



PROGRAMMA DI RICERCA		
1	TITOLO	Econometric analysis of high-dimensional and network models
	SSD	SECS-P/05
2	RESPONSABILE SCIENTIFICO/ TUTOR	Giuseppe Cavaliere

ABSTRACT PROGETTO DI RICERCA

The research program refers to the Italian PRIN Project entitled “Hi-di network econometric analysis of high dimensional models with network structures in macroeconomics and finance – PROT. 2017TA7TYC” funded by the Italian Ministry of Education.

The project aims at developing novel multivariate econometric models and methods to deal with network effects and to take into account time varying relationships. Attention will be given to how latent factors drive economic and financial systems and are subject to instabilities. Their roles will be studied and compared in the pre- and post-coronavirus era.

The project will address the problems related to the identification, estimation and the inference in (structural) network models based on large sets of data. The focus will lie on the development of inference methods for time-dependent networks, possibly allowing for non-stationary dynamics. In particular, the project will emphasize the development of new econometric models for network structures capable to deal with jumps, large shocks and, in general, with “unstable environments” such as those regularly observed in economics and finance and currently in place in the aftermath of the covid-19 shock.

The researcher will study new techniques for modelling multivariate structures in the time domain under non-stationarity, time-varying cross dependence and extreme events. These techniques will be extended to network structures and to network VAR models which are yet largely unexplored in the literature or are based on unrealistic simplifying assumptions. Emphasis will be put on the development of bootstrap theory for network data.

The project will also tackle the issue of high dimensionality by innovative bootstrap methods and by developing new tools for inference in “conditional” network models, i.e. models in which some of the variables of interest are modelled conditional on other variables, with the idea of reducing the course of dimensionality and increase the power of tests.

The methodological achievements of the project will contribute to the measurement of the economic impact of financial and macroeconomic uncertainty: uncertainty is expected to act as a key driving factor in the aftermath of the covid-19 shock. The project will focus on the policy actions



that central governments will implement to offset the macroeconomic consequences of a shock of size never experienced by world economies after WW2.

PROGRAMMA DELLE ATTIVITA'

The research activity follows the research program developed by Graziano Moramarco in the period 1.9.2019-31.12.2021. Dr. Moramarco has completed Phases 1 and 2 below. Hence, the new research program will focus on Phases 3 and 4 below.

Phase 1 (Completed by Dr. Moramarco)

The candidate will review the existing literature on quantitative network analysis. First, he/she will start from traditional VARs, their identification, estimation and inferential issues, and then he/she will move to network VAR models with the idea of isolating the main inferential challenges that this literature poses in order to bring these models to the data. The candidate will also start collecting macroeconomic and financial data that will be used for applications of interest.

Phase 2 (Completed by Dr. Moramarco)

The candidate will contribute to the specification of new econometric models/methodologies for network structures. He/she will also contribute to software development and Monte Carlo experiments required to study the performance of novel designed (asymptotic and bootstrap) methods. This is one of the main goals of the project. In this phase the candidate will interact actively with the other researchers of the Bologna Unit as well as of the other Research Units that participate to the project. He/she is expected to attend national and international conferences to present his/her research achievements. The candidate will also produce (at least) a Working Paper to submit to the Department of Economics at the end of this phase.

Phase 3: months 1-7

The candidate is expected to identify a relevant empirical application in macroeconomic/finance networking analysis that should complement the methodological progresses achieved in Phase 2. The candidate is also expected to qualify his/her analysis to the role of uncertainty and its link with network analysis in the aftermath of the covid-19 shock. In this phase the candidate will strengthen the relationships with the other project team researchers, Department members in general, and the other Research Units that participate to the project. He/she will participate to national and international conferences with the aim of discussing the progresses of his/her research. The candidate is expected to produce (at least) another Working Paper to submit to the Department of Economics at the end of this phase.

Phase 4: months 8-14

This is the crucial phase of the candidate's research activity. The candidate is expected to be a top expert in the field of macro and financial networking analysis. He/she will participate to relevant conferences and will finalize and polish the Working Papers produced in the previous phases. The candidate is expected to submit (at least) one article to a top-field international journal in Econometrics/Economics.