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**Title of Thesis:** Statistical Properties of Estimators for Variable Coefficients Models

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**Abstract :**

Many approaches have been developed to face the estimation problems in panel data; such as Generalized Least Square (GLS) technique which is used in Swamy (1970), and Generalized Method of Moment (GMM) which is used in Hansen (1982) and Verbeek (2004). Generalized Least Square is a known procedure used in estimating the unknown parameters in the linear regression model and it can be used in situations where Ordinary Least Squares (OLS) is statistically inefficient, or gives misleading inferences. The GMM is a very general statistical technique for obtaining estimates of parameters of statistical models. Many estimators are known as special cases of (GMM) such as (OLS), Instrumental Variables (IV) and two Stage Least Squares (2-SLS). The study is concerned with solving the problem of the negative variance concerning the (GLS) method and hence a comparative study of (GLS) and GMM procedures with Simple Panel Data (SPD) and Multiple Panel Data (MPD) is introduced and discussed simulated data from several models that we used to compare the two procedures under different conditions of panel data such as: ample sizes, models, parameters values, and standard deviation. For comparison, we applied the bias, the Mean Square Error (MSE), the Variances and the rate of Negative Variances. We found from the above mentioned approaches that (GMM) is more capable and accurate in estimation than (GLS) in case of random coefficients and nonnegative definite. Finally, a criminal statistics data from ministry of interior (MOI) in state of Kuwait were used. We first have to test the coefficients variation to proved that the coefficients was random or fixed in the real data and we found that the coefficients are random and (GMM) was better in sense of (MSE) than (GLS) in case of random coefficients which support our simulation study.

**Keywords:**

Generalized Least Square (GLS); Generalized Method of Moment (GMM); Simple Panel Data (SPD); Multiple Panel Data (MPD) and Mean Square Error (MSE).