Model Specification Methods:

Comparison of Autometrics with other strategies

PhD THESIS
(ECONOMETRICS)

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A Thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy in Econometrics at International Institute of Islamic Economics, International Islamic University, Islamabad

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December, 2014

School Of Economics

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Mudassar Rashid

Acknowledgments

Thanks to almighty Allah the most merciful and beneficent, who never wastes the honest efforts of individuals, who has given me the potential and ability to complete my research work. I offer my respects from the core of my heart to the Holy Prophet Muhammad (Peace be upon him) who urges his followers to "Seek knowledge from cradle to grave". I am very thankful to my supervisor Dr. Asad Zaman for his guidance and continuous support from the first day till the end of my PhD. Specially thanking him for bearing my indolence. There are very few words to write about him but have countless respect for him.

I want to thanks my teachers at IIIE/seniors, particularly Dr. Atiq-ur-Rheman, Dr. Saud and Mr. Asad ul Islam, for their kind support and personal interest in my research. I also acknowledge the cooperation of all the staff of IIIE but Mr. Syed Niaz Ali Shah, Mr. Muhammad Zareef, and Mr. Tauqeer Ahmed in particular. Thanks to Zohaib, Khurrum, Nadeem and Hafiz Zia for their computational aid in my final stage of research. For my friends than classmates, Ateeq-ur- Rehman and Ahsan-ul-Haq, whom I always found next to me in tense as well as in blissful situations. Their company is un-forgettable and hoping to have them till my end.

Allah may rest my deceased Father in heavens whose sacrifices, hard work and honesty is behind our family's prosperity. I am thankful to my mother for her prayers, sister Irfana and brother Kamran for their kind support throughout my life. My final words go to the equally important people in my life, my sweet wife *Arooj* and my two Barbie's *Anusha* and *Iffrah*. I cannot explain in words, the backup and courage I got from my wife throughout the time. It feels guilt for *Anusha* for the countless loss she suffered due to my absence during her personality building. Now I can spend a lot of time with you and *Iffrah* and hoping that *Iffrah* will not suffer the same.

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MODEL SPECIFICATION METHODS: COMPARISON OF AUTOMETRICS WITH OTHER STRATEGIES

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Abstract

Model specification selection is of considerable importance across the social sciences. There are numerous procedures to select the important variables/factors from the set of variables. Due to the improvements in computational techniques several time saving and easily accessible procedures are available. The list of common procedures that are used for the model selection have different types of path reduction procedures like Autometrics (2009) (latest version of General to specific approach) along with various stepwise procedures i.e. forward, backward (1960).

This study establishes and then analyzes the performance of these model selection methods for the panel data framework. Their performance is judged on the basis of selection of true model, potency and gauge in different circumstances of sample size, parameterization.

The results of the simulation depict that in the circumstances of panel data no conclusive result can be inferred. Different procedures did well in one situation but performed poorly in others. However, overall Autometrics did well as it shows consistency and did well for small samples and smaller parameter values. Overall, it shows good potency and gauge; especially in random coefficient models as the assumptions of this model are closest to real world. Following Autometrics, stepwise procedures did well and then the information based procedures. At the end factors explaining the investment for developing countries found in different theories and empirical research are reconsidered and re-estimated. A unique model is found, through the Autometrics approach using a random coefficient model, which may be helpful for policy making across examined countries.

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List of Abbreviations

AIC	Akiake Information Criteria	LFS	Labor Force Survey
AICc	Akiake Information Criterion Corrected	NLS	National Longitudinal Survey
BIC	Bayesian Information Criterion	PSID	panel study of income dynamics
BICc	Bayesian Information Criteria Corrected	CCM	Constant Coefficient Model
HQC	Hannan-Quinn Criteria	FEM	Fixed Effect Model
G-to-S	General to specific	REM	Random Effect Model
SW	Stepwise procedure	RCM	Random Coefficient Model
FS	Forward selection procedure	POLS	Pooled Ordinary Least Square
BWE	Backward Elimination Procedure	OLS	Ordinary least Square
AICs	AIC and AICc information Criteria	FGLS	Feasible Generalized least Square
BICs	BIC and BICc information Criteria	ECM	Error Component Model
LSE	London School of Economics	OECD	Organization for Economic Co-operation and Development
UK	United Kingdom	GDP	Gross Domestic Product
AR	Autoregressive	WDI	World Data Indicator
DGP	Data Generating Process	GE	General Government Final Consumption Expenditure
SER	Standard error of Regression	R	Lending Interest Rate
PRESS	Prediction Error Squared Sum	T	Trade
SPSS	Statistical package for Social Sciences	Y	GDP per Capita Growth
FDI	Foreign Direct Investment	I	Gross Fixed Capital Formation
Inf	Inflation	S	Gross Domestic Savings
PRIVT	Domestic credit to private sector		

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Chapter 1

Introduction

1.1 Brief Introduction

"Model selection is an essential component of empirical research in all disciplines, where a prior theory does not pre-define a complete and correct specification. Economics is surely such an empirical science, as macroeconomic processes are complicated, high-dimensional and non-stationary" (Hendry and Krolzig, 2005)

Model building has always been under discussion due to its uncertainty regarding the selection of variables, their functional forms, structural breaks or the lag lengths to be included. Although these issues have been discussed frequently there is still no clean conclusion about best method for selection of key variables from a set of variables. It got more attention after the great oil price shocks in early 70's. Most existing macro models failed due to specification errors and were highly criticized. That provided a new impetus to the construction of model selection procedures and many different techniques and model selection criteria were revised and developed. Among these were the General to specific approach (1978), Bayesian approach (1978), Vector Auto Regression (1980), Akiake Information Criterion (1973), Schwarz Information Criterion (1978). Also many books are written in this context e.g. Introduction to multiple time series (Lütkepohl, 1991), Model Selection and Multi-model Inference: A Practical Information-Theoretic Approach (Burnham and Anderson, 2002), Dynamics Econometrics (Hendry, 1995).The methodology and practice of econometrics (Castle and Shephard, 2009).Till to the date this debate continue (e.g. Castle et al. 2011, 2012 and Sucarrat 2009).

With the advances in computer processing technologies, different automated versions of methodologies and criteria are now available in the commonly used software packages for the selection of variables e.g. All possible models, different versions of Stepwise regressions, information criteria; Akiake, Schwarz, Hannan, Bayesian method, General-to-Specific approach. The method that has more attention and progress in recent years is the General-to-Specific (G-to-S) modeling procedure.(It is known by different names Hendry methodology, London School of Economics (LSE) methodology, Gets (1995), PcGets the computerized version (2001). After significant improvements by Doornik in 2006, the approach is now known as Autometrics. Doornik introduced a new model search algorithm that begins with a whole set of models generated by the variables initially included. The approach then discards irrelevant variables systematically to speed up the search. It improves the computational efficiency and can work when the number of variables exceeds the number of observations, which enhances its applicability.

This research focuses on Autometrics, as said earlier, is based on G-to-S modeling and its comparison with other model selection procedures. This comparison will be based on panel data as well as on a time series univariate model. There is limited literature for the comparison of selection procedures especially for the panel data. As panel data is getting increasingly attention in analysis nowadays, it is important to know which model selection procedure works well for such data structure, so this study aims to compare Autometrics with other model selection procedures, with the panel data environment.

1.2 Motivation

The problem that which variable affects a dependent variable is still not conclusive and what methodology should one use in selecting the variables from the set of potential variables also remains unresolved. There are different theories for economic phenomena in the literature, that each define different factors influencing that phenomena e.g. Solow(1956) believes that growth rates depends upon labor growth rate and technological progress while the Roomer (1986) and Lucas (1988) refer to the importance of research and development, educational investments and other factors. In fact these models assume that some factor is important and try to show its influence, but choosing among different conflicting models, requires good model selection procedures. There are some studies which show that the factors statistically affecting economic growth in one study do not appear significant in the other results e.g., Fernandez et al. (2001), Hoover and Perez (2004), Hendry and Krolzig (2004c). Each researcher chooses the model selection strategies and criteria so that the conclusions produced may support their theories. So the key problem still stands there that how to select the correct set of variables for explaining the economic phenomena under discussion.

For these and related reasons, model selection procedures/algorithms are of great importance in arbitration between competing hypothesis. Many procedures have automated versions that are available in commonly used software packages. These automated model selection procedures work well depending on their algorithms and can give reliable results for large and complicated data sets quickly, as Oxley (1995) and Philips (2005) pointed out. While there are a lot of studies of model selection but there are very few in the context of panel data. Panel data is becoming more and more frequently used. This study used the panel data for comparison of different model selection procedure.

1.3 Research Questions/Aim of Research

Many tools have been developed which can be used in the modeling tasks e.g. model selection criteria and statistical tests. Moreover, various algorithms have been proposed which specify the sequence in which the tools should be used to identify a useful model. In this context different automated modeling procedures are available. Their advantages are that they are available in software packages that are easily accessible for researchers. Most of them are subset procedures that reduce the model along a specific path which is determined by a variable selection criterion or statistical tests i.e. stepwise procedure, forward selection and backward elimination. There is a new technique proposed in recent years e.g. Autometrics (2009) by Doornik which is based on the G-to-S approach and claims that it does not break down in many situations.

In our study we will establish the newly designed strategy, Autometrics, for panel data frame work and will also compare Autometrics to other strategies and information criteria's i.e. stepwise procedure, forward selection and backward elimination procedure, Bayesian/Schwarz information criterion (BIC/SIC) and Akiake information criterion

(AIC) to see 'How does the Autometrics approach compare to alternative search methods? This will be simulation based experiment under various situations and through which we will see how Autometrics works in search of a true specification. However our objectives are:

- To achieve our main goal of the research our first objective is to verify our results with previous studies. For this purpose we will compare Autometrics, stepwise procedure, forward selection and backward elimination, BIC/SIC, AIC and Hannan-Quin information criteria for time series univariate model through a simulation based experiment.
- The main goal is to establish Autometrics and other stepwise strategies for the panel data environment. Since the panel data is frequently used nowadays due to the availability of different data bases so it would be much useful for common researcher to have such techniques of model selection for panel data. This objective will be achieved through necessary theoretical changes along with extensive programming so that it can be used by common researcher.
- After the development of Autometrics and other strategies in panel framework, their performance will be compared in different situations and through different performance criteria in an extensive Monte-Carlo simulation.
- At the end Autometrics will be applied to the real world data. The objective behind this is to show that how one can have a unique model, by using Autometrics, for included cross sections in the research.

1.4 Contribution/Significance

Which variable matters and which does not, is extremely important in almost every subject especially in economics, medical sciences, psychology and managerial sciences. The main task of the modeling procedures is to select the appropriate variables from the set of candidate variables and use them for management decisions, inference and policy making. As many issues related to policy formulation and implementation crucially depend on the right model selection, the present study is expected to provide valuable insights into the hunt for dominant model selection procedure from a set of procedures. This should also provide guidelines for common researchers for using these model selection procedures. Real world reflects a wide range of assumptions about data e.g. it could be static or dynamic in nature, could have auto-correlation of series or have auto-regressive behavior. A good model selection procedure should work under a variety of specifications.

Our main contribution will be the establishment of Autometrics and other strategies i.e. stepwise procedure, forward selection and backward elimination, for panel data frame work. It would be helpful for studies using panel data as due to the availability of different databases this type of data is frequently in use by researchers and then we will analyze performance of these developed procedures along with information criteria for different panel data models.

Available panel data models only gives estimates for the variables for each cross section but after the establishment of model selection procedures for panel framework one would be able to select unique model which will represent common factors explaining any phenomenon for all included cross sections. The information would be very useful for making policy and other social sciences tools.

1.5 Outline of the Research

This research evaluates model selection procedures in context of models for panel data. This chapter contains a brief introduction of model selection and provides motivation and contribution for this study and its practical importance.

The remainder of the thesis line up as follows. In the next chapter literature review with the history and improvements regarding the General to specific approach along with comparative studies of model selection procedures existing in literature is presented and discussed. Next chapter includes detail description of different methods that are to be used in this study along with a discussion of experimental design through which the research progresses. In chapter four the results of the simulation for comparison between procedure using time series data and panel data along with their interpretations are presented. Chapter five presents the results of re-estimated investment factors using panel data through Autometrics. Chapter six concludes and provides helpful guidelines regarding the use of model selection procedures and future research.

Chapter 2

Literature Review

2.1 Introduction

Several model selection procedures are available in the literature. Some are based on path reduction e.g. Simple to general; subset procedures such as stepwise regression and some are unordered i.e. they have no specific way to select the best model and one have to estimate all possible models e.g. information based strategies like AIC, BIC, and HQC , all possible regression and Bayesian procedures. A strategy that have gained increased attention in recent is General-to-specific model selection, which simplifies the general model that captures the prominent features of the data. It has a long historical background and is central feature of the London school of Economics (LSE) approach, known as LSE approach due to its roots at the London School of Economics in the 60's.Sargan (1964) provided some pioneering work but it is later developed by Hendry and others e.g. Davidson et al. (1978) (known as DHSY for modeling UK consumption), Hendry & Mizon (1978). Mizon (1995) and Hendry (2003) discuss the history and origins of LSE methodology. Hendry with others had, for more than 30 years, developed and used extensively this methodology in applied research. Due to strong affiliation of Hendry to this approach it is also known as Hendry's methodology. It is also named as General to specific (Gets) Hendry (1995) and PcGets which is its computerized version developed by Hendry & Krolzig (2001).

This chapter includes recent improvements in G-to-S and then discusses different studies that compare various available model selection procedures in various circumstances i.e. based on regression analysis and for autoregressive models.

2.2 Improvements in G-to-S framework

After the pioneering work of Sargan (1964), the paper of Davidson et al. (1978) is considered as the pillar of general –to specific modeling. After that it is improved from time to time by the other followers of Hendry and London School of Economics (LSE). Additional developments of Co-integration tests and improved error correction modeling by Engle and Granger (1987), Johansen (1988) respectively are significant. But the main algorithm of reduction remain unchanged until Hoover & Perez (HP)(1999) as they introduced the algorithm under the G-to-S frame work that contained the idea of multiple search paths which gave new directions to G-to-S modeling approach. There is no specific mechanism for searching through the path i.e. how many paths one should go through in search of model. HP used ten most insignificant variables paths to begin their search with. They also used general unrestricted model (GUM) as the starting point for the reduction which must be coherent with the data and also introduced back-testing with respect to the GUM as well as subsample evaluation of the model. Their algorithm is known as the first generation algorithm (Krolzig and Hendry 1999).

The idea of Hoover and Perez is taken a step further by Krolzig and Hendry (1999) who enhanced the algorithm by introducing pre-search selection using F-test on a block of variables, increased search paths by block deletion and through all insignificant variables, introduced iteration, along with use of information criteria for the selection of a final model instead of examining standard error of regression. Since this approach of Gets computer supported, their algorithm is known as PcGets.

Hendry & Krolzig (2001) after making some improvements i.e. pre testing for general unrestricted model (GUM) and Post-selection sub-sample evaluation, evaluated the properties of computer version of G-to-S i.e. PcGets. They showed through simulation that both changes helped to reduce the overall size of the model selection procedure by deleting irrelevant through block F test of GUM. In sub-sample evaluation it happened by deleting variable which don't exist in both samples. They compared PcGets with previous experiments of Hoover and Perez (1999), Hendry and Krolzig (1999a) and found that PcGets provide better power with similar sizes; they also show that over fitting does not occur in their improved version.

Hendry and Krolzig (2003, 2005) analytically discussed PcGets and compare it to other methodologies existing in literature. They argue that best properties of most of them are embodied in PcGets. After simulated evaluation of some properties of PcGets, they found it to be non-distortionary in size and power and to provide a consistent selection. Pre-test biases are found to be un-fluctuated by search i.e. found similar results when starting from the DGP and the GUM for each strategy. After re-running the Hoover and Perez (1999), Krolzig and Hendry (2001) experiments, they found improved PcGets better in power but with similar sample sizes.

Hendry et al. (2004) considered selecting a regression model for location-scale models and takes a special case where they saturated the model with individual impulse dummies as variables for every observation. They split the data into two sets and test the dummies for significance. The significant dummies are taken in the sub-models. Then they used the usual general to specific strategy for selection of final model. They derive the distributions of the mean and standard deviations after retaining only significant impulses from the saturated set by doing Monte Carlo simulations. This shows more consistency and wider spread after retention and confirmed that this approach is feasible.

Johanson & Nielsen (2008) extend the impulse or dummy saturation algorithm, for a classical regression model and AR models. They derive the asymptotic theory for both the stationary and non-stationary cases. Santos & Hendry (2006) extend their impulse saturation experiment to stationary autoregressive of order one (AR(1)) models and provide evidence through Monte Carlo simulations that impulse saturation tests have power against additive outliers and level shifts. It also showed that this test for level shifts in dynamic models was not depended on the degree of serial correlation of the sample.

In 2009 Doornik introduced a new model search algorithm, known as Autometrics, in context of G-to-S framework. He made some useful improvements in PcGets by establishing a new tree search, which is intended to speed up the algorithm, in-spite of unordered multiple paths used the HP (1999) and Hendry and Krolzig (2001, 2005) in their automated version of G-to-S methodology. Doornik reduced the numerical computations by reducing the search paths, neglecting the pre-search technique and delayed diagnostic testing.

2.3 Comparative Studies

2.3.1 Univariate studies

Lovell (1983), compared the three variable selection procedures, stepwise regression, maximum-minimum {t}, maximum adjusted R square using annual data for different type of data generating process (DGP) i.e. random, dynamic or auto correlated and auto regressive. Results of simulation showed that the stepwise procedure provided the correct specification (DGP) most of the time (70%) as well as the max adjusted R square.

Lovell's experimental framework is reevaluated by HP (1999). They included the G-to-S approach, after making improvements, in comparison with stepwise, max-min[t] and max adjusted R-square. Their results show clear domination for G-to-S (almost 80%), in various situations, over max-mint[t] and max adjusted R-square. While stepwise stay close, but Gets had much better size than stepwise. To judge the success of methods he made 5 different categories e.g. true specification found, true specification chosen or not and it had lower standard error of regression (SER) or not etc.

Hendry & Krolzig (1999) extend HP (1999) work and showed advantage in favor of PcGets (97%) as relative to HP's (1999) (80%) under the same experimental design.

Castle et al. (2011) compare Autometrics along with other model selection algorithms in analysis of obtaining reliable coefficients which they get from each model selection algorithm, based on performance taking into account the tradeoff between type-

I and type-II error. The better algorithm has to optimize that tradeoff. But they found none of algorithm that performs best in their simulation experiment in all circumstances.

Kudo & Sklansky (2000) compare predictive properties of several of path reduction procedures and found stepwise approach better than simpler procedures by using cross validation method, however simpler procedures are found time saving. Reunanen (2003) also reached the same conclusion while comparing the predictive properties of the forward selection and the stepwise procedure.

Liew (2004) analyzes a number of existing criteria for selection of an autoregressive model using AR (3) DGP with care of non-stationarity. His simulation results show that all the criteria did well in selecting true model in large samples(80%) as well as in small samples(round 60 %). These results are confirmed by Asghar and Abid (2007) while using AR (5) DGP. However they extended analysis by using normal and non-normal errors with structural breaks and conclude that no procedure works well in presence of structural breaks. Moreover, in small sample AIC and Hannan-Quinn criteria (HQC) perform comparatively better while SIC performs best in large samples.

