My broad research interests are in the fields of Econometrics, Applied Econometrics and Macroeconometrics. In particular, I attempt to answer questions such as: 1) How to test for forecast rationality without actually knowing the functional form of the loss function and in the same time accounting for possible asymmetries in the loss? 2) What are the effects of identification loss in testing the predictive ability of models, where the potential source of identification deficiency is an intrinsic characteristic of the model? 3) How does the prevalent fragility of parameter estimates in modern DSGE models arising due to lack of identification transfer to other objects of interest such as point forecasts? Below I summarize my three papers that address these questions.

“Testing Forecast Rationality under Asymmetric and Unknown Loss ”
(Job market paper 1)

The choice of loss function is an important problem in the forecast assessment literature as it has a direct effect on the results of forecast optimality tests. This paper contributes to the literature of forecast assessment under asymmetric and unknown loss. I propose a testable property for forecast rationality that holds when the forecaster’s loss function is unknown and possibly asymmetric. The paper is most closely related to Elliott et al. (2005, 2008). Unlike Elliott et al. (2005, 2008), my approach accounts for the possibility of asymmetry, without restricting the forecaster’s loss to a particular parametric form. The attractiveness of the approach from a practical point of view, is that it can be applied even if the forecast user does not have any information regarding the shape of the forecaster’s loss function. In the construction of the test statistic, I require neither the knowledge of the underlying loss nor the knowledge of the forecasting model used by the forecaster. What is required is the sequence of forecast errors that could have been generated by a parametric, nonparametric, semiparametric, or no model at all. The construction of the proposed test is based on the conditional moment tests of Bierens (1982, 1990), De Jong (1996), Corradi and Swanson (2002).

Monte Carlo simulations illustrate the advantages of the proposed approach. I show
that the test in Elliott et al. (2005, 2008) is loss function sensitive and can lead to incorrect inference when the loss function is misspecified. In contrast, my approach can be used without requiring the specification of a particular functional form for the loss. In addition, simulations show that the proposed test has good finite sample properties even when the forecasting rule is nonlinear. An empirical study highlights some differences in the results that we obtain when applying the two forecast rationality tests to data from the Survey of Professional Forecasters (SPF). The contradiction in the results reveal interesting insights regarding the rationality of the SPF forecasts.

“Identification Robust Predictive Ability Testing” (Job market paper 2)

The paper considers the predictive ability evaluation of models affected by identification deficiencies. Comparing the predictive ability of models where identification might fail, has not yet been examined in the literature, even though many models from empirical predictive evaluation studies can suffer from identification problems. In the setup that I analyze, the potential source of identification deficiency is an intrinsic characteristic of the model. The class of models that I consider can have different identification strengths, varying from non-identification to weak, semi-strong and strong identification. I show that the finite sample distributions of some of the estimators are far from the normal distribution. In an example the I consider, these finite sample distributions are strongly bimodal or uniform. Due to these nonstandard distributions, the forecast errors generated from a model that is not identified are larger than the errors that would have been obtained if the model was (strongly) identified. This affects the null distribution of out-of-sample predictive ability tests, which in situations where the parameter estimation error is negligible, are not well approximated by the standard normal distribution, when one (or both) model(s) considered for predictive ability comparison are not (strongly) identified.

I show that tests and confidence intervals that employ the standard strong identification critical value have size distortions and can lead to incorrect inference. The weaker is the identification strength, the lower are the coverage probabilities of confidence intervals (CI) based on the standard critical value. I propose methods to make the out-of-sample predictive ability tests and CIs robust to identification deficiencies. These methods use a different critical value than the standard one and include: a least-favorable critical value and a data dependent critical value. The least favorable critical value is based on the least favorable possible distribution of the test statistic. For the data dependent critical value, I use an identification category selection procedure to determine the identification strength and adjust the critical value accordingly. In settings where the parameter error is non-negligible, I show that the asymptotic distribution of the predictive ability test in West (1996) is standard even when one allows for the models to be only semi-strongly identified.
“Global Identification Failure in DSGE Models and its Impact on Forecasting” (submitted)

Although the validity of statistical inference in DSGE models has been questioned due to identification deficiencies (see e.g., Beyer and Farmer (2004), Canova and Sala (2009)), there are few papers in the literature that assess the impact of identification failure on different macroeconomic outcomes. The purpose of this paper is to examine whether the fragility of parameter estimates in DSGE models, resulted from lack of identification, transfers to other objects of interest such as point forecasts. A few papers in the literature analyzed the effect of identification loss on impulse response functions (see e.g., Morris (2014)), but to my knowledge, my paper is the first to examine the impact of identification failure on forecasting with DSGE models. I focus on global identification failure, as this particular identification issue is of interest when giving policy recommendations based on DSGE models.

The results show that when observationally equivalent parameter estimates belong to the same model structure, they imply the same system matrices, which result in the same point forecasts, under both correct and misspecification. Thus, global identification failure does not impose issues in constructing predictions from DSGE models, when identification is conditional on the model structure, i.e., in a framework where there could exist distinct parameter values, within the same DSGE structure, that lead to the same dynamics of the observables. However, when the identification problem allows for different structures, (e.g., models with different policy rules, different types of frictions or shock processes), two parameter points that generate the same data dynamics can lead to distinct forecasts. I illustrate this with observationally equivalent parameter estimates arising from two model structures: one in which the monetary policy follows an interest rate rule that reacts to current inflation, and another where the central bank responds to expected inflation. Overall, when constructing forecasts based on DSGE models, the results of the paper point to the necessity of taking into account different possible policy scenarios that could be consistent with the data, i.e., observationally equivalent structures.

For future research, one of the areas I plan working on is heterogeneous agent models in continuous time. Heterogeneous agent models are typically set in discrete time. While they are a workhorse of modern macroeconomics, little is known about their theoretical properties. Recent papers (see e.g., Achdou et al. (2014b), Gabaix et al. (2015)) turn thus to continuous time versions of such models, given that in continuous time, a wide class of heterogeneous agent models boils down to systems of partial differential equations.
formed by a Hamilton-Jacobi-Bellman equation and a Kolmogorov Forward equation (or Fokker-Planck equation).

Razvan Mosincat (PhD candidate Mathematics, U. Edinburgh) and I are planning to work on theoretical characterizations of such systems (existence of a solution, uniqueness, stability) and their economic implications. For a survey of literature and examples of various economics models where continuous time methods have played an important role in recent years see e.g., Achdou et al. (2014a).

References


