICIAL INTELLIGENCE FOR ALGORITHMIC TRADING STRATEGIES**

**PROJECT DESCRIPTION:**
The aim of the stage is to analyze how the combination of models to forecast financial market trend and technical analysis indicators can improve the performance of a system of algorithmic trading rules. 
As concern the forecasting models both artificial intelligence, in particular Neural Networks, Recurrent Neural Network,s Long Short-Term Memory Networks and kernel-based regression models will be used. 
With regards to technical analysis indicators, their parametric configuration will be obtained using optimization meta-heuristics such as Particle Swarm Optimization. 
The stage includes the following phases:
- Literature review on abovementioned models.
- Design of a trading system that combines forecasting models and technical analysis indicators.
- Implementation of the previous point.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Skill on R o Python

TUTOR: Claudio Pizzi (estimated start date: January 2020)

**INTERNERSHIP GRANT “VALERIA SOLESIN”**
Linked to the participation to the Summer School of Oslo. Art.1.3 of the call

**17. INCOME AND CONTRIBUTION AGE-PROFILES: POLICY EFFECTS AND POLICY CONSIDERATIONS**

**PROJECT DESCRIPTION:**
Support the analysis of profiles of income and pension contribution in Italy and in Europe using microeconomic data. Contribute to the drafting of research papers on the issue of intergenerational equity in pension systems and degrees of inequality, including considerations and a political economy approach.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Working knowledge of the programming language STATA. Excellent knowledge of English.

TUTOR: Agar Brugiavini (estimated start date: January 2020)

**18. STUDY OF THE WORKING CAREERS OF WOMEN AND MEN FOR DIFFERENT GENERATIONS**

**PROJECT DESCRIPTION:**
Support the analysis of the income profiles of different generations (mothers and daughters) in Italy and Europe using microeconomic data. Contribute to the drafting of research documents on the subject of gender differences in the workplace and on policies Supporting reconciliation of work, family and private life, also in connection with the research topics dedicated to the events in memory of Valeria Solesin.

PREFERENTIAL QUALIFICATIONS/SKILLS TO SPECIFY IN THE LETTER OF MOTIVATION:
Working knowledge of the programming language STATA. Excellent knowledge of English.
TUTOR: Agar Brugiavini (estimated start date: January 2020)