Shittu & Asemota (2009) use AR models to compare the performance of different model's order determination criteria in terms of selecting correct model using different sample sizes. They found SIC and HQC better than others. They also found AIC provides results that are close to selecting order to their true value.

Basci, Zaman & Kiraci (2010) analyze the selection criteria (AIC, SIC, HQC, and Akiake information criteria corrected (AICc)) by replacing the prediction error squared sum (PRESS) by usual variance estimates. They used these criteria for selecting the lag length of AR (6) model when DGP is known. They found that for all the four criteria probability of selecting the correct dimension improves in large samples.

Through the simulation based comparison for autoregressive model of some information based criteria Shittu and Asemota (2009) confirms the results of Poskitt (1994) and Salau (2002) that AIC is inconsistent. BIC performs best in selecting true models in small samples, while HQC perform better in large samples. This attitude of BIC and HQC is also shown by Potscher (1991) for ARMA models.

Zaman (1984) discusses the properties of Akiake information criterion for the nested regression models. He showed the inconsistency of AIC theoretically and so found undesirable in selecting the order of autoregressive models and suggested the Bayes procedure.

2.3.2 Comparison based on Vector Autoregressive Models

Bruggmann & Lütkepohl (2001) investigated the four selection procedures (Full Search or all possible models, SER, Testing Procedure, Top Down) for selection of lag order in the context of VAR modeling. They find that all four strategies are incapable of identifying the true model but they behaved well in forecasting. They used simulation and used US monetary data for empirical results. Bruggmann et al. (2002) extended their study by including PcGets in the comparison. They found that subset strategies and PcGets are near to each other in many aspects. However the PcGets approach is more advantageous in forecasting.

Hacker and Hatemi (2008) use simulation to investigate AIC, SIC, HQC to choose the order of vector autoregressive (VAR). Their results comes out in favor of SIC, which shows SIC gives better performance in selecting VAR order in both small and large samples. Analogous results are found by the Lütkepohl (1985), Kadilar and Erdemir (2002) for VAR and SVAR.

Rehman (2010) use the RSS form of different information criteria and analytically compares their penalties and marginal penalties. He observes that generally BIC/SIC favors the selection of parsimonious models while AIC tends to support larger models based on the adjusted R-squares.

2.3.3 Comparative studies for Panel data

Although there is an extensive usage of panel data in research but few studies have applied and compare the model selection procedures for such type of data environment.

Judson and Owen (1999) investigate and compare the sample properties of least square dummy variable (LSDV) and pooled OLS models for dynamic panel data modeling. Through the simulation they analyzed the changes in the bias of the estimated coefficients due to the length of the panels. They conclude that in small time dimension panels LSDV performs better with less biased coefficients while with large time dimensions of panel lagged difference method (Anderson-Hsaio 1981) performs well.

Owen (2003) discusses the PcGets algorithm and focuses on its pre search reduction of variables and in the selection of the final model. Then he applied it to cross-section data. He concluded that it efficiently works for such type of data sources.

Castle(2005) in reply of Perez-Amaral et al.(2005),who found PcGets having distorted size and power for non-linear functions, compares PcGets and RETINA (Relevant Transformation of the Inputs Network Approach)) and find that RETINA commonly gets parsimonious models but it missed the relevant ones more often. Also PcGets performs well in searching true DGP but with some irrelevant variables and its size and power does not differ for non-linear functions.

2.3.4 **Comparisons based on Real data**

Koehler and Murphee in 1988 used the real time series data and use it to compare the AIC and SIC for selection of model order. Their results showed that AIC frequently gets the larger order of the selected model then expected which means it often faces over-parameterization. While SIC select the small order models along with good forecasts as compared to AIC.

Acquah (2010)and De-Graft (2012) used the price transmission model to compare AIC and SIC which is based on simulation and bootstrap approaches respectively. He concludes that AIC performs well in selecting true model for small samples but does not improve in large sample i.e. it appears inconsistent. On the other hand BIC showed much improvement in large samples and is found consistent. Markon and Krneger (2004) reach on a same conclusion using factor analysis.

Gayawan and Ipinyoni (2009) compare AIC, SIC and adjusted R^2 for real fertility data for Europe and Africa. They used different fertility models and found SIC as best to choose model with fewer variables than AIC and adjusted R^2 criteria.

2.4 Conclusion

The model selection procedure that has made rapid improvements in the recent past is general to specific modeling. The latest version of this which is named as third generation procedure is Autometrics (Doornik 2009). There is not much literature on comparing different model selection procedures especially the procedures which are used for regression model selection. The main emphasis of existing studies is the comparison of model selection procedures for univariate by using different information criteria. Few studies exist that look at panel data. The reasons may be the unavailability of databases and selection procedures for such frameworks. Nowadays, due to the availability of large databases, the research having panel data is getting more attention, so there is need to develop/ extend model selection procedures for such type of data. This thesis attempts to extend existing model selection procedures for panel frame work.

From the literature some patterns of the model selection procedures are clear. G-to-S has good powers and well behaved size in many data environments. Stepwise and other related strategies perform well in predictive properties. BIC/SIC are found consistent in many situation and select parsimonious models.HQC is also found consistent. AIC works well in small samples selecting true variables but selects the larger models more often and is found inconsistent.

Chapter 3

Model specification Methods and Methodology

Section I

Model Specification Methods

3.1 Introduction

As indicated previously, there are numerous model selection procedures. Most of these are available in statistical software's e.g. SPSS, STATA etc. and are commonly used by researchers over the past several years. These model selection procedures can be divided in two main classes; the structured and the unstructured procedures. The structured procedures are those in which the final model is achieved by an ordered process. They can be further classified as refined procedures, which select the model through a defined reduction structure (multiple paths) along with the data validity i.e. Autometrics. The other approaches include the procedures that determine the final model through single specific path reduction or variables addition i.e. the backward elimination method, forward selection and stepwise.

The unstructured procedures contain the class of strategies that select the final model in an unordered fashion i.e. they estimate all the possible models and then obtain the final model through using different criteria. They can also be subdivided into two parts i.e. Information based criteria and others including All possible models and Bayesian methods.

3.2 Structured Procedures

3.2.1 Multiple Path procedures

3.2.1.1 Autometrics

Hendry & Doornik (2007) and Doornik (2009) develop an automated algorithm for model selection which is based on General-to -specific approach framework and follows the work done by the Hoover and Perez (1999) and Hendry & Krolzig (2005). Beginning with general unrestricted model the approach use an enhanced search method known as tree search in place of multiple searches, which take the all sets and then systematically discards the irrelevant based on diagnostic test results. Different sub-models are then re-uniting to get the final model. It is known as 3rd generation algorithm and named as Autometrics and is included in Pc-Give software as a part. The algorithm of Autometrics can be divided in three stages as described below:

Stage I: Estimation and evaluation of GUM

The first stage contains the formulation, estimation and evaluation of a general unrestricted model (GUM), outlier detection through dummy saturation along with pre-search determination for lag-lengths. In the first part of this stage GUM is the formulated e.g.

$$Y = \beta_0 + \beta_1 X_1 + \dots\dots\dots + \beta_k X_k + \varepsilon$$

Where ε can be homoscedastic, heteroscedastic and auto-correlated.

Next, the GUM estimated through ordinary least squares and is then checked through a battery of diagnostic tests for uncorrelated and homoscedastic errors, misspecification of model and parameter constancy i.e. Heteroscedasticity test based on White (1980), Autocorrelation test represented by Godfrey (1978), Autoregressive conditional heteroscedasticity (ARCH) test by Engle (1982), Ramsey (RESET) test for misspecification (Ramsey 1969) and a Normality test based on approach by Doornik & Hansen(1994). If any of the tests fails then the researcher must decide whether to go back and provide a new GUM or drop down the significance level of that test, which can be resettled at the later stage.

Next, as an optional test, Autometrics uses the impulse saturation method of Santos et al. (2008) and Johansen and Nielson (2009) to detect the outliers. If any are detected they can be included in the GUM. In this test dummies are created for each observation and the data is then split in two or more parts for regression. The significant dummies are then added to the model to be estimated.

Another optional feature of Autometrics is to drop a set of irrelevant variables with very low significance levels. It is done so by ordering the variables according to their t-values and then dropping the set of insignificant variables (top-down search) or retaining a group of significant variables (bottom-up) through joint F-test. Another reduction is related to the lag length selection for which they used the F test until it is rejected. By default Autometrics does not apply these pre-searches for efficiency and time savings.

After the first stage a new GUM i.e. named as GUM 0 is formulated which may be similar to initial GUM or may include any dummy found to be significant in the dummy saturation detection or deletes variables or lags in the pre-search. GUM 0 will be the starting point of the next stage.

Stage II: Reduction Process

This step consists of multiple path searches for the terminal models. At this stage Autometrics attempts to simplify the general model i.e. GUM 0 by searching available paths generated by the insignificant variables using the enhanced tree search method, which speeds up the search by deleting repeated paths. If all the regressors in the GUM0 (found at the end of stage I) are significant then the algorithm stops and that will be the final model for that replication. For the case where there are some insignificant variables in GUM0, Autometrics will start the search by deleting an insignificant variable or a block of such variables. The terminal model is reached when all the variables in the model became significant as well as diagnostic test is passed for the reduced model. At any point during reduction path if reduction fails, Autometrics backtracks along the simplification path up to the previously accepted model and then go to the other reduction path.

After searching all the available paths of insignificant variables, if we get only one terminal model then it will be the final model for the replication. However, it may be a rare case, because Autometrics go through multiple paths in search of terminal models, so it may be possible to have more than one terminal model after the search. To handle this type of situation Autometrics combine the terminal models and check each terminal against the union of models i.e. the encompassing based approach by Cox (1961).The union of remaining terminal models that passes encompassing test will be the starting point of the next stage.

Stage III: Iterative Search

At this stage Autometrics repeats the steps of stage II up to the union of terminal models (Iterative multiple search). If the unions after stage III are similar to the union after stage II, the algorithm stops. If more than one terminal model are found after the encompassing test against the union, then the selection between the terminal models will be made on the basis of some information criteria i.e. AIC (1973, 1981), SIC (1978) and HQC (1979) .If the union at the end of two stages i.e. stage II and stage III differs the Autometrics will proceed another round for the search.

3.2.2 Single Path Procedures

Formulating a parsimonious model from the set of candidate variables is not straight forward process and most statistical packages i.e. SPSS, STATA etc. provide algorithms for model selection in multiple regressions. There exist algorithms that work by successive inclusion or reduction of significant or insignificant variables (forward selection and backward elimination) and the combination of these two, stepwise. Collectively, these algorithms are known as stepwise multiple regressions.

These algorithms were first proposed by Efroymson (1960) and thereon are widely used by researchers for modeling task and so are included in different comparative studies i.e. Lovell (1983), Hoover and Perez (1999), Kudo & Sklansky (1999), Bruggmann & Lütkepohl (2001), Hendry and Krolzig (2001), Bruggmann, Lütkepohl & Krolzig (2002) and Reunanen (2003).

3.2.2.1 Forward selection Procedure

Forward selection or uni-directional-forward selection starts without any variable in the model but it estimate linear regression for all the candidate variables separately i.e.

$$Y = \beta_0 + \beta_i X_i + \varepsilon \ \forall i = 1..........k$$

Where Y is the dependent variable, X's are candidate variables and β's are coefficients.

Variables are then added to the model one at a time based on their p-values or t-statistics. For each of the variables, forward selection calculates t-statistic or p-value. If the p-value criterion is used for adding the variable to the model, a variable with the lowest p-value along with condition that it is lower than the specified stopping criteria, will be entered to the initial model. Once a variable enters in the model it is not removed. This addition of variables continues by selecting the variable with next lowest p-value, given that the first added variable is included.

$$Y = \beta_0 + \beta_1 X_1 + \beta_i X_i + \varepsilon \qquad \forall i = 2..........k$$

The selection procedure continues up to the point when none of the remaining variables has a p-value lower than the specified stopping value or all the variables included in the model.

3.2.2.2 Backward Elimination Procedure

Backward elimination procedure or uni-directional-backward is reversed version of forward selection procedure, unlike forward selection algorithm it begin with the general model which includes all the candidate variables i.e.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon$$

The model is then estimated and calculates the p-values for the variables, if the p-value criterion is used. Then it successively deletes variables one by one from the model on the basis of largest p-value that are greater than the specified value. This deletion continues for the next highest p value, given that the first variable is already deleted i.e.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_{k-1} X_{k-1} + \varepsilon$$

The procedure stops deletion when no remaining variables in the model have greater p-value than the specified stopping value.

3.2.2.3 Step-wise Regression Procedure

The stepwise procedure is a combination of the forward selection procedure and backward elimination procedure i.e. it uses both criterion the lowest p-value than specified one for entering variable and highest p-value than specified for deletion. Like the forward selection algorithm it starts without any variables in the model i.e.

$$Y = \beta_0 + \beta_i X_i + \varepsilon \qquad \forall i = 1.........k$$

It estimate candidate variable separately and calculates the p-values for each of the candidate variable. It adds variable to the model with lowest p-value which is also smaller than the specified p-value. The variable with next lower p-value is added, given that the first variable has already been included i.e.

$$Y = \beta_0 + \beta_1 X_1 + \beta_i X_i + \varepsilon \qquad \forall i = 2.........k$$

After the addition, the variables already added in the model do not necessarily stay there (like forward selection procedure) in the next steps. The stepwise technique rechecks the variable already included in the model and deletes any variable that have p-values greater than the specified p-value. After rechecking the included variables, the next variable is added. At each addition, all the previously included variables are checked against the specified removal p-value. This procedure stops when there remain no variable i.e. outside the model with a p-value lower than specified entering level and inside the model with the p-value higher than the specified deletion level.

3.3 Unstructured Procedures

3.3.1Procedures based on Information Criteria

Amongst the list of model selection procedures based on information criteria, the Akiake information criteria (Akiake 1973) and the Schwarz information criteria (Schwarz 1978) are the most popular. Information criteria calculate a model that adds variables, set of penalties assessed by incorporating such variable. Value of the gain from a restrict model while imposing penalties for incorrect variable. They select the models with lowest values. The general form of both the procedures is same but differs in penalty i.e. $\ln(\sigma^2) + Penalty$, where $\sigma^2$is the maximum likelihood estimate of the error variance for a given model and *Penalty* is a function that monotonically increases in the number of co-efficient to be estimated. Due to their tendency to over fit there are small sample corrections available for AIC and SIC known as AIC corrected (AICc) and SIC corrected (SICc) which were developed by Hurvich and Tsai (1989) and McQuarrie (1998) respectively.

3.3.1.1 Akiake Information Criteria

An Akiake information criterion (AIC), introduced by Akiake (1973), is a measure of goodness of fit of the model. It is a relative measure of the information lost when a given model is used to reflect reality. The model having the minimum AIC supposed to be the best. It has been used from decades and many studies find it good in selection of the true lag order and predictive power when sample size is small. Acquah (2010), Kundu & Murali (1995), Hastie et al. (2005) and is given as:

$$AIC = \ln(\sigma^2) + 2(k+1)/T$$

The likelihood form is

Akiake information Criteria= $AIC = -2(l/T) + 2(k/T)$,

Where σ^2 is error variance, k is the number of parameter estimated using T observations and l be the value of log likelihood function is given by;

$$l = -T/2(1 + \log(2\pi) + \log(\varepsilon'\varepsilon/T))$$

3.3.1.2 Akiake Information Criteria corrected

This criterion is modified version of AIC and so is called AIC corrected (AICc) and is formulated by Hurvich and Tsai (1989). They include the serial order correction for small sample size as AIC gives over fitted models in small samples. Burnham & Anderson (2002) proposed strongly using AICc if n or k is small. Kletting & Glatting (2009) found it better for selecting small models, Hacker & Hatemi (2008) found AICc better in lag-choosing and in forecasting for small samples. It is written as:

Akiake information Criteria corrected $AICc = \ln(\sigma^2) + (T + K + 1) / (T - K - 3)$

Which has the likelihood form:

Akiake information Criteria Corrected= $AICc = -2(l / T) + 2(k / T)$

Where k is the number of parameter estimated using T observations and l be the value of log likelihood function is given by;

$$l = -T / 2(1 + \log(2\pi) + \log(\varepsilon' \varepsilon / T))$$

3.3.1.3 Schwarz/Bayesian Information criteria

Bayesian information criterion or Schwarz a criterion (BIC or SBC) is formulated by Schwarz (1978), and is another criterion for model selection which includes a penalty term for the number of parameters in model. Given the set of models, the model with lower value of BIC or SBC should be preferred. There are numerous studies which find this criterion good in selecting small lag-length of different models AR, VAR and also having good prediction properties when n is large. Gayawan & Ipinyoni (2009), Acquah (2010), Rust et al. (1995), Rahman (2010),Hacker & Hatemi (2006, 2009). It is given as:

Schwarz/Bayesian information Criteria $SIC = \log(\sigma^2) + (k+1)\ln(T)/T$

Schwarz/Bayesian information Criteria $SIC = -2(l/T) + k\log(T)/T$

Where k is the number of parameter estimated using T observations and l be the value of log likelihood function is given by;

$$l = -T/2(1 + \log(2\pi) + \log(\varepsilon'\varepsilon/T))$$

3.3.1.4 Schwarz/Bayesian Information Criteria Corrected

As said earlier like AIC,BIC also have a tendency to produce an over-parameterized model so Macquarie and Tsai (1998) introduced a corrected Bayesian information criteria , in which they developed the small sample correction by inducing extra penalty and is given as:

$$SICc = \log(\sigma^2) + (k+1)\ln(T)/(T-k-3)$$

Its log likelihood form can be written as:

Schwarz/Bayesian information Criteria $SICc = -2(l/T) + k\log(T)/T$

Where k is the number of parameter estimated using T observations and l be the value of log likelihood function is given by;

$$l = -T/2(1 + \log(2\pi) + \log(\varepsilon'\varepsilon/T))$$

3.3.1.5 Hannan -Quinn Information Criteria

An alternative to AIC & BIC is Hannan-Quinn information criteria (HQC),based on the same penalty function, is developed by Hannan & Quinn(1979).They showed through simulation that in case of order selection of autoregressive models, HQC performs better than BIC. Shittu & Asemota (2009), Hacker & Hatemi (2006) find HQC good in large samples for getting true lag order. Its error variance form is

$$HQC = T\log(\sigma^2) + 2k\log(\log(T))$$

It can also be written as log likelihood form

Hannan-Quinn Information Criteria= $HQC = -2(l/T) + 2k\log(\log(T))/T$

Where k is the number of parameters estimated using T observations and l be the value of log likelihood function is given by;

$$l = -T/2(1 + \log(2\pi) + \log(\varepsilon'\varepsilon/T))$$

3.3.2 Regression based unorganized criteria

3.3.2.1 Bayesian approach

The Bayesian approach assumes that the information about unknown parameters should be represented in the form of a density. Before observing the data, prior information is summarized by the prior density. After observing the data, Bayes formula is used to update the prior and develop the posterior density. This includes both the prior and the data information. The posterior distribution contains all our information about the parameter after observing the data. Thus the prior-to-posterior transformation formulae immediately yield formulae for Bayesian estimators of regression parameters. The formula is easiest when the prior information is in the form of a normal density. To analyze the Bayesian approach one has to estimate all the possible combinations.

