# Predicting Iran's unemployment rate based on longitudinal Bayesian models, case study 2017

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# **Extended Abstract**

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# Introduction

The increasing difficulty of collecting data in traditional ways, due to the complexity of today's societies, necessitates the need to study to change or update statistical methods. Using other data sources and model-based techniques are some of the methods that can be used as alternatives to increase the accuracy of statistical estimates and inferences. Information sources from previous data (such as past censuses or recorded data) are always one of the most important sources for this purpose. Therefore, in this article for the first time in Iran's Statistical System, we predict the unemployment rate by using Bayesian inference and methods. Unemployment rate, as one of the most important socio-economic indicators of a country, has a great importance rule for micro and macroeconomic programing and policy making in national level.

#### Material and methods

The data which is used in this paper, derived from the results of Iranian Labor Force Survey (LFS), during the years 2006-2017. This survey is implemented by Statistical center of Iran (SCI). Because of the longitudinal data, the different models (including random effects, transition and marginal models) in a Bayesian paradigm is used for predicting statistical methods in this paper. The use of Bayesian methods in Iranian official statistics is not common. Therefore, this paper attempts to evaluate the application of these methods in Iran's official statistics system. As noted before, we use data from the Iran's LFS (during 2006 to 2016) to predict the 2017 unemployment rate of the Iran population, for ten years and more, as the main objective of this research. This has been done for the whole country as well as the provinces separately. It is worth noting that the predicted values are compared with the observed values for the same year (Results of LFS 2017) to evaluate the accuracy

of our proposed model. In this scheme and according to the calculations done in this study, it was found that the best model for predicting unemployment rate is the marginal model with correlation structure ARMA(1,1).

## **Results and discussion**

The results which is obtained by the proposed method in this study are very good and acceptable, which strongly suggests the possibility of using this Bayesian predictive models in other official statistics applications. The reported results demonstrate that there is a good agreement between the Bayesian model and estimated results given from the survey. This will transform the analysis of the results of such surveys. It is worth noting that in this study, variables such as "population size, economic participation rate, literacy rate, postgraduate population rate, women's participation rate, urbanization and discouragement" were proposed for entering modeling, but they are not significant to stay in the model so the prediction model is based solely on the unemployment rate over time. All results reported in the tables and graphs in the text for better explanations.

### Conclusion

The findings were drawn from this research showed that the predicting of unemployment rate based on the aforementioned marginal model, is more efficient for all provinces. Although for two provinces which had different unemployment rate in comparison with trend of the past decade, than other provinces in year 2017. The predicted unemployment rate for the whole country which is calculated by Bayesian model, that is 11.37, is very acceptable compared to the estimated value which is given by observed values form LFS, that is 11.55. It shows that performance of the Bayesian predicted model is properly desired. This result, suggests the possibility of using Bayesian inferences in longitudinal surveys and all data which are formed in time series format as efficient inference method. This issue is raised due to the nature of the proposed method which is based on information of previous data.

**Keywords:** Official Statistics, Bayesian predictive models, Bayesian inference, Unemployment rate, longitudinal data, Labor Force Survey (LFS), Shifted model, random effects model, Marginal model

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