3.3.2.2 All possible regression

In this method all the possible combinations are used in the generating the final model. Then the Cp (Mallows) criterion is used for the selection of the best model which is given as:

$C_p = SSE_p/S^2 - N + 2P$ where $SSE_p = \Sigma(Y_i - Y_{pi})^2$, N is sample size, P is no of regressors, Y_{pi} is predicted values and S^2 is residual mean square. The lowest the Cp Mallows the better the model is. The number of estimating models increase with the number of variables included e.g. if one have 5 variables he would estimate 31 i.e. 2^n-1 models. As number of candidate variables grows it become complicated to estimate all the possible models e.g. for 10 variables one would estimate 1023 models and so on.

3.4 Limitations

The intention of this research is to guide common researcher in the selection of model selection procedures while using the panel data environment which is rare in the literature. Focus is on the procedures that are commonly used by the social science practitioners and easily available in statistical software packages. This study examines Autometrics, since it is based on general to specific approach which has been used for decades. Stepwise, forward selection and backward elimination are frequently used in all sciences. All the information criteria explained have also been used in selecting regressions and the order of autoregressive models. Bayesian and all possible regressions are not considered since these both are not of wide use in practice due to selection of prior and extensive computations respectively. Such procedures are not available in common software packages.

Section II

Methodology

3.5 Introduction

When it comes to the question of measuring the performance of the model selection procedures then one can find in literature numerous ways of assessing the performance of the above mentioned criteria. The choice of performance measure depends on the research purpose. We are trying to evaluate model selection procedures i.e. how well a specific procedure selects the true model, while controlling the data generating process (DGP), and also how frequently they choose the correct variables. Castle et al. (2010) list the following commonly used/ possible performance measures:

i) Probability of selecting DGP

ii) The Potency: Retention rate of relevant variables.

iii) The Gauge: Retention rate of irrelevant variables.

Suppose there are L total numbers of candidate variables, K are the relevant variables contained in the DGP with non-zero β coefficients, and L-K is number of irrelevant variables.

3.6 Performance Measuring Criteria

3.6.1 Probability of getting True model

The probability of retaining the DGP is the frequency that the model selection procedure selects the DGP as the final model. This method of analyzing the performance of a model is used by Basci, Zaman & Kiraci (2010), Shittu & Asemota (2009) and Rust et al. (1995) in their analysis of different selection criteria. Bruggmann, Krolzig & Lütkepohl (2002) and Bruggmann & Lütkepohl (2001), Hacker & Hatemi (2009) also used this performance criterion in comparing different selection procedures in context of VAR modeling.

3.6.2 Potency

The second measure which is analogous to power, i.e. Potency calculates average retention rates over the relevant variables. It is recommended by Castle et al. (2010) and used by Castle et al. (2011).

If the retention rate for the given variable 'i' across the M replications is defined as:

If $\hat{\beta}_i \neq 0$ for $i = 1.....L$

$$\tilde{p}_i = 1/M\sum_{i=1}^{M} I(\hat{\beta}_i \neq 0)$$

Then $Potency = \frac{1}{K}\sum_{i=1}^{K}\tilde{p}_i$, where K is the number of relevant variables

3.6.3 Gauge

Castle et al. (2010) recommend another measure Gauge, for the performance of model selection procedure which calculates average retention rates over the irrelevant variables. It is analogous to the size in the statistical procedures. It is used by Castle at el. (2011).

For the retention rate P_i defined above, Gauge is given as:

$$Gauge = \frac{1}{L-K}\sum_{i=K+1}^{L} \tilde{p}_i, \text{ where L-K is the number of irrelevant variables}$$

3.7 Experimental Design

We conducted the Monte-Carlo experiment for our comparison of different variable selection procedures. We did experiment for panel data as well as for time series univariate. In this regard our first step was to develop a well-defined DGP. We intend to find procedure that performs comparatively better in different situations so we used the following DGP's.

3.7.1 Univariate Data

We used two types of data, univariate and panel. The basic idea of univariate is to compile our results with previous studies. In univariate data environment we used static model in comparing the performance of model selection procedures which is given as below;

3.7.1.1 Static Models

$$y_t = \alpha + \sum_{i=1}^{k} \beta_i x_{it} + e_t \qquad \text{....................}(3.1)\text{ where } t = 1\text{........}T \text{ and } e_t \sim iid(0,1)$$

Here $x_t = v_t \qquad v_t \sim IN[0, I]$

Where y_t is dependent variable α is intercept, k is the number of variables from the set of L included in DGP and x's are fixed random numbers. $e_t \sim iid(0,1)$. Such types of

DGP's are used by Hendry and Krolzig (2001), Castle (2005), Doornik (2009) and Castle et al. (2011).

3.7.2 Panel Data

Along with univariate data analysis the main objective of this study is to analyze the above mentioned model selection procedure on the panel based models. Nowadays, in economics typical panel or longitudinal data set may contain a large number of observations on numerous individuals companion or countries across several time periods points thus provides rich sources of information about the economy e.g. statistics of OECD, labor force survey (LFS), national longitudinal survey (NLS), panel study of income dynamics (PSID). The basic panel data model can have form:

$$Y_i = X_i\beta_i + \varepsilon_i, \quad i = 1......N, \quad \text{where}$$

$$Y_i = \begin{pmatrix} y_{1i} \\ y_{2i} \\ \vdots \\ y_{Ti} \end{pmatrix}, X_i = \begin{pmatrix} x_{1i1} & \cdots & x_{Ki1} \\ x_{1i2} & \cdots & x_{Ki2} \\ \vdots & \ddots & \vdots \\ x_{1iT} & \cdots & x_{KiT} \end{pmatrix}, \beta_{ki} = \begin{pmatrix} \beta_{1i} \\ \beta_{2i} \\ \vdots \\ \beta_{Ki} \end{pmatrix}, \varepsilon_i = \begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \\ \vdots \\ \varepsilon_{Ti} \end{pmatrix}$$

Where Y is $NT \times 1$ vector of dependent variables for each cross section, X is $NT \times K$ vector of independent variables for each cross section, β is $K \times 1$ vector of coefficients for each cross section and ε_i having $NT \times 1$ error vector.

3.7.2.1 Constant Coefficient Model / Pooled regression

The simplest model in panel modeling domain is known as constant coefficient model (CCM) which is applicable to all the individuals simultaneously under the assumption of common characteristics of all groups i.e. no heterogeneity. Then all the data can be pooled together and standard pooled ordinary least square (POLS) techniques can be used to get consistent and efficient regression parameters.

After pooling the data

$$\begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ \vdots \\ Y_N \end{pmatrix} = \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ \vdots \\ X_N \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \vdots \\ \beta_N \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \vdots \\ \varepsilon_N \end{pmatrix}$$

Where Y is $NT \times 1$ vector of dependent variables, X is $NT \times K$ vector of independent variables, β is $K \times 1$ vector of coefficients and ε_i having $NT \times 1$ error vector. Each Y_i,

X_i and ε_i are given as below

$$Y_i = \begin{pmatrix} y_{1i} \\ y_{2i} \\ \vdots \\ y_{Ti} \end{pmatrix}, X_i = \begin{pmatrix} x_{1i1} & \cdots & x_{Ki1} \\ x_{1i2} & \cdots & x_{Ki2} \\ \vdots & \ddots & \vdots \\ x_{1iT} & \cdots & x_{KiT} \end{pmatrix}, \beta_{ki} = \begin{pmatrix} \beta_{1i} \\ \beta_{2i} \\ \vdots \\ \beta_{Ki} \end{pmatrix}, \varepsilon_i = \begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \\ \vdots \\ \varepsilon_{Ti} \end{pmatrix} \text{Let}$$

$$Y = \begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_N \end{pmatrix}, X = \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ X_N \end{pmatrix}, \beta = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_K \end{pmatrix} and \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_T \end{pmatrix}$$

It can be represented as

$$Y = X\beta + \varepsilon \qquad \text{..................(3.2)}$$

This model can be estimated by using pooled ordinary least square technique by the following estimator.

$$\hat{\beta}_{pols} = (X'X)^{-1}(X'Y) \quad ....(3.3)$$

3.7.2.2 Fixed Effect Model

Fixed effect model (FEM) allows the intercept term to vary across individuals while all the slope parameters are assumed remain constant over cross sections and time. The term fixed here indicates that the term is not varying over the time, it does not mean that it is non-stochastic i.e. intercept may vary across individuals/groups but not across time. It is also called a heterogeneity model because it accounts for the difference across cross sections. To estimate the model we can use dummy variable approach by introducing dummies for each individual/group that can be estimated through OLS. Due to the loss of degrees of freedom this approach is often not feasible. A way which avoids this problem, is to estimate fixed effect model by using centralized variables /mean corrected variables in OLS to get coefficient estimates.

To capture the cross-sectional heterogeneity, induced due to the different intercepts for each section, and to estimate the intercept for each cross section a T x N matrix Z_i is introduced. Where the ith column is a T x1 vector of ones and the rest of vector consist of zero vectors of dimension T x1 i.e.

$$Z_1=\begin{pmatrix}1&0&\cdots&0\\1&0&\cdots&0\\\vdots&\vdots&\ddots&\vdots\\1&0&\cdots&0\end{pmatrix},Z_2=\begin{pmatrix}0&1&\cdots&0\\0&1&\cdots&0\\\vdots&\vdots&\ddots&\vdots\\0&1&\cdots&0\end{pmatrix}............Z_N=\begin{pmatrix}0&0&\cdots&1\\0&0&\cdots&1\\\vdots&\vdots&\ddots&\vdots\\0&0&\cdots&1\end{pmatrix}$$

it can be written as

$$Z_1=(\mathbb{C}\quad 0\quad\cdots\quad 0),Z_2=(0\quad\mathbb{C}\quad\cdots\quad 0),............Z_N=(0\quad 0\quad\cdots\quad\mathbb{C})$$

where C is t x 1 vector of ones and 0 is t x 1 zero vectors. So

$$Z=\begin{pmatrix}Z_1\\Z_2\\\vdots\\Z_N\end{pmatrix}\Rightarrow Z=\begin{pmatrix}\mathbb{C}_1&0&\cdots&0\\0&\mathbb{C}_2&\cdots&0\\\vdots&\vdots&\ddots&0\\0&0&\cdots&\mathbb{C}_N\end{pmatrix}$$

The general form of panel data now can be written in the following form

$$Y=Z\beta_0+X\beta+\varepsilon \qquad \text{--------------------------(3.4)}$$

$$\begin{pmatrix}Y_1\\Y_2\\\vdots\\Y_N\end{pmatrix}=\begin{pmatrix}Z_1\\Z_2\\\vdots\\Z_N\end{pmatrix}\begin{pmatrix}\beta_{01}\\\beta_{02}\\\vdots\\\beta_{0N}\end{pmatrix}+\begin{pmatrix}X_1\\X_2\\\vdots\\X_N\end{pmatrix}\begin{pmatrix}\beta_1\\\beta_2\\\vdots\\\beta_K\end{pmatrix}+\begin{pmatrix}\varepsilon_1\\\varepsilon_2\\\vdots\\\varepsilon_N\end{pmatrix}$$

Where Y_i, X_i, Z_i and ε_i are given as below

$$Y_i=\begin{pmatrix}y_{1i}\\y_{2i}\\\vdots\\y_{Ti}\end{pmatrix},X_i=\begin{pmatrix}x_{2i1}&\cdots&x_{Ki1}\\x_{2i2}&\cdots&x_{Ki2}\\\vdots&\ddots&\vdots\\x_{2iT}&\cdots&x_{KiT}\end{pmatrix},\beta=\begin{pmatrix}\beta_2\\\beta_3\\\vdots\\\beta_K\end{pmatrix},\varepsilon_i=\begin{pmatrix}\varepsilon_{1i}\\\varepsilon_{2i}\\\vdots\\\varepsilon_{Ti}\end{pmatrix}$$

$$Z_i = \begin{pmatrix} \mathbb{C}_1 & 0 & \cdots & 0 \\ 0 & \mathbb{C}_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & 0 \\ 0 & 0 & \cdots & \mathbb{C}_N \end{pmatrix}, \beta_0 = \begin{pmatrix} \beta_{01} \\ \beta_{02} \\ \vdots \\ \beta_{0N} \end{pmatrix}$$

$$Y = \begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_N \end{pmatrix}, \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ X_N \end{pmatrix}, \begin{pmatrix} \beta_{0i} \\ \beta_2 \\ \vdots \\ \beta_K \end{pmatrix} and \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_N \end{pmatrix}$$

In equation (3.4) if we decompose the error term into two components i.e. into an cross sectional effect α_i and the disturbance which vary over time and cross-sections, it look like as

$$\varepsilon_{it} = \alpha_i + \nu_{it} \qquad \text{.....................(3.5)}$$

It is assumed that α_i is independent across sections while ν_i is independent across time and cross sections. There is some assumption for α_i fixed effect model

$$\alpha_i \sim N(0, \sigma^2_{\alpha_i}) and \nu_{it} \sim N(0, \sigma^2_\nu)$$

$$E(\alpha_i) = 0, E(\alpha_i^{'}\alpha_i) = \sigma^2_\alpha \; and E(\alpha_i^{'}\alpha_j) = 0 \, for \, i \neq j$$

$$E(\nu_{it}) = 0, E(\nu_{it}^{'}\nu_{it}) = \sigma^2_\nu and E(\nu_{it}^{'}\nu_{jt}) = 0 \, for \, i \neq j$$

$$and E(\alpha_i^{'}\nu_{jt}) = 0$$

So the equation (3.4) after putting equation (3.5):

$$Y = Z\beta_0 + X\beta + \alpha_i + v_{it}$$
$$Y = Z(\beta_0 + \alpha_i) + X\beta + v_{it}$$
$$Y = \beta_0 i + X\beta + v_{it}, for i = 1,2......N and t = 1,2.....T$$

To estimate fixed effect model is we used centralized variables /mean corrected variables in OLS to get coefficient estimates given as

$$\widehat{\beta}_{FE} = (\sum_{i=1}^{n}\sum_{t=1}^{T_i}(x_{itk} - \bar{x}_{i.k})(x_{itk} - \bar{x}_{i.k})^{-1})\sum_{i=1}^{n}\sum_{t=1}^{T_i}(x_{itk} - \bar{x}_{i.k})(y_{itk} - \bar{y}_{i.k})) \quad .....(3.6)$$
$$and \quad \alpha_i = \overline{Y}_i - \overline{X}_i\beta$$

3.7.2.2 Random Effect Model

As an alternative to a fixed effect model we have the random effect model (REM) which is also called error component model. Similar to the fixed effect model, the intercept term also varies across individuals but here it is assumed as a random variable with mean 0 and variance σ^2. Since the disturbance term consists of a two terms the random coefficient model is also known as the error component model (ECM). In this model the OLS estimates are inefficient, therefore efficient estimates can be obtained using feasible generalized least square(FGLS).

The general model is.

$$Y = Z\beta_0 + X\beta + \varepsilon \qquad ....(3.7)$$

$$\begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_N \end{pmatrix} = \begin{pmatrix} Z_1 \\ Z_2 \\ \vdots \\ Z_N \end{pmatrix} \begin{pmatrix} \beta_{01} \\ \beta_{02} \\ \vdots \\ \beta_{0N} \end{pmatrix} + \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ X_N \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_K \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_N \end{pmatrix}$$

Where Y_i, X_i, Z_i and ε_i are given as below

$$Y_i = \begin{pmatrix} y_{1i} \\ y_{2i} \\ \vdots \\ y_{Ti} \end{pmatrix}, X_i = \begin{pmatrix} x_{2i1} & \cdots & x_{Ki1} \\ x_{2i2} & \cdots & x_{Ki2} \\ \vdots & \ddots & \vdots \\ x_{2iT} & \cdots & x_{KiT} \end{pmatrix}, \beta = \begin{pmatrix} \beta_2 \\ \beta_3 \\ \vdots \\ \beta_K \end{pmatrix}, \varepsilon_i = \begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \\ \vdots \\ \varepsilon_{Ti} \end{pmatrix}$$

$$Z_i = \begin{pmatrix} \mathbb{C}_1 & 0 & \cdots & 0 \\ 0 & \mathbb{C}_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & 0 \\ 0 & 0 & \cdots & \mathbb{C}_N \end{pmatrix}, \beta_0 = \begin{pmatrix} \beta_{01} \\ \beta_{02} \\ \vdots \\ \beta_{0N} \end{pmatrix}$$

$$Y = \begin{pmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_N \end{pmatrix}, \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ X_N \end{pmatrix}, \begin{pmatrix} \beta_{0i} \\ \beta_2 \\ \vdots \\ \beta_K \end{pmatrix} and \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_N \end{pmatrix}$$

The model is same to fixed affect in representation but the assumptions are different here. Instead of treating β_0 as fixed in equation (3.7) it is assumed as random variable with mean value of β_1 i.e.

$$\beta_{0i} = \beta_0 + \alpha_i \qquad \text{where} \quad i = 1, 2.....N$$

Here α_i is the random term with zero mean and variance equal to σ_α^2 .There is some assumption for α_i random effect model

$$\alpha_i \sim N(0,\sigma_\alpha^2) \text{ and } \nu_{it} \sim N(0,\sigma_\nu^2)$$

$$E(\alpha_i)=0, E(\alpha_i'\alpha_i)=\sigma_\alpha^2 \text{ and } E(\alpha_i'\alpha_j)=0 \quad \text{for } i\neq j$$

$$E(\nu_{it})=0, E(\nu_{it}'\nu_{it})=\sigma_\nu^2 \text{ and } E(\nu_{it}'\nu_{jt})=0 \quad \text{for } i\neq j$$

$$\text{and} \quad E(\alpha_i'\nu_{jt})=0$$

The coefficients of the random effect model are estimated through feasible generalized least square instead of OLS as;

$$\widehat{\beta}_{RE}=(\sum_{i=1}^{n}X_i'V_i^{-1}X_i)^{-1}(\sum_{i=1}^{n}X_i'V_i^{-1}Y_i) \text{ where } V_i=\sigma_\alpha^2 J_i+\sigma^2 I_i \text{ ....(3.8)}$$

Here J_i is s T x T matrix of ones and I_i is T x T identity matrix.

3.7.2.4 Random Coefficient Model

In the random effect model we only take intercept as the random term. But with sufficiently large data sets, the idea of random parameters can also be incorporated that is, the other coefficients may also vary randomly across individual's (Swamy 1970) .i.e.

$$Y_{it}=\beta_{it}X_{it}+\varepsilon_{it} \text{ and } \beta_{it}=\beta+\alpha_i \quad \text{where } i=1.....N \text{ and } t=1......T$$

Where α_i is random with zero mean and Δ variance.

In such models, all the intercepts and the slope coefficients are random, so this is known as the random coefficient model. The two step generalized least square is used to estimate the parameters of these models under the assumption that

$$E(\alpha_i) = 0, E(\alpha_i x'_{it}) = 0 and E(\alpha_i \alpha'_j) = \begin{Bmatrix} \Delta for i = j \\ 0 for i \neq j \end{Bmatrix}$$

It is assumed that the α_{it} are independently and normally distributed over cross sections i with zero mean and covariance Δ. This means that there are only individual specific effects, which remain constant over time. The random coefficient model can be written in stacked form as:

$$Y = \overline{Z}\overline{\gamma} + W\alpha + u \qquad \text{..................(3.9)}$$

Where

$$\underset{NT\times1}{Y} = \begin{pmatrix} Y_1 \\ \vdots \\ Y_N \end{pmatrix}, \underset{T\times1}{Y_i} = \begin{pmatrix} y_{i1} \\ \vdots \\ y_{iT} \end{pmatrix}, \underset{NT\times l}{\bar{Z}} = \begin{pmatrix} Z_1 \\ \vdots \\ Z_N \end{pmatrix}, \underset{T\times1}{Z_i} = \begin{pmatrix} z'_{i1} \\ \vdots \\ z'_{iT} \end{pmatrix}, \underset{NT\times1}{u} = \begin{pmatrix} u_1 \\ \vdots \\ u_N \end{pmatrix}, \underset{T\times1}{u_i} = \begin{pmatrix} u_{i1} \\ \vdots \\ u_{iT} \end{pmatrix},$$

$$\underset{NT\times Np}{W} = \begin{pmatrix} W_1 & 0 & \cdots & 0 \\ 0 & W_2 & \cdots & 0 \\ \vdots & \cdots & \ddots & \vdots \\ 0 & 0 & \cdots & W_N \end{pmatrix}, \underset{T\times p}{W_i} = \begin{pmatrix} w'_{i1} \\ \vdots \\ w'_{iT} \end{pmatrix}, and \underset{Np\times1}{\alpha} = \begin{pmatrix} \alpha_1 \\ \vdots \\ \alpha_N \end{pmatrix}$$

It is also assumed that α and μ are mutually independent with

$$E(u) = 0, \quad and \quad E(uu') = C$$

Suppose $v = W\alpha + u$ then

$E(v) = 0, and$
$E(vv') = W(I_N \otimes \Delta)W' + C = \Omega$, this equation (3.9) can take form as:

$$Y = \overline{Z}\overline{\gamma} + v$$

Here v has non-spherical covariance matrix and mean coefficient vector $\overline{\gamma}$ and covariance matrix of v, Ω are to be estimated.

If Δ and C are known the GLS will generate the best linear unbiased estimator of $\overline{\gamma}$ as

$$\hat{\overline{\gamma}} = (\overline{Z}'\Omega^{-1}\overline{Z})^{-1}(\overline{Z}'\Omega^{-1}Y) \quad \text{..................(3.10)}$$

With covariance matrix;

$$D = Cov(\hat{\overline{\gamma}}) = (\overline{Z}'\Omega^{-1}\overline{Z})^{-1}$$

If Δ and C are not known, than two step GLS estimator will be applied. In two step GLS first we estimate Δ and C in second step $\overline{\gamma}$ will be estimated by putting Δ and C in equation (3.9).

3.7.3 Development of Model selection procedures for Panel data

To achieve the main objective that is to establish/ develop Autometrics and other model selection procedures for different panel data models, we used constant coefficient model, fixed effect model, random effect model and random coefficient model procedures explained in sub-section 3.7.2 and their estimates given by equations 3.3, 3.6, 3.8, 3.10.

These are developed and obtained by using Autometrics, stepwise, forward selection and backward elimination procedures from sub-section 3.2 in Matlab program. It is programmed to intend that it will be applicable for common researcher and to help them for selecting models in real world panel framework which are more useful in policy making and other social sciences decisions.

3.8 Experimental Sequence

3.8.1 Univariate simulation design

For the static model the DGP used to generate the data is presented in equation (3.1). The set of candidate variables X_{it} 's are generated by zero mean and unit variance and are kept fixed in all experiments. The error term are generated by $e_t \sim iid(0,\sigma^2)$ keeping variance equal to 1 throughout the experiment. The β's in DGP have non-zero coefficients based on different t-values.

The general unrestricted model (GUM) consists of DGP and the other irrelevant variables along with constant. Our experiment varies in number of ways i.e. Ratio of relevant and irrelevant variables in the GUM, sample size and values of β's coefficients. As we are using some model selection procedures based on information criteria i.e. AIC, BIC and others and they need estimation of 2^n-1 all possible combinations e.g. If we have 10 variables in the GUM then 1023 model will be estimated. So the GUM is limited to include 6 variables. The different ratio of relevant-irrelevant variables (k/L) is used i.e. 0.25, 0.50, and 0.75. This variation is used to see how model selection procedures respond when there are fewer variables and as well as when there are more relevant variables. The value of β's varies from 1,2...8,10, 12 along the experiments. For static models we use sample size of 50, 100 and 200 to see the consistency of the procedure. The level of significance and Monte-Carlo simulation size are kept 0.05 and 500 all along the experiments. Matlab is used for all the simulations.

3.8.2 Panel Data simulation Design

As mentioned earlier, our main objective is to analyze performance of model selection procedures in panel circumstances. For this a more detailed design is used. Sample size is extended by including class of 25 sample sizes along with 50,100 and 200. Moreover, the k/L ratio options are also increased. We used three k/L ratio for univariate analysis but to get more detailed picture we used five k/L ratios i.e. 0.1, 0.25, 0.50 and 0.75, 1. The value of β's varies according to respective t-values of 1,2...8, 10 and 12 along the experiments. Since we are using four panel data models i.e. CCM, FEM, REM and RCM, and each have different assumption, therefore we generated data under the assumption of respective model. The data generating processes for these models are given by equations (3.2), (3.4), (3.7) and (3.9) respectively.

Chapter 4

Results and Discussion

4.1 Introduction

In this chapter, I present the results of the simulation experiments while using eight model selection procedures discussed in detail in previous chapter. I use two types of data environment the time series univariate and panel. The main objective of this study is to develop Autometrics for panel data and compare it with other model selection procedures for panel environment. The univariate is used to compare our results with the literature. These strategies are programmed in Matlab version 2009 for univariate and then for panel estimations. This chapter has two sections, section one contains results and discussion for the univariate data case and in section II the panel data results are discussed for different panel data models.

Section I

4.2 Univariate Data

There are different types of univariate models used for comparison of model selection procedures in the literature e.g. static, autoregressive and models with error correlation, autoregressive distributed lagged models, random models etc. But the most commonly regression models are static. Krolzig and Hendry (2001), Castle (2005), Doornik (2009), Castle et al. (2011). To link our results with the literature, the static models are used in the analysis. To see the performance of procedures in different situations e.g. sample size variation, different t-values and the ratio of relevant and irrelevant in the model, there are different criteria are proposed and used.See Hendry et al (2010) . In this study I compare the performance of procedures on the basis of the probability of getting the true model, Potency and Gauge. The last two are analogous to power and size in statistical hypothesis testing respectively. In the following section a brief overview of the results are discussed. Detail results regarding to all models are given in the annexure A to E.

4.2.1 Sample size variation effect on the Performance of procedures

Figure 1 shows the effect of sample size on the performance of procedures through probability of getting true model, potency and gauge. To show the sample size effect, the number of relevant variables in the GUM and t-values are fixed at 3 and 6 respectively but the sample size is allowed to vary. In small sample the overall probabilities of getting true model are not very high (round 40 %). As the sample size increases the probability of getting the true model goes upwards for all the procedures except for the AICs (AIC and AICc). This sample size variation matters more where the t value is low. Similar with previous studies the BICs versions (BIC and BICs) are most consistent; however, Autometrics did comparatively well with results similar to those of the BICs.

The potency of all the procedures becomes more than 95 % for the sample size 100 and 200. So the procedures can be compared only for the small samples. Here AICs and HQC perform somewhat well than others (round 85%) while other have potency round 70 %.

Regarding selection of irrelevant variables in the final selected model here we use the 1-Gauge instead of Gauge. Since gauge is the probability of the getting irrelevant variables in the final model and 1-gauge is the probability of dropping or not getting the irrelevant variables, so the procedure that has a higher value of 1-gauge should be better. As the sample size increases all the procedures have increased their probabilities of not getting irrelevant variables. However BICs are the best in dropping irrelevant variables across all sample sizes. After that it turns out to be Autometrics. Stepwise procedures and HQC also have increasing pattern along sample size. But the AICs found to be the worst and showed no effect of sample size on performance.

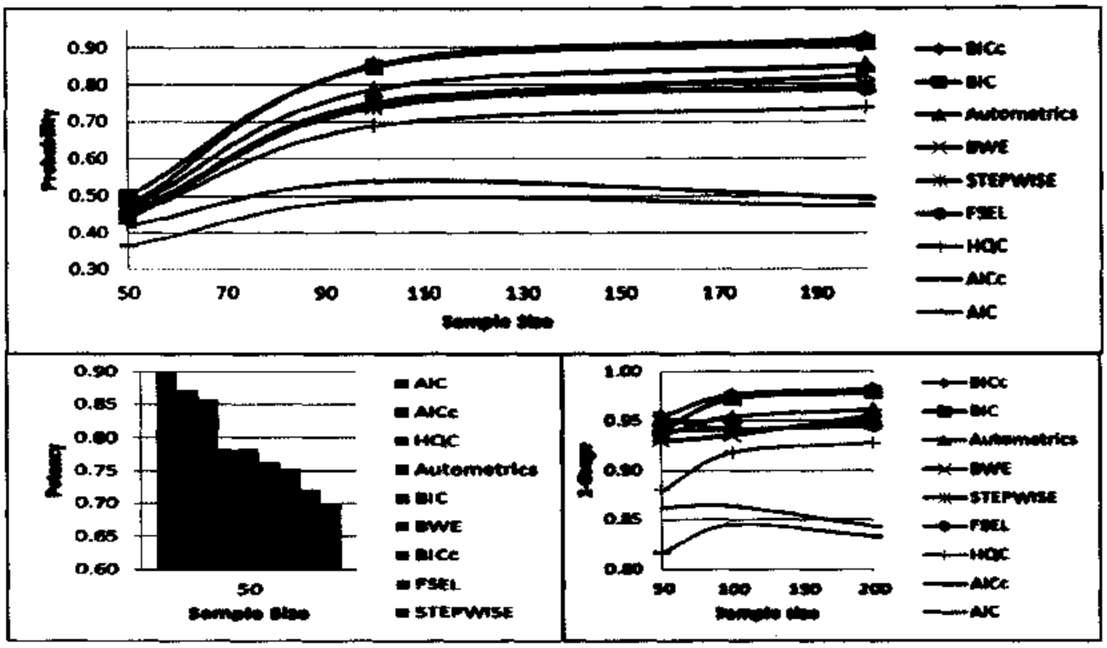


Figure 1Sample size effect on Probability, Potency and 1- Gauge for Static Model

4.2.2 Performance of procedures for Coefficient values

The following figure depicts the performance of procedures with changing coefficient values. Here the probability of getting the true model, potency and 1-guage are plotted against different t-values for fixed sample size and k/L ratio i.e. 50 and 0.50 the results show that none of the procedures work well for smaller coefficients. However as the t-values gradually increase, all the procedures tend to work well and select the true model in more than 80 % cases with very large t-values. But as the t-value become larger, the AICs and HQC collapse and remain round 60%. Through the graph it is clear that coefficient values contribute much in model selection. As they becomes greater the probabilities of getting true model increase significantly.

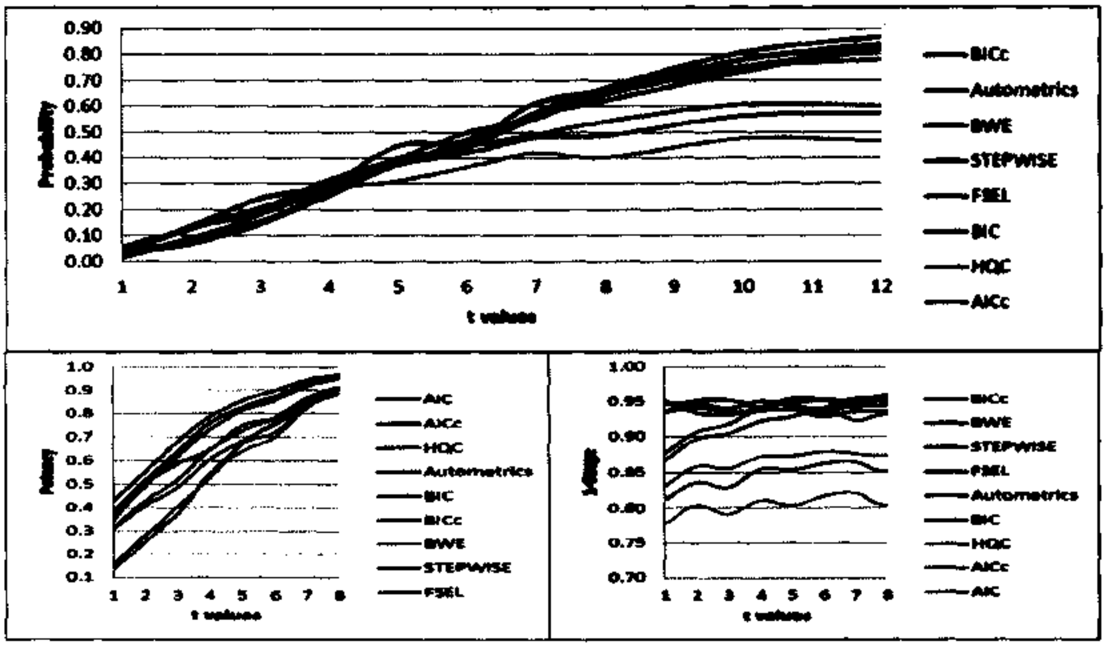


Figure 2 Coefficient values effect on Probability of true model, Potency and 1-Gauge for Static Model

The potency of all the procedures gradually increases along the t-values and reaches near 100% after 8. AICs remained at top from start to end, than it comes out Autometrics, HQC and BICs. Path reduction procedures (stepwise, forward selection and backward elimination) had very low potency at smaller t-values but it improves and competes well to others as the t value gets larger. This means that they select less relevant variables than the others when t is small.

Gauge analysis shows that the Autometrics and other path reduction procedures (SW, FS, BWE) have high probability of dropping irrelevant variables from the beginning i.e. smaller t-values to the end. However BICs start with comparatively smaller values especially when t is less than 3. As t-values gets larger they dominate. AICs and HQC well below from all others.

4.2.3 Outcome of procedures with changing relevant versus irrelevant ratio

To analyze the effect of changing the ratio of relevant to irrelevant variables on the performance of model selection procedures, we used three options of smaller, medium and larger DGP with respect to GUM i.e. k/L=0.25,0.50,0.75 here k is the number of variables in the DGP and L is the number of variables included in GUM. The results are shown in the following graph for k=2, 3, 5 when the sample size and t-values are fixed at 50 and 6 respectively.

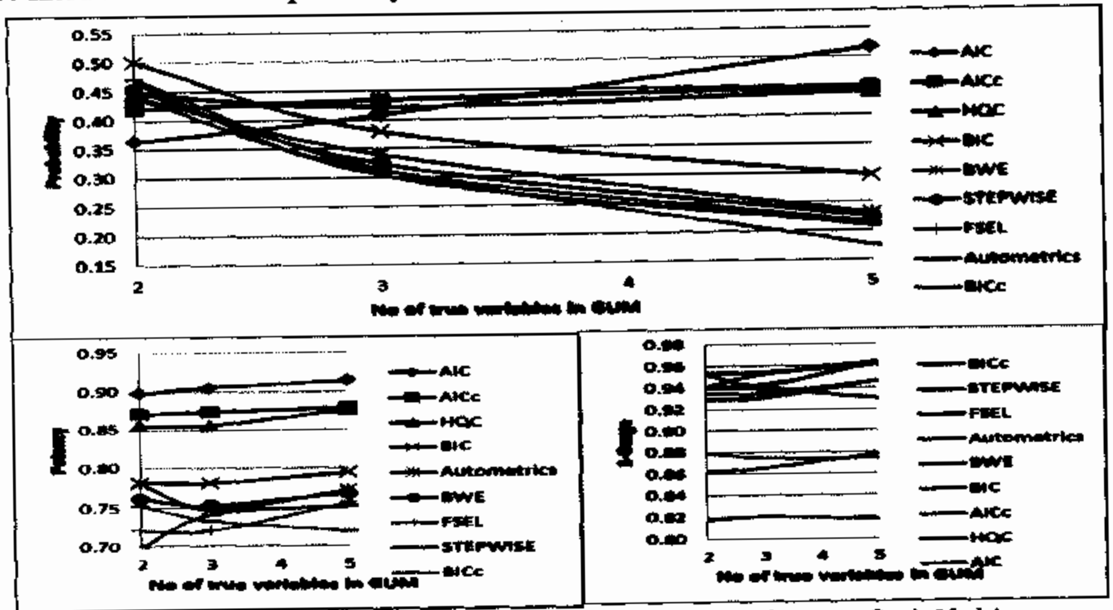


Figure 3 Effect of k/L ratio on Probability of true model, Potency and 1-Gauge for Static Model

The results indicate that when there are fewer relevant variables in the GUM i.e. k=2 Autometrics along with BICs and path reduction procedures performed well. But as the number of relevant variables increased the performance of these procedures tends to worsen (Castle et al.2011). On the other hand the AICs goes in opposite direction, with fewer relevant variables they do not perform well. With an increase in number of relevant variables, especially when k/L ratio is greater than 0.5 they outperform the other procedures. When we see the potency and 1-gauge, AICs remain almost the same for all the procedures in all settings of k and L which means that there is no significant effect of k/L ratio on the potency and 1-gauge.

4.2.4 Conclusion

The table below shows the ranking of all procedures for the static model. It can be seen that Autometrics, Stepwise procedures and BICs perform well for medium and large samples when there are significant t-values and fewer relevant variables in the GUM.

Table 4.1 Ranking of all the model selection procedures for Static Model

		Autometrics			Stepwise			FSEL			BWE			BICs			HQC			AICs		
		TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI
Sample size	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
t-values	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
K/L ratio	<0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	>0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TR= Prob. of getting true model,RR= Prob.of retaining relevant variables, DI= Prob.of Dropping Irrelevants

A=Excellect=above 90%,B=Good=71-90%,C= Satisfactory=51-70%,D=Unsatisfactory=30-50%,P=Poor= less than 30%

They also have good potency and a large probability of dropping irrelevant variables in all circumstances. These procedures are thus recommended keeping in mind the above mentioned situations. AICs and HQC perform better than the alternatives when there are more relevant variables in the GUM relative to irrelevant variables. AICs are also found reluctant to drop irrelevant variables. After the simulation experiment in this section our first objective is achieved by getting same result as in the previous studies mentioned in literature review hence the objective of verification of results is achieved.

Section II

4.3 Panel Data Models

Panel data are commonly used in the applied social sciences and there are various models available in the literature for such data e.g. Constant coefficient, fixed effects, random effects and random coefficient effects are commonly used in studies. However, comparing the model selection procedures for various panel data models remains an open challenge for researchers. As mentioned earlier, the main emphasis of this study is to analyze the performance of model selection procedures in the panel data frame work, as three is rare study that compares model selection procedures for such data. For this purpose I test these procedures in Matlab under various assumptions of different panel data models and then compared them. To get a clear picture, more detailed analysis is taken in panel framework e.g. Five combination of k/L ratio are used here, unlike of three in the univariate case. The sample size option is also increased i.e. 25, 50, 100, 200 including 25 here.

4.3.1 Constant Coefficient Model

The constant coefficient model assumes that all the coefficients and the intercepts are constant, so one can use the pooled regression to get coefficients in these models. Under such conditions the data is generated and then all the proceduresare implemented to select the model. Performance is judged on the basis of the procedures abilityto select the true model, potency and Gauge for the different situations of sample size, k/L ratio and beta coefficients.

4.3.1.1 Sample size variation effect on the Performance of procedures

Figure 4 shows the results of the performance of model selection procedures for the constant coefficient model. The sample size is plotted against the probability of getting true model, potency and 1-gauge keeping fixed the number of variables in GUM and t value at 3 and 8. Here sample size varies from 25, 50, 100 and 200.

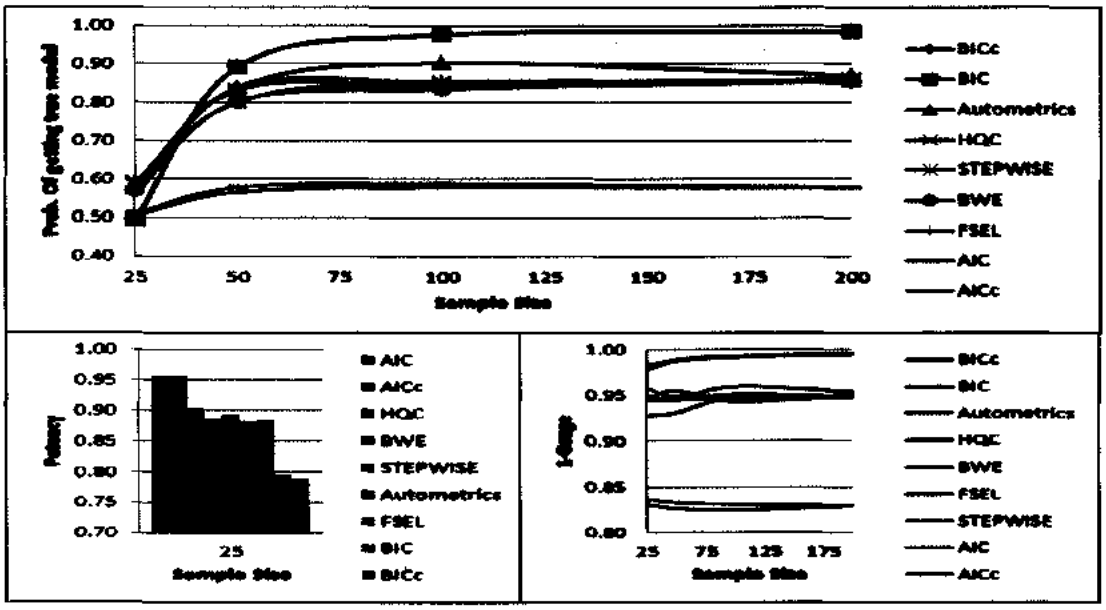


Figure 4Sample size effect on Probability, Potency and 1-Gauge for CCM Model

From the graph it is clear that in small sample all the procedures remains within the 50-60 % regions. But as the sample size goes up, except for AICs, the true probability of all procedures goes upward. BICs get the top position, while Autometrics performs next best following the path reduction procedures and HQC.

The potency of all the procedures becomes more than 95% in excess of 50 and sample size. So the small sample of 25 is discussed here. When sample is small AICs did backward elimination performed worst for smaller t-values (for t=1, 2, 3) but later on they remain closer to others.

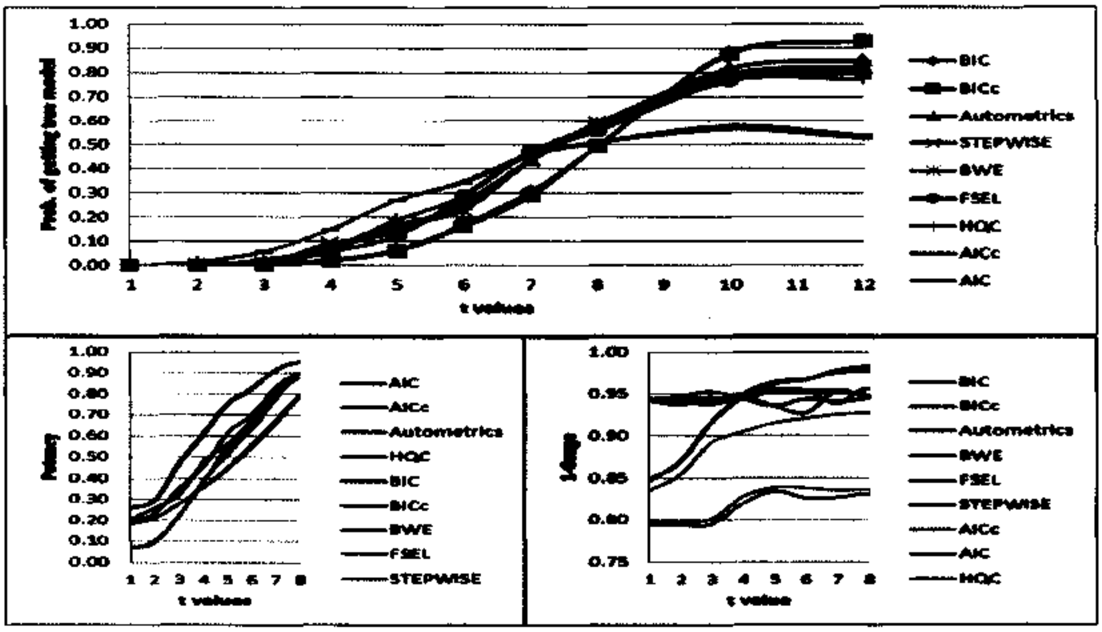


Figure 5Coefficient values effect on Probability of true model, Potency and 1-Gauge for CCM Model

The 1-gauge of all the procedures is not significantly affected by the changing values of the coefficients. They remain almost same from smaller to larger t-values. BICs and HQC show little differences but alternatively remain similar for all t-values. AICs is dominated by all other procedures at lesser as well as larger t-values.

4.3.1.3Outcome of procedures with changing relevant versus irrelevant ratio

As it is mentioned earlier, different relevant-irrelevant variable ratios (k/L) are used to examine the effect of number of relevant or irrelevant variables on the performance of under discussion model selection procedures i.e. 0.10, 0.25, 0.50, 0.75. The results showed that if fewer relevant variables are used than AICs perform worst but as the number of relevant variables increases, AICs gradually perform better and did best when the k/L ratio becomes greater than 0.5. On the other hand, the BICs show the reverse, with fewer true variables in the GUM, they perform best (near 90 %) and when the number of relevant variables increases their performance goes down. When k/L is greater than 0.5 they perform worse (less than 30%) than the alternatives. Only the HQC does not show much variation with the change in the number of relevant variables (remains round 60 %). Autometrics and stepwise procedures act like BICs but with small variation (50-70%), although Autometrics did comparatively better than other three.

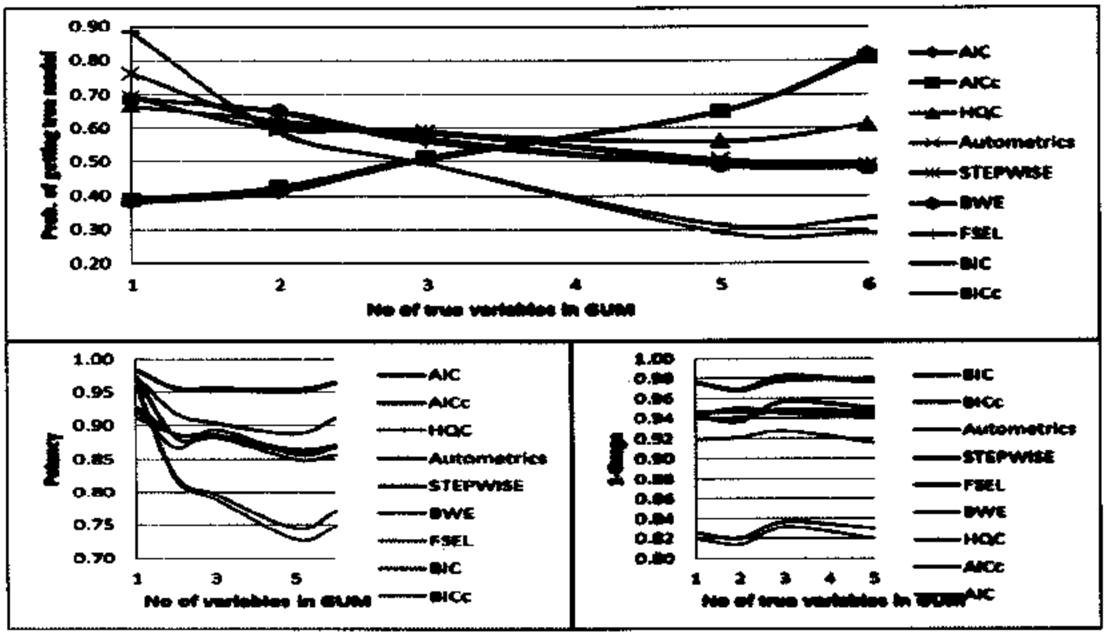


Figure 6Effect of k/L ratio on Probability of true model, Potency and 1-Gauge for CCM Model

The potency analysis depicted in the graph above shows that Autometrics and all the procedures start well but as the number of relevant variables grows in the GUM; their performance deteriorates i.e. from round 95% to round 85 % but the BICs deteriorated more sharply to others, (96% to 72%). The AICs dominate i.e. they select the right variables all the time irrespective of the k/L ratio. The 1-gauge graph shows that BICs outperforms the others, while Autometrics and other stepwise procedures stay near 95%. AICs showed divergent results and poorest performance (about 82%).

4.3.1.4 Conclusion

In the constant coefficient model Autometrics and stepwise versions perform better for all sample sizes, large t-values and when there are more irrelevant variables in the model than the relevant. In the unstructured group of information criteria BICs and HQC did well in small k/L ratio, with large t-values and in all sample sizes. AICs performed well when there are more relevant variables than irrelevant and showed good potency in many situations.

Table 4.2 Ranking of all the procedures for Constant Coefficient Model

		Autometrics			Stepwise			FSEL			BWE			BICs			HQC			AICs		
		TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI
Sample size	Small	[redacted]																				
	Medium	[redacted]																				
	Large	[redacted]																				
t-values	Small	[redacted]																				
	Medium	[redacted]																				
	Large	[redacted]																				
K/L ratio	<0.5	[redacted]																				
	0.5	[redacted]																				
	>0.5	[redacted]																				

TR= Prob. of getting true model,RR= Prob.of retaining relevant variables, DI= Prob.of Dropping Irrelevants

A=Excellent=above 90%,B=Good=71-90%,C= Satisfactory=51-70%,D=Unsatisfactory=30-50%,F=Poor= less than 30%

4.3.2 Fixed Effect Model

The fixed effect model assumes that the coefficients remain constant but the intercept of the model varies along the cross sections. There are different ways to capture this effect; one can use dummies but at the cost of degree of freedom. Another way is to transform the data to mean deviation and then run ordinary least square. The data is generated under the assumption of the fixed effect model and then mean deviations are used to see the performance of the procedures.

4.3.2.1 Sample size variation effect on the Performance of procedures

The following graph shows the impact of variation in sample size for the probability of selecting of true model, potency and 1-gauge for each procedure. The graph shows that with small sample sizes, none of the procedures performs well with BICs showing particularly poor results (almost zero.), AICs are the top performers with a probability of just above than 20 %. But as the sample size gradually increases from 25 to 200, the reverse results are shown. BICs almost approached to 100% and AICs comes at the lowest position (round 60 %) i.e. improved but with less percentage as compared to other procedures i.e. inconsistency. Autometrics and others did well with true model selection probability exceeding 80%.

The potency of all the procedures exceeds 95% for sample sizes of 100 and 200. For samples of 25 and 50, AICs show good potency in contrast with the BICs. The other procedures ranked between these two.

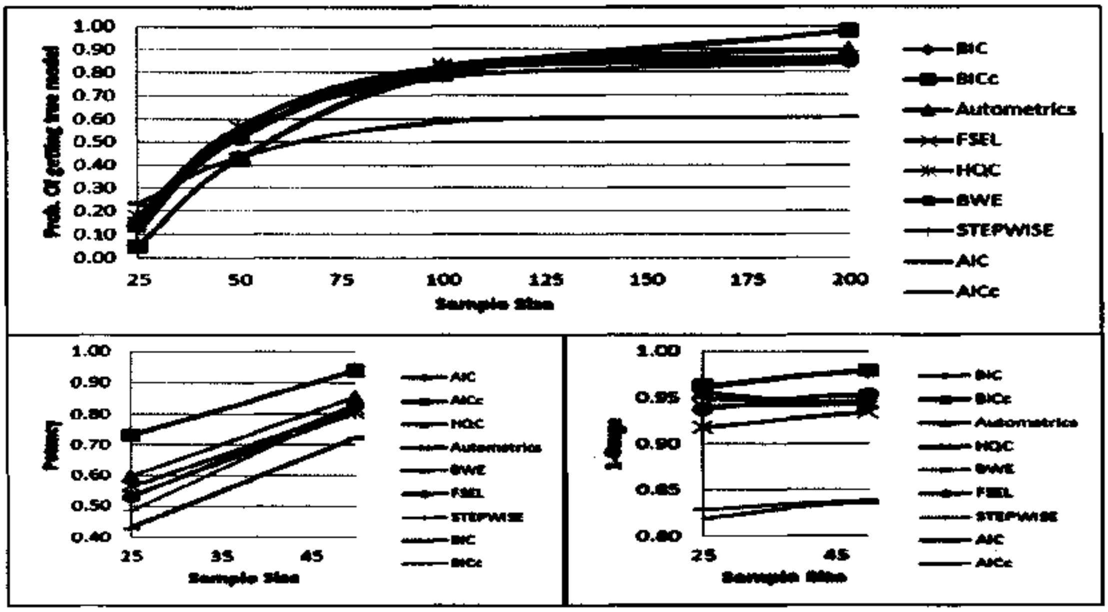


Figure 7 Sample size effect on Probability, Potency and 1-Gauge for FEM Model

The1-gaugeresults are not much affected by the sample size. However, BICs have a higher probability of dropping irrelevant variables. Autometrics and other procedures except AICs also showed good performance, with probabilities of dropping irrelevant variables of about 95%.AICs are dominated by the other procedures for all sample sizes.

4.3.2.2 Performance of procedures for different Coefficient values

To see the effect of t-values on the performance of the model selection procedures for the fixed effect model, the number of true variables in the GUM and the sample size is fixed at 3 and 50 respectively. The graph below shows that for the t-values less than 2 all the procedures performed poorly. In the region where t-values are between 2 to 5, AICs perform better than the other procedures, while BICs perform worse. Overall, though none of the procedures performed well i.e. they all have a less than 50 % chance of selecting the true model. When the t- values are 6 and 7 the path reduction procedures did better than the information based criteria. After that, the BICs get the little edge over others and AICs are stable at 60%.

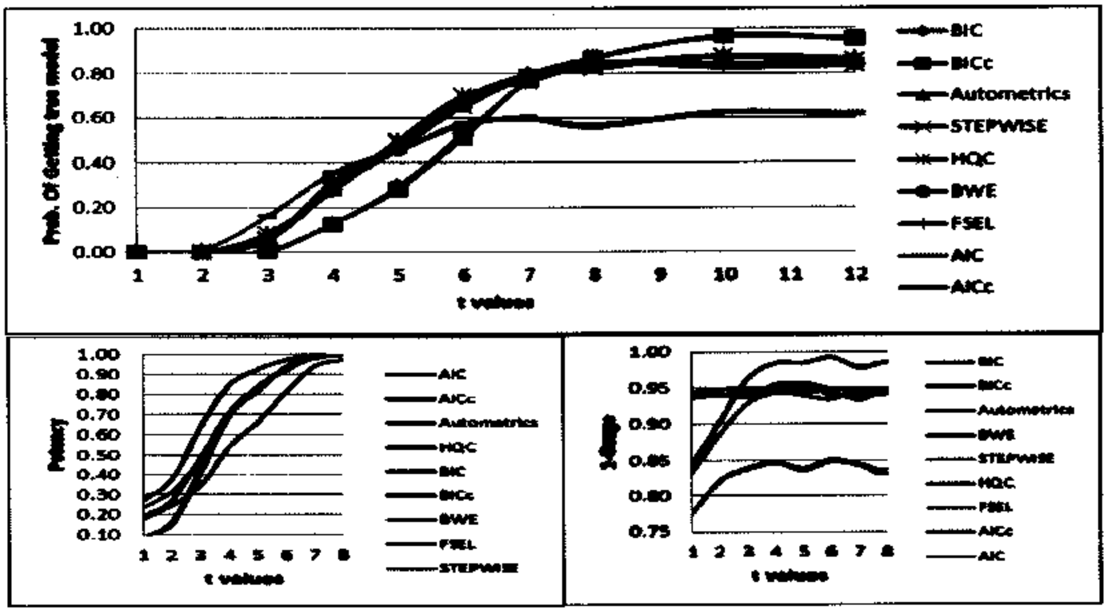


Figure 8Coefficient values effect on Probability of true model, Potency and 1-Gauge for FEM Model

For models with t-values less than 2, the AICs and Autometrics showed good potency compared with the others, which means that they are good in selecting true variables for smaller t-values. The other path reduction procedures performed the worst. After that all the procedures increased their powers gradually for the increasing t-values but keeping a distance from AICs at top and BICs at bottom. All procedures gained potency above 95% when t-values become greater than 8.

The performance of procedures for 1-guage is not much affected by the coefficient values. Only the BICs showed little variation for smaller t-values but remained stable at the t-values increased. All the procedure did very well in dropping irrelevant variables but AIC dominated.

4.3.2.3Outcome of procedures with changing relevant versus irrelevant ratio

The following graphs of probability of getting true model, potency and 1-gauge depict the impacts of the k/L ratio on the performance of the modeling procedures. When the k/L ratio is small i.e. k=1 the BICs perform best, followed by Autometrics. Next in order are HQC and path reduction procedures. The only procedures that have probabilities of detecting the true model less than 50 % (all other have above than 70 %) are the AICs. When the k/L ratio is increased the AICs clearly dominates all the procedures while the BICs performance deteriorates. It means when the relevant variables becomes high in the GUM the AICs select the DGP more often than any other procedures.

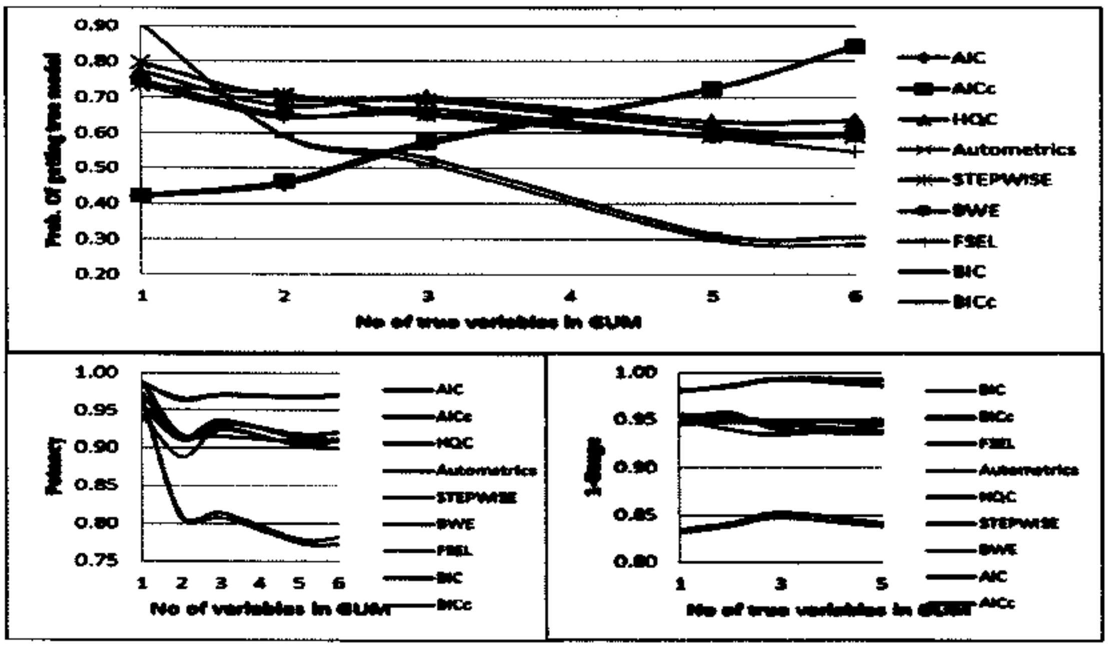


Figure 9Effect of k/L ratio on Probability of true model, Potency and 1-Gauge for FEM Model

All the other procedures showed downward performance as the number of relevant variables is increased (from around 80% to around 60%). It is clear from potency graph that all the procedures did well from the lowest number of relevant variables in the DGP to the highest one. A little edge can be given to AICs because they behave same from smaller k/L ratio to higher. BICs have downward direction with the increase of relevant variables in the GUM. Although AICs perform well in potency but in case of dropping the irrelevant variables i.e. the 1-gauge, the AICs performed the worst. Autometrics and others showed good 1-gauge values. BICs manage the highest 1- gauge which approaches 100% as the number of relevant variables in the DGP increases.

4.3.2.4 Conclusion

Under the assumptions of the fixed model, in large samples, for all K/L ratio alternatives and high t-values, Autometrics along with other path reduction procedures performed well. These procedures also show good power and good probability of dropping irrelevant variables. BICs and HQC also performed well in large samples and models with large t-values. AICs did very well in the presence of more relevant variables but with high 1-gauge.

Table 4.3 Ranking of all the procedures for Fixed Effect Model

		Autometrics			Stepwise			FSEL			BWE			BICs			HQC			AICs		
		TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI
Sample size	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
t-values	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
K/L ratio	<0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	>0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TR= Prob. of getting true model,RR= Prob.of retaining relevant variables, DI= Prob.of Dropping Irrelevants

A=Excellent=above 90%,B=Good=71-90%,C= Satisfactory=51-70%,D=Unsatisfactory=30-50%,F=Poor= less than 30%

4.3.3 Random Effect Model

In this model it is assumed that the intercept term exhibits random variation over the cross sections. With this assumption, ordinary least square coefficients are biased and inefficient so generalized least method is used for the estimation of coefficients. The random effect model assumes that variation of the intercept is random. It can behave like the FEM if the variance of the random term is larger than the variance of the error term. On the other hand it coincides with the CCM if the variance of error term is greater than the variance of the random term. The assumption random effect models are used to generate the data generating process and the performance of procedure is analyzed.

4.3.3.1 Sample size variation effect on the Performance of procedures

The figure below shows the effect of sample size on model selection procedures for the random effect model while fixing number of true variables in the GUM and t-values (3 and 8). The information criteria performed poorly (less than 30% probability of identifying the true model) in small samples as did AICs (around 40%) but it is found to be inconsistent. BICs are superior in consistency along with HQC and path reduction procedures. Autometrics and other stepwise procedures performed well enough (around 60%) in small samples but improves a size grows along others and reach to more than 80 %.Autometrics got little bit edge in small samples.

All the procedures except BICs showed improved potency as sample size increases. BICs detect less relevant variables in small samples but gradually join others at the end. Although all the procedures gradually increased their power along with increased sample size but Autometrics and other path reduction procedure rapidly achieve the maximum.

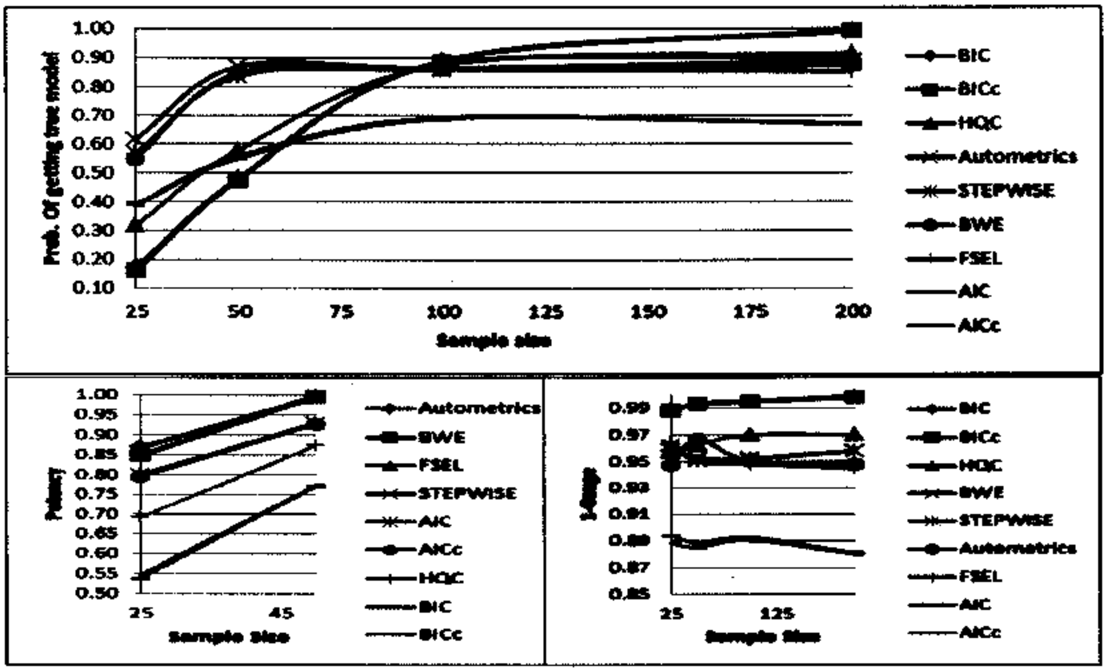


Figure10 Sample size effect on Probability, Potency and 1-Gauge for REM Model

The BICs approaches 100% as sample size goes upwards. All the path reduction procedures along with HQC remain closer to 95 %, while the AICs for all sample sizes remained same but with worse probability among the procedure that drop irrelevant variables.

4.3.3.2 Performance of procedures for different Coefficient values

To see the performance of procedures for varying t-values the sample size and k/L ratio are fixed at 50 and 3 respectively. All the procedures perform poorly for low t-values (up to 3), however with t-values in the range of 4,5 and6, the path reduction procedures perform equally well enough in identifying the true model as opposed to information based criteria. While within information based criteria, AICs showed comparatively better performance up to t=8 but then BICs come over them till end. HQC remains in between both.

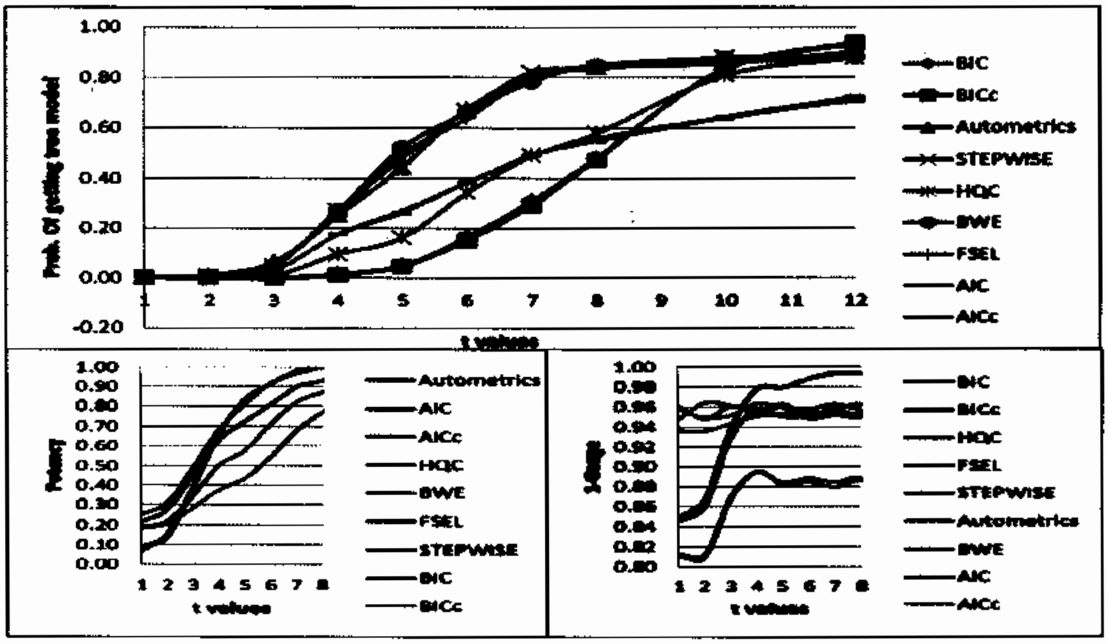


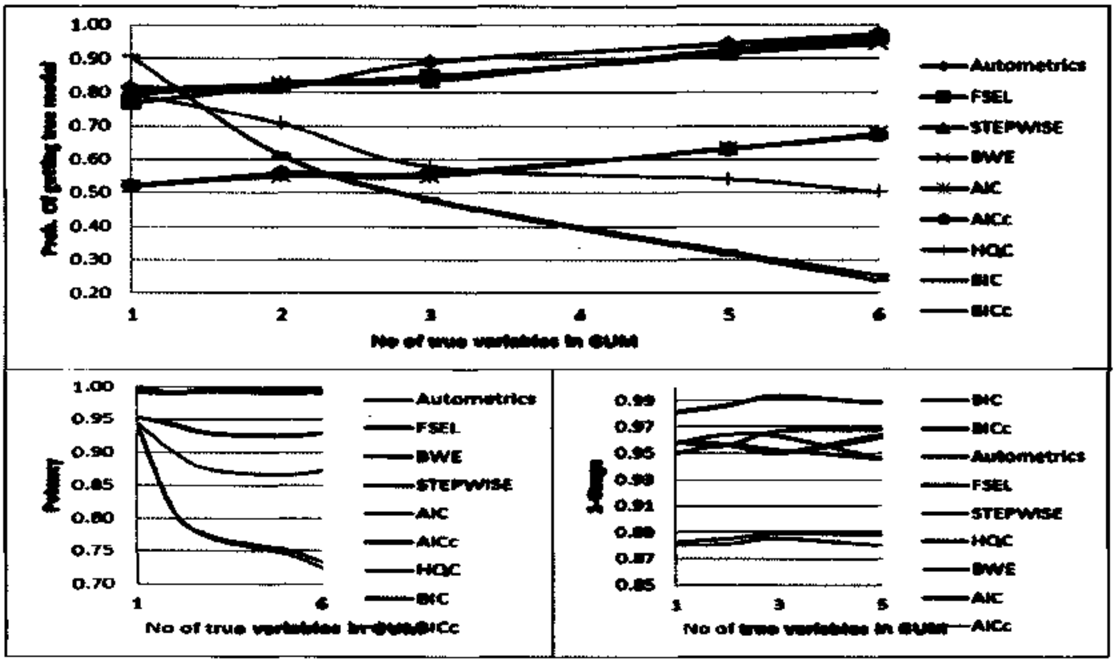
Figure 11Coefficient values effect on Probability of true model, Potency and 1-Gauge for REM Model

When we plot the potency, Autometrics shows better progress in selecting significant variables at small t-values then all others while the three stepwise versions performed poorly in such situations. From the group of information criteria, AICs competed to Autometrics well from start till end. HQC gain its power gradually but little better than BICs.

For smaller t–values models, the path reduction procedures performed better than information criteria in dropping irrelevant variables. But as the t-values become greater than 3, the BICs dominate. HQC merges with the path reduction line but the AICs showed not much improvement remain at the lowest position.

4.3.3.3 Outcome of procedures with changing relevant versus irrelevant ratio

Autometrics and other path reduction procedures did well in selecting the relevant model for all k/L ratios for fixed t-values and sample sizes. They perform well (more than 80 %) irrespective of greater presence of relevant or irrelevant variables. With fewer (more) relevant variables BICs and HQC perform very well (poorly). While AICs remained in between the range of 50% to 70% from low to high values.



As the relevant-irrelevant variable ratio goes on, the Autometrics, AICs and other path reduction procedures showed improved potency which reflects their greater efficiency. BICs and HQC have good potency; it diminishes as we increase the number of relevant variables.AICs have a tendency of larger models i.e. showlowest 1-gauge throughout the variation of relevant-irrelevant ratio. On the other hand, BICs tends to select parsimonious models throughout the experiment. All other procedures have stable probabilities around 95%, however, Autometrics perform little bit better.

4.3.3.4 Conclusion

For the random effect model where the intercept varies randomly, the path reduction procedures including Autometrics perform well in small as well as large samples. These procedures also show better results for reasonable large coefficient values and shows good performance for all set of relevant-irrelevant variable ratio. From information criteria BICs performed as compared to others in large sample size and lower k/L ratios.

Table 4.4 Ranking of all the procedures for Random Effect Model

		Autometrics			Stepwise			FSEL			BWE			BICs			HQC			AICs		
		TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI
Sample size	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
t-values	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
K/L ratio	<0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	>0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TR= Prob. of getting true model,RR= Prob.of retaining relevant variables, DI= Prob.of Dropping Irrelevants

A=Excellent=above 90%,B=Good=71-90%,C= Satisfactory=51-70%,D=Unsatisfactory=30-50%,E=Poor= less than 30%

4.3.4 Random Coefficient Model

The Random coefficient model assumes that the coefficients are generated through random processes. It is the nearer model to the real life data where every cross section has its own coefficients as well as intercepts. The two step generalized least square is used to estimate such type of models. After the generation of data according to assumptions of random coefficient model then procedures are applied to check their relative performances.

4.3.4.1 Sample size variation effect on the Performance of procedures

None of the criteria perform well (less than 50 %) using the small sample size of 25.However, when the sample increases all showed good improvement (in between 55% to 80%) except AICs. In sample size of 50 Autometrics has a slight edge on the other procedures.

For the potency analysis only the 25 and 50 sample sizes are discussed as all the procedures approaches to potency greater than 95%, AICs found best of all in small sample as well as in large. BICs and HQC perform better in small samples after AICs and also reach to maximum with the sample size. Autometrics and stepwise version also did well but comparatively less than the information criteria in small samples. These also improve with the sample size and reach to maximum. However Autometrics have little advantage over stepwise versions.

As we increase in sample size the 1-gauge of the AICs decreases which tells that they always get the large number of irrelevant variables. HQC remain along 95% level while BICs shows very high 1-gauge. Autometrics and other path reduction procedures found very high probabilities of dropping irrelevant variables (98% and above).

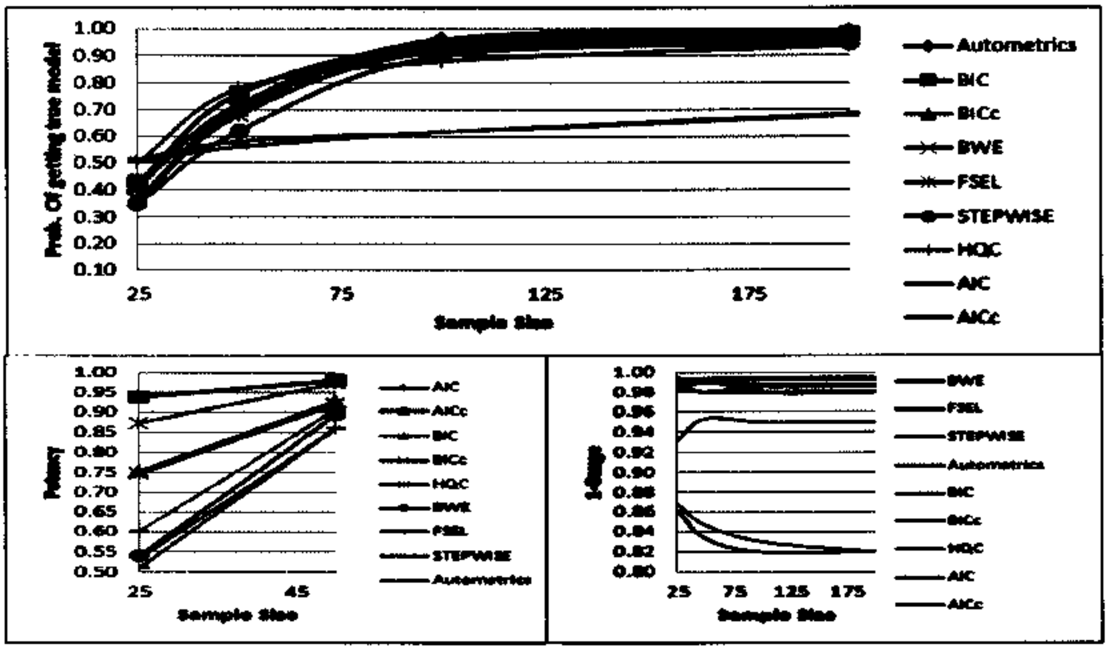


Figure 13Sample size effect on Probability, Potency and 1-Gauge for RCM Model

4.3.4.2 Performance of procedures for different Coefficient values

The performance of all the criteria is very poor for the smaller coefficient values. However for moderate t-values, the AICs as well as HQC perform better. At high values of coefficient i.e. more than 6 the AICs become stable at 60%. Autometrics along with other path reduction procedures and BICs perform well at the end.

The potency of AICs remains at uppermost level from smaller coefficient values to the larger ones among the information criteria. Autometrics performed relatively better than the path reduction procedures. Stepwise versions had the poorest performance for smaller coefficient values but gradually increase their potency i.e. the selection of true variables for higher coefficient values.

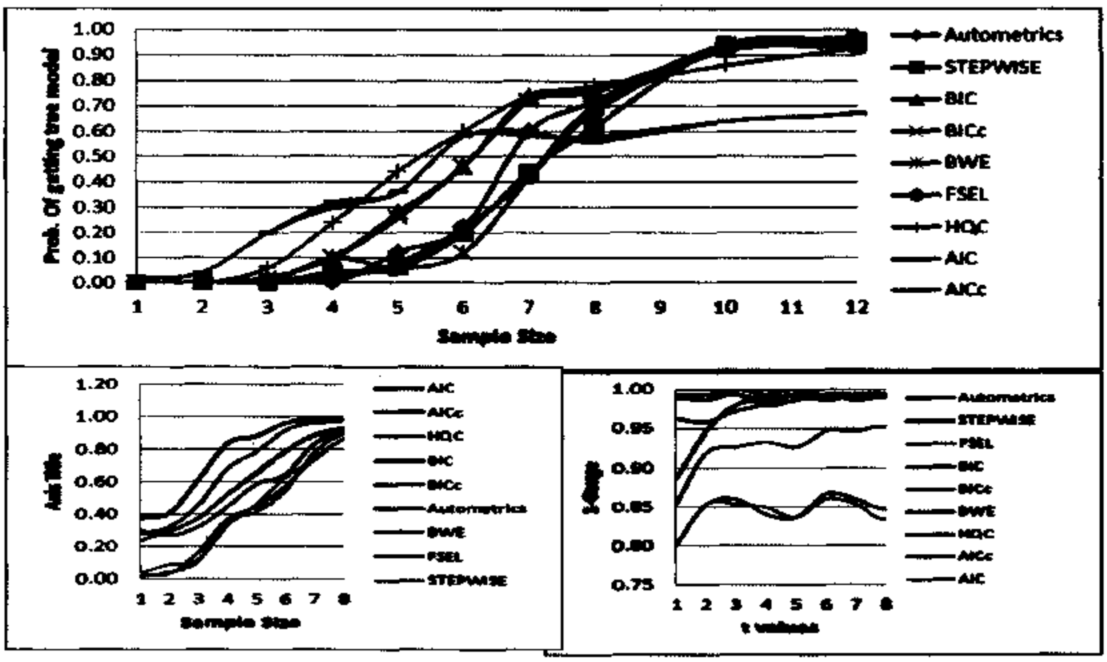


Figure 14Coefficient values effect on Probability of true model, Potency and 1-Gauge for RCM Model

Autometrics along with stepwise procedures dropped irrelevant variable with very high probabilities for all t-values. Among information criteria BICs performs little worse but as coefficient values get larger there performance becomes similar to path reduction procedures. HQC did not work very good for smaller coefficient values but as t-values increases it become stable along the 95% level. AICs selected a large number of irrelevant variables from the smaller to the larger t-values i.e. have the lowest probabilities of dropping irrelevant variables.

4.3.4.3 **Outcome of procedures with changing relevant versus irrelevant ratio**

To see the effect of the changing ratio of relevant-irrelevant variables on the performance of the procedures in different situations the sample size and t-value are kept fixed. Autometrics did very well finding true model when the number of irrelevant variable is very large. It gradually decreases as the number of relevant increases.

Stepwise version also performs analogous pattern but does not perform as well as Autometrics. Among the information criteria BICs did well with a smaller ratio of relevant-irrelevant variables but as this ratio rises,the BICs performance deteriorates to the lowest level among information criteria. On the other hand, AICs showed the reverse i.e. comparatively low performance in lesser relevant-irrelevant ratio and best among all the procedures for larger relevant-irrelevant ratio. HQC perform well and invariant.

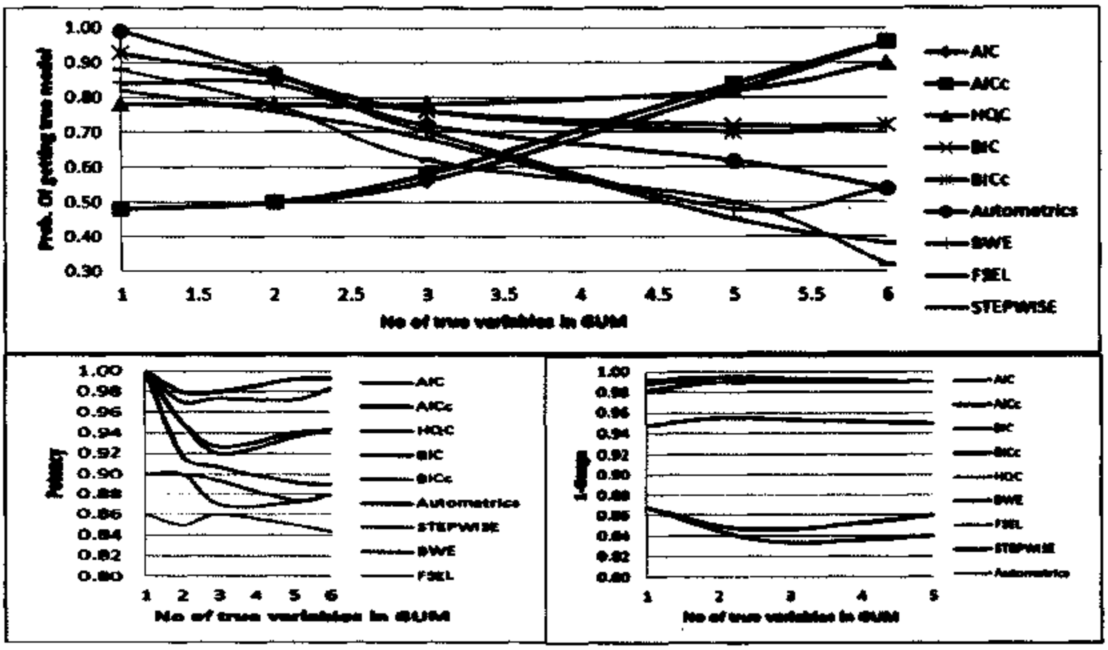


Figure 15Effect of k/L ratio on Probability of true model, Potency and Gauge for RCM Model

In the potency comparison, all procedures did well enough i.e. over 80 % in all situations. However AICs did comparatively well among all means they frequently select the relevant variables. Autometrics and other path reduction procedures along BICs showed very high 1-gauge near 99%.This means that they almost always reject the selection of irrelevant variables irrespective of their number in the model. HQC remain along 95 % while the AICs are at worst round 85%, which shows their tendency to select irrelevant variables in the final model irrespective of number of relevant in the general model.

4.3.4.4 Conclusion

In the random coefficient model the Autometrics and stepwise version are found consistent and their gauge decreases considerably i.e. they become more efficient in selecting the true variables for the set of candidate variables. Autometrics performed best in finding true model when number of relevant variables is very less i.e. k=1. They showed significantly increasing potency with sample size and coefficient values, however in case of smaller coefficient values stepwise did worst. Among the information criteria AICs found inconsistent, however it perform better in terms of power for smaller coefficients and best when there are more than half relevant variables in the general model. HQC too are found consistent. BICs are consistent with low gauge and perform well when true model have lesser variables as compare to general model.

Table 4.5 Ranking of all the procedures for Random Coefficient Model

		Autometrics			Stepwise			FSEL			BWE			BICs			HQC			AICs		
		TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI	TR	RR	DI
Sample size	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
t-values	Small	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Medium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Large	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
K/L ratio	<0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	>0.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TR= Prob. of getting true model,RR= Prob.of retaining relevant variables, DI= Prob.of Dropping Irrelevants

A=Excellent=above 90%,B=Good=71-90%,C= Satisfactory=51-70%,D=Unsatisfactory=30-50%,F=Poor= less than 30%

Chapter 5

Determinants of Investment revisited

5.1 Introduction

We have examined the Autometrics and other procedures for the selection of variables in panel environment. In between the class of panel data models, a model that is often used are representative of real world data is the random coefficient model, which assumes the random coefficients and intercepts for each cross section. The objective of this section is to apply Autometrics to identify a model representative of investment for all the countries in general. For this purpose we are estimating the general model which includes maximum available candidate variables explaining the investment.

Investment is one of the crucial factors of aggregate demand and any significant variations have persistent effects on economy .There are a large number of empirical studies which, time to time, have showed the importance of investment in attaining higher rates of growth e.g. Barro and Lee (1994), Collier and Gunning (1999) and Ndikumana (2000). In developing countries, many studies investigate the investment – growth relation and the factors influencing variation in the investment rate. Investment can be classified in two main classes, i.e. domestic investment and foreign direct investment (FDI). Several studies have explained the determinants of FDI in middle and low income countries (e.g. Blonigen and Piger (2011)). However, the studies discussing the factors affecting domestic investment in these countries are fewer. In this study we use the Autometrics to investigate the factors explain the domestic investment for low and middle income countries.

5.2 Review of Literature

Several researchers have studied the role of a variety of factors including macroeconomic variables in explaining investment behavior. The studies not only differ from each other on the basis of factors included in the model and the estimation techniques applied but also on basis of results arrived and a spectrum of conclusions. In a broader sense, the empirical literature on investment behavior in developing countries focuses on macroeconomic variables. The findings of some of the relevant studies on the topic are discussed below.

Typical studies include lagged investment as an explanatory factor for explaining investment. Which give clear picture to investors about the economy of a country, so has a positive affection on investment e.g. Mileva (2008), Salahuddin et al. (2009) for transition and developing countries respectively.

An increase in aggregate demand tends firms to increase supply which may need enhancement of installed capacity and thus affect investment positively. Wolf (2002) shows that GDP per capita significantly explains domestic investment for South African developing countries. Similar results are found using different groups of countries by Salahuddin et al. (2009) on Muslim developing .Oshikoya (1994) on African countries, Ghura and Goodwin (2000) on countries from Asia, Latin America and Sub Saharan

Africa, Mileva (2008) on 22 transition economies, Peltonen et al. (2009) on emerging markets of Asia, Latin America.

Salahuddin et al. (2009) find domestic saving to be related positively with domestic investment for 21 Muslim developing economies. Feldstein and Horioka (1980) suggest that the saving-investment correlation is high in OECD countries, which implies low capital mobility among these countries; this is known as F-H puzzle. Wong (1990) and Dooley et al. (1987) also reach a similar conclusion for the developing countries. Shahbaz et al. (2010) and found a weak correlation, may be due to insufficient capital mobility for Pakistan and the south Asian countries showing a contradiction with the FH puzzle.

The interest rate and inflation have been found to have a mixed relation with investment. Ghura and Goodwin (2000) show that interest rate have negative effect on private investment for the developing countries of Asia, Latin America and Sub Saharan Africa. Salahuddin et al. (2009) study Muslim developing countries and find no significant influence of the real lending rate on private investment. Li (2006) finds a negative relation of inflation with domestic investment for 117 countries. Shahbaz et al. (2010) shows a positive impact of inflation on investment for Pakistan. There exist another set of studies that concludes that there is no relation between domestic investment and inflation e.g. Jaramillo (2010) and Salahuddin et al. (2009) for emerging and Muslim developing economies respectively.

International trade is considered to have positive relation with investment. As the volume of imports and exports increases, the investors are induced to invest more. Salahuddin et al. (2009) find a positive relation between trade and domestic investment. However, Mileva (2008) in a study on transition economies reports an insignificant influence of trade.

Government expenditure can affect investment in either direction. High government borrowing may affect the interest rate which tends to reduce the size obtainable funds in the financial market for private sector, which leads to crowding out of private investment. Ghura and Goodwin (2000) find results which favors this hypothesis for developing countries from Asia, Latin America and Sub Saharan Africa. The Government can enhance investment by utilizing the funds on improvement of basic infrastructure to develop an comfortable environment for investors. This is supported by Asante (2000)for Nigeria.

5.2.1 Conclusion

The literature shows a number of factors affecting the investment. However, the patterns of variables may change depending upon the sample features or the techniques of estimation used for analysis. Due to the constraints of data availability, it is not always possible to have the entire candidate variables. The following set of variables are incorporated in the analysis: lagged investment, real Gross domestic product (GDP) per capita growth, domestic credit to private sector, domestic saving, government expenditures, trade, inflation and interest rate.

5.3 Data description

This study considers the data from middle income Asian countries[1]. The data is taken from WDI 2011 online data base. As said earlier, due to data constraints, it is not possible to have all the countries in our analysis, so we have to manage 10 cross sections/ countries annual data from 1980 to 2010.(The countries included are listed in Appendix A-5)

5.4 Model and Estimation

We want to select the model that would be representative of all the countries. We will use the Autometrics developed under the assumption of a random coefficient model. The general model will include all the above mentioned variables along with their first lag. So the general model we start with includes sixteen variables along with intercept. In order to find the role of financial and macroeconomic variable on the domestic investment we use an investment model which is a variant of the model earlier used by Ndikumana (2000). The model in its general form is presented below;

$$I_{it} = \beta_0 + \beta_1 I_{it-1} + \sum\beta_i X_{it} + \sum\beta_j X_{it-1} + \epsilon_{it} \qquad (5.1)$$

Where $Inv_{it}$is the investment (as a percentage of GDP) of country i at time t. X indicates the set of all possible variables. It can also be written as

[1] The classification is based on the World Bank 2011.

$$I = \beta_0 + \beta_1 I_{it-1} + \beta_2 GE_{it} + \beta_3 GE_{it-1} + \beta_4 Inf_{it} + \beta_5 Inf_{it-1} + \beta_6 PRIVT_{it} + \beta_7 PRIVT_{it-1} + \beta_8 R_{it} + \beta_9 R_{it-1} + \beta_{10} S_{it} + \beta_{11} S_{it-1} + \beta_{12} T_{it} + \beta_{13} T_{it-1} + \beta_{14} Y_{it} + \beta_{15} Y_{it-1} + \epsilon_{it} \quad (5.2)$$

Where;

I_{it} = "Gross Fixed Capital Formation as a percentage of GDP

GE_{it}= "General government final consumption expenditure (% of GDP)

Inf_{it} = Inflation, GDP deflator (annual %);

$PRIVT_{it}$ = "Domestic credit to private sector as a percentage of GDP"

R_{it} = Lending interest rate (%); S_{it} = Gross domestic savings (% of GDP)

T_{it} = Trade (% of GDP); Y_{it} = GDP per capita growth (Annual %)

5.4.1 Gross Fixed Capital Formation Gross fixed capital formation (a proxy for gross domestic investment) is expressed as a percentage of GDP and is used as dependent variable (*I*) which includes land developments (fences, drains); machinery ;plant, equipment purchases,; and construction which includes railways , roads, offices, schools, hospitals, commercial and industrial buildings and private residential residences. Mileva (2008) and Arazmuradov (2011) analyzed the determinants of investment using same variable.

5.4.2 General Government Final Consumption Expenditure General government final consumption expenditure (*GE*) indicates current government expenditures for goods and services and expenditure on security and defense; however the expenditures on the government military are excluded from it.

5.4.3 Inflation, GDP Deflator Inflation (*Inf*) is measured by the GDP deflator which specifies the rate of change in price as a whole in the economy.

5.4.4 Domestic Credit to Private Sector Domestic credit to private sector *(PRIVT)*, a financial variable that defines the role of bank in financing the private sector

5.4.5 Lending Interest Rate Lending interest rate (*R*) is the rate of interest claimed by banks on finances from the lender.

5.4.6 Gross Domestic Savings Gross domestic saving *(S)* is calculated by taking the difference between GDP and final consumption expenditures.

5.4.7 Trade Trade *(T)* is the total amount of imports and exports of the goods and services as a percentage of GDP.

5.4.8 GDP Per Capita Growth GDP per capita growth (*Y*) is the annual growth rate of GDP per capita (the ratio of gross domestic product and the midyear population).

5.5 Results and Discussion

To see the results of different models we run the random coefficient model .The starting point of search in Autometrics is the general model given by (5.2). Table 5.1 shows the coefficients, standard error, t and p values for all the variables at 5% significance level. The general model consists of the variables explained in the above section, along with their one lag. The general model is estimated by random coefficient model and results are given by the following table 5.1.

All the variables got the right signs and out of candidate variables seven are found significant at 5 % level and two variables are significant at 10% level of significance. (Highlighted ones)

Estimated General model				
	Coefficient	Standard err	t-values	p-value
Intercept	2.515	1.647	1.527	0.148
I(t-1)	0.831	0.032	26.274	0.000
GE	0.293	0.122	2.412	0.029
GE(t-1)	-0.156	0.123	-1.263	0.226
Inf	-0.005	0.030	-0.155	0.879
Inf(t-1)	0.022	0.029	0.746	0.467
PRIVT	0.032	0.026	1.252	0.230
PRIVT(t-1)	-0.045	0.025	-1.781	**0.095**
R	-0.008	0.088	-0.089	0.930
R(t-1)	-0.072	0.083	-0.870	0.398
S	0.170	0.044	3.909	0.001
S(t-1)	-0.142	0.042	-3.366	0.004
T	0.037	0.020	1.894	**0.078**
T(t-1)	-0.042	0.020	-2.160	0.047
Y	0.199	0.048	4.122	0.001
Y(t-1)	0.160	0.050	3.182	0.006

Table 5.1 Results of Random coefficient Model for investment Data of Middle income Asian Countries

Our main objective of this exercise is to show that how model selection procedures perform in a real panel data environment for the selection of the model and how it would be helpful for common researcher. The discussion of the variable coefficient is our secondary goal; however, all the variables get the expected signs and magnitudes in the estimated general model. After estimating the general model Autometrics runs the reduction process which will give us the selected models. The final model given by Autometrics is

Reduced model by Autometrics				
	Coefficient	Standard err	t values	P value
Intercept	0.351	0.906	0.388	0.702
I(t-1)	0.843	0.026	32.871	0.000
GE	0.163	0.056	2.894	0.008
S	0.138	0.041	3.377	0.002
S(t-1)	-0.130	0.039	-3.326	0.003
Y	0.208	0.042	4.962	0.000
Y(t-1)	0.197	0.043	4.601	0.000

Table5.1 Model selected by Autometrics for Middle Income Asian Countries

Autometrics select six variables in the final model after the reduction from 14 variables in the general model. All have their expected sign. The lagged investment dependent variable showed a very significant positive impact on the current investment. The positive coefficient of lagged investment shows that investment practice in the previous year acts as an indicator of the economic condition in all included cross sections, thereby stimulating investment in the following year. Government expenditure also found positive relation to investment. It may be due to the fact that government expenditure on infrastructure (communication, transport and irrigation) and government spending on national defense and security creates a climate favorable for investment. The coefficient of saving is also found to affect the domestic investment positively for all the cross sections. A positive relationship of gross domestic saving with domestic investment implies that the two variables are complimentary; however, a relatively smaller coefficient i.e. 0.138 indicates the higher mobility of capital from these countries.

The coefficient of GDP per capita growth bears a positive sign and is statistically significant. This provides evidence in support of the endogenous growth theory (Locas (1988) and Romer (1986)). The philosophy of neo classical theory of investment, that output growth is positively related with the investment due to the accelerator effect[2], also sustains by this relationship. Furthermore, it is not only the current level of per capita income that affects domestic investment but its lagged value also determines investment positively and almost equally.

The result shows that how a common researcher can have unique model for the all the countries in the sample. The countries can simultaneously emphasize, while making policy, on variables which are selected in final model. It suggests that lagged investment, real GDP per capita growth, domestic saving, government expenditures, are the key determinants of domestic investment in the middle income Asian.

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[2]The accelerator effect theory states Gross Domestic Product (GDP) stimulates investment. In response to a rise in GDP, firms increase their investments and thus the profits go up. Consequently the fixed investments of firms explode, in the form of increased capital stock. This further leads to economic growth by raising consumer expenditure through the multiplier effect.

Chapter 6

Conclusion and Future Directions

6.1 Conclusion

Selection of relevant variables from the set of candidate variables is always an important task. There are numerous automated methodologies available in common statistical/econometric software packages which perform this modeling task quickly. In this simulation based study different automated model selection procedures i.e. Autometrics (latest version of general to specific modeling) is compared with stepwise, forward selection, backward elimination and Information criteria (AIC, BIC along with their corrected forms and HQC) are developed for a panel data framework and then compared their performances. The performance of these model building procedures is compared on the basis of finding true model, Potency (power in hypothesis testing) and gauge (size in hypothesis testing) in different situations i.e. sample size, ratio of relevant-irrelevant variables and different coefficient values.

The objective to use the univariate case is to get consistency of our programmed procedures with the previous literature. This goal is achieved by finding through our results of consistent BICs and HQC Hannan (1979), inconsistency of AICs Salau (2002). AIC perform better in the presence of many relevant numbers, while BICs behave conversely (Castle et al. 2011). Autometrics performs better with low relevant-irrelevant ratio but it shows weak response in circumstances when the number of relevant variables is increased in the general model (Castle et al. 2011).

The main objective is to establish/develop Autometrics along with other path reduction procedures in a panel data framework and then analyze their performances. Different models of panel data are used in the analysis i.e. Constant coefficient model, fixed effect model, Random effect model and random coefficient model. The results showed that in the constant coefficient model Autometrics did well when the number of relevant variable is small as compared to the number of irrelevant variables with good powers and good probability of dropping irrelevant variables for all situations. Stepwise versions are found well 1-gauge in all situations. BICs are consistent with higher 1-gauge. AICs perform better in small samples.

For the fixed effect Autometrics along with other path reduction procedures did well and can be used in these situations. These procedures also show good power and a good probability of dropping irrelevant variables. BICs and HQC also did well in large samples and large t-values. AICs did very well in the presence of more relevant variables but with low 1-gauge.

For the random effect model where the intercept is random term, the path reduction procedures including Autometrics perform well in small as well as large samples. These procedures also show better results for reasonable large coefficient values and showed good performance for relevant-irrelevant variable ratio.

In the random coefficient model the Autometrics and stepwise version are found consistent and their probability of dropping irrelevant variables (1-gauge) goes very high. Autometrics did best in finding true model when number of relevant variables is very less. Among the information criteria AICs are found to be inconsistent, however they perform better in terms of power for smaller coefficients and best when there are more than half relevant variables in the general model. BICs are consistent with a high probability of not getting irrelevant variable and perform well when true the model has fewer variables relative to a general model. HQC are also consistent and provide good value of the 1- gauge.

In the last chapter Autometrics is used for the determining the factors of investment for the middle income Asian countries. The possible available variables are estimated and after reduction through Autometrics, found the model which equally represents the investment factors explaining the economy of the included cross sections. One might keep in mind these factors while making policy for the country.

It is concluded that there is no model selection procedure included Autometrics that performs best in all the circumstances analyzed here, some perform well in one situation but not found good in other situations. As like Al-Subaihi (2002) noted, researchers should take care of applying these model selection procedures because all the criteria perform differently in different circumstances. Their performance is affected by sample size, ratio of relevant-irrelevant variables and the coefficient values. However the Autometrics can be preferred in many situations as it has the data competency through different testing procedures which is not available in any other procedure.

6.2 Future Directions

In thc experiments the static data generation process are used which can be extended to dynamic ones. The probability of getting true model, potency and gauge/1-gauge are used to compare the performance in the situations where sample size, coefficient values and relevant-irrelevant ratio vary. One can extend this research by including Bayesian and all possible subset approaches in the comparative analysis. In real life the economic relationships can be linear and nonlinear; this study analyzed only linear models. In this study the variance is kept fixed all along the experiments and used the orthogonal variables. The effect of variance and collinearity on the performance of model selection procedures can also be tested. Prediction or forecasting powers is also a good measure of performance of procedures which can be seen through some criteria.

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Appendices

Appendix A: Results for Static Model

Table A1: Results for Static Model when n=50

Table:A1(Static Model Results)L=6,K/L=0.75 so k=5,n=50,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.37	0.27	0.25	0.35	0.23	0.22	0.22	0.30	0.19	0.13	0.07	0.06	0.12	0.06	0.04	0.06	0.07
2	0.03	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.57	0.51	0.38	0.33	0.48	0.37	0.35	0.36	0.39	0.19	0.14	0.08	0.05	0.13	0.07	0.06	0.04	0.06
3	0.08	0.04	0.01	0.00	0.04	0.01	0.01	0.01	0.01	0.69	0.62	0.50	0.44	0.61	0.47	0.46	0.46	0.50	0.22	0.19	0.09	0.06	0.17	0.06	0.04	0.04	0.06
4	0.25	0.16	0.08	0.03	0.15	0.06	0.04	0.06	0.05	0.80	0.74	0.64	0.57	0.74	0.61	0.60	0.60	0.61	0.20	0.11	0.06	0.03	0.10	0.06	0.04	0.05	0.06
5	0.45	0.33	0.19	0.09	0.32	0.16	0.14	0.12	0.10	0.88	0.83	0.74	0.67	0.83	0.71	0.71	0.70	0.70	0.18	0.11	0.06	0.03	0.11	0.03	0.05	0.05	0.07
6	0.52	0.45	0.30	0.18	0.44	0.23	0.21	0.22	0.30	0.91	0.88	0.79	0.72	0.88	0.77	0.76	0.75	0.77	0.18	0.12	0.07	0.03	0.13	0.05	0.04	0.04	0.06
7	0.58	0.58	0.45	0.30	0.57	0.39	0.39	0.36	0.45	0.94	0.92	0.87	0.81	0.92	0.84	0.84	0.83	0.86	0.21	0.12	0.08	0.03	0.12	0.07	0.08	0.06	0.05
8	0.72	0.73	0.64	0.50	0.62	0.58	0.56	0.52	0.56	0.98	0.97	0.93	0.88	0.97	0.91	0.90	0.89	0.91	0.22	0.13	0.07	0.03	0.14	0.07	0.03	0.05	0.04
10	0.81	0.85	0.81	0.75	0.85	0.84	0.79	0.80	0.82	0.99	0.99	0.97	0.95	0.99	0.98	0.96	0.97	0.97	0.16	0.10	0.06	0.03	0.11	0.04	0.05	0.07	0.05
12	0.84	0.90	0.94	0.98	0.89	0.94	0.93	0.95	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.10	0.06	0.02	0.11	0.05	0.07	0.05	0.04
L=6,K/L=0.50 so k=3,n=50,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.42	0.38	0.30	0.29	0.36	0.18	0.18	0.16	0.35	0.20	0.17	0.10	0.09	0.15	0.06	0.04	0.05	0.07
2	0.06	0.03	0.02	0.01	0.03	0.01	0.02	0.01	0.03	0.53	0.49	0.37	0.35	0.45	0.32	0.32	0.31	0.41	0.21	0.16	0.09	0.07	0.14	0.07	0.06	0.05	0.07
3	0.15	0.15	0.06	0.03	0.13	0.06	0.05	0.04	0.06	0.68	0.63	0.50	0.45	0.60	0.44	0.42	0.42	0.48	0.19	0.14	0.07	0.05	0.12	0.07	0.05	0.05	0.07
4	0.24	0.25	0.16	0.13	0.24	0.15	0.11	0.12	0.14	0.78	0.74	0.60	0.56	0.72	0.58	0.54	0.56	0.61	0.19	0.14	0.07	0.05	0.13	0.06	0.04	0.04	0.06
5	0.35	0.35	0.26	0.19	0.33	0.27	0.25	0.25	0.22	0.85	0.82	0.69	0.63	0.80	0.70	0.67	0.68	0.68	0.19	0.15	0.07	0.04	0.14	0.07	0.05	0.05	0.06
6	0.36	0.42	0.50	0.47	0.45	0.44	0.44	0.45	0.47	0.90	0.87	0.78	0.75	0.86	0.76	0.72	0.70	0.78	0.18	0.14	0.06	0.05	0.12	0.07	0.06	0.05	0.06
7	0.42	0.47	0.49	0.43	0.47	0.47	0.45	0.48	0.51	0.93	0.91	0.84	0.79	0.90	0.84	0.82	0.83	0.85	0.19	0.14	0.07	0.04	0.13	0.06	0.06	0.05	0.06
8	0.46	0.55	0.59	0.56	0.56	0.64	0.59	0.59	0.58	0.97	0.95	0.90	0.86	0.95	0.91	0.88	0.89	0.89	0.21	0.14	0.07	0.04	0.14	0.05	0.05	0.06	0.06
10	0.52	0.63	0.76	0.79	0.65	0.77	0.74	0.76	0.75	0.99	0.99	0.96	0.95	0.99	0.96	0.96	0.96	0.96	0.19	0.13	0.05	0.03	0.12	0.05	0.06	0.05	0.06
12	0.56	0.68	0.81	0.88	0.70	0.83	0.82	0.83	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.12	0.06	0.04	0.12	0.06	0.05	0.06	0.06
L=6,K/L=0.25 so k=2,n=50,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.06	0.05	0.03	0.02	0.04	0.04	0.02	0.02	0.04	0.43	0.38	0.32	0.31	0.36	0.16	0.13	0.15	0.34	0.22	0.19	0.13	0.12	0.17	0.05	0.05	0.06	0.07
2	0.13	0.14	0.09	0.08	0.13	0.07	0.08	0.08	0.14	0.55	0.52	0.43	0.41	0.49	0.28	0.25	0.28	0.50	0.20	0.16	0.10	0.09	0.14	0.07	0.05	0.05	0.07
3	0.19	0.21	0.18	0.16	0.20	0.15	0.14	0.15	0.24	0.68	0.64	0.52	0.49	0.62	0.41	0.37	0.37	0.59	0.21	0.17	0.10	0.08	0.14	0.07	0.06	0.05	0.06
4	0.28	0.31	0.31	0.27	0.32	0.25	0.28	0.26	0.30	0.79	0.76	0.65	0.61	0.73	0.53	0.54	0.55	0.65	0.19	0.15	0.08	0.06	0.13	0.06	0.05	0.06	0.07
5	0.31	0.37	0.40	0.38	0.39	0.38	0.39	0.38	0.45	0.86	0.83	0.73	0.68	0.81	0.67	0.67	0.64	0.75	0.20	0.15	0.07	0.05	0.13	0.06	0.06	0.05	0.06
6	0.36	0.42	0.50	0.47	0.45	0.44	0.44	0.45	0.47	0.90	0.87	0.78	0.75	0.86	0.76	0.72	0.70	0.78	0.18	0.14	0.06	0.05	0.12	0.07	0.06	0.05	0.06
7	0.42	0.48	0.56	0.57	0.49	0.56	0.58	0.56	0.61	0.94	0.93	0.86	0.83	0.92	0.84	0.83	0.82	0.86	0.18	0.14	0.08	0.05	0.12	0.06	0.05	0.06	0.05
8	0.40	0.49	0.65	0.67	0.54	0.62	0.67	0.66	0.66	0.97	0.96	0.91	0.89	0.95	0.88	0.89	0.89	0.90	0.20	0.15	0.07	0.04	0.13	0.06	0.05	0.04	0.06
10	0.48	0.56	0.75	0.81	0.61	0.73	0.74	0.75	0.78	0.99	0.99	0.97	0.96	0.99	0.97	0.97	0.95	0.96	0.18	0.13	0.06	0.03	0.11	0.06	0.06	0.05	0.05
12	0.47	0.57	0.78	0.87	0.60	0.83	0.82	0.82	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.13	0.06	0.03	0.12	0.04	0.05	0.05	0.06

Table A2: Results for Static Model when n=100

Table:A2(Static Model Results)L=6,K/L=0.75 so k=5,n=100,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.57	0.54	0.34	0.32	0.45	0.36	0.35	0.34	0.35	0.15	0.13	0.04	0.03	0.09	0.04	0.06	0.05	0.07
2	0.21	0.17	0.03	0.01	0.08	0.03	0.04	0.04	0.04	0.78	0.75	0.54	0.50	0.67	0.59	0.59	0.60	0.57	0.18	0.16	0.04	0.03	0.10	0.04	0.04	0.05	0.05
3	0.41	0.38	0.15	0.11	0.29	0.21	0.20	0.19	0.18	0.88	0.86	0.71	0.67	0.81	0.76	0.74	0.75	0.72	0.20	0.17	0.05	0.03	0.11	0.07	0.03	0.06	0.05
4	0.70	0.68	0.45	0.38	0.63	0.52	0.51	0.50	0.51	0.96	0.95	0.86	0.83	0.93	0.89	0.89	0.88	0.89	0.16	0.13	0.03	0.02	0.09	0.05	0.04	0.05	0.05
5	0.77	0.77	0.68	0.61	0.78	0.70	0.76	0.73	0.77	0.99	0.98	0.93	0.91	0.97	0.95	0.95	0.95	0.96	0.18	0.15	0.04	0.03	0.10	0.06	0.06	0.06	0.05
6	0.80	0.84	0.82	0.78	0.85	0.82	0.85	0.86	0.83	0.99	0.99	0.97	0.95	0.99	0.97	0.97	0.98	0.97	0.17	0.13	0.03	0.02	0.08	0.06	0.04	0.06	0.05
7	0.80	0.84	0.91	0.91	0.89	0.92	0.90	0.94	0.90	1.00	1.00	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.19	0.15	0.05	0.03	0.10	0.04	0.07	0.03	0.06
8	0.82	0.86	0.94	0.95	0.90	0.92	0.94	0.93	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.14	0.05	0.04	0.10	0.06	0.05	0.06	0.06
10	0.83	0.87	0.94	0.96	0.92	0.95	0.93	0.95	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.13	0.06	0.04	0.08	0.05	0.07	0.05	0.04
12	0.81	0.84	0.95	0.97	0.89	0.94	0.94	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.19	0.16	0.05	0.03	0.11	0.06	0.06	0.04	0.04
L=6,K/L=0.50 so k=3,n=100,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.07	0.07	0.01	0.01	0.04	0.01	0.01	0.02	0.02	0.55	0.53	0.37	0.35	0.45	0.35	0.34	0.35	0.40	0.19	0.16	0.06	0.06	0.10	0.06	0.05	0.05	0.06
2	0.26	0.26	0.11	0.08	0.20	0.12	0.09	0.13	0.11	0.78	0.76	0.56	0.53	0.67	0.57	0.56	0.57	0.55	0.17	0.15	0.04	0.03	0.09	0.06	0.05	0.05	0.06
3	0.35	0.37	0.26	0.24	0.37	0.29	0.31	0.30	0.25	0.87	0.86	0.69	0.66	0.81	0.74	0.74	0.73	0.70	0.19	0.16	0.04	0.03	0.10	0.06	0.05	0.05	0.05
4	0.49	0.52	0.54	0.50	0.60	0.62	0.58	0.53	0.59	0.95	0.94	0.85	0.83	0.92	0.89	0.88	0.86	0.88	0.16	0.13	0.03	0.03	0.08	0.05	0.05	0.05	0.05
5	0.54	0.60	0.71	0.72	0.68	0.75	0.71	0.73	0.72	0.99	0.99	0.92	0.91	0.97	0.95	0.94	0.95	0.93	0.18	0.15	0.04	0.02	0.10	0.05	0.05	0.05	0.04
6	0.49	0.54	0.85	0.85	0.69	0.74	0.75	0.74	0.79	0.99	0.99	0.97	0.97	0.99	0.98	0.98	0.97	0.97	0.16	0.14	0.03	0.02	0.08	0.06	0.06	0.06	0.05
7	0.57	0.62	0.85	0.87	0.73	0.84	0.85	0.82	0.79	1.00	1.00	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.17	0.15	0.04	0.03	0.10	0.05	0.05	0.05	0.06
8	0.55	0.61	0.88	0.90	0.75	0.85	0.86	0.87	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.15	0.04	0.03	0.09	0.05	0.05	0.05	0.05
10	0.55	0.59	0.89	0.92	0.73	0.85	0.84	0.84	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.16	0.04	0.03	0.10	0.06	0.06	0.06	0.04
12	0.57	0.64	0.88	0.92	0.77	0.86	0.85	0.87	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.14	0.04	0.03	0.09	0.05	0.05	0.05	0.05
L=6,K/L=0.25 so k=2,n=100,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.14	0.14	0.05	0.04	0.12	0.09	0.08	0.10	0.09	0.55	0.53	0.38	0.38	0.46	0.31	0.30	0.32	0.45	0.19	0.17	0.09	0.09	0.12	0.06	0.04	0.05	0.08
2	0.26	0.28	0.16	0.15	0.27	0.24	0.26	0.24	0.20	0.76	0.74	0.55	0.54	0.66	0.56	0.55	0.56	0.59	0.18	0.16	0.06	0.06	0.11	0.06	0.05	0.05	0.07
3	0.38	0.41	0.39	0.37	0.45	0.43	0.45	0.40	0.41	0.87	0.85	0.70	0.67	0.80	0.73	0.73	0.71	0.73	0.17	0.15	0.04	0.04	0.10	0.06	0.05	0.06	0.05
4	0.47	0.51	0.63	0.61	0.62	0.59	0.58	0.58	0.61	0.95	0.95	0.86	0.84	0.93	0.86	0.85	0.85	0.86	0.16	0.14	0.03	0.03	0.08	0.07	0.06	0.05	0.04
5	0.47	0.53	0.75	0.76	0.66	0.76	0.72	0.72	0.69	0.99	0.99	0.93	0.92	0.97	0.95	0.94	0.94	0.93	0.17	0.14	0.04	0.03	0.09	0.04	0.05	0.05	0.05
6	0.49	0.54	0.85	0.85	0.69	0.74	0.75	0.74	0.79	0.99	0.99	0.97	0.97	0.99	0.98	0.98	0.97	0.97	0.16	0.14	0.03	0.02	0.08	0.06	0.06	0.06	0.05
7	0.50	0.55	0.83	0.85	0.72	0.84	0.80	0.81	0.79	1.00	1.00	0.98	0.98	1.00	1.00	0.99	0.99	0.99	0.16	0.14	0.04	0.03	0.08	0.04	0.05	0.05	0.05
8	0.48	0.55	0.87	0.90	0.70	0.80	0.81	0.80	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.15	0.04	0.03	0.09	0.05	0.05	0.06	0.05
10	0.48	0.53	0.85	0.87	0.68	0.82	0.82	0.84	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.15	0.04	0.03	0.09	0.05	0.05	0.05	0.05
12	0.48	0.53	0.87	0.89	0.70	0.79	0.80	0.81	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.15	0.03	0.03	0.09	0.06	0.05	0.05	0.03

Table A3: Results for Static Model when n=200

Table:A3(Static Model Results)L=6,K/L=0.75 so k=5,n=200,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.19	0.17	0.01	0.00	0.08	0.05	0.04	0.06	0.05	0.76	0.75	0.47	0.46	0.64	0.58	0.58	0.57	0.55	0.15	0.14	0.03	0.02	0.07	0.05	0.03	0.06	0.04
2	0.67	0.67	0.27	0.23	0.52	0.50	0.49	0.45	0.51	0.95	0.95	0.79	0.77	0.89	0.88	0.87	0.86	0.87	0.12	0.12	0.02	0.01	0.07	0.06	0.06	0.04	0.04
3	0.80	0.81	0.71	0.69	0.80	0.77	0.81	0.81	0.77	0.99	0.99	0.94	0.93	0.97	0.96	0.97	0.96	0.96	0.17	0.15	0.03	0.02	0.09	0.04	0.05	0.03	0.08
4	0.86	0.87	0.92	0.91	0.93	0.93	0.93	0.92	0.91	1.00	1.00	0.99	0.98	1.00	1.00	0.99	1.00	1.00	0.14	0.12	0.02	0.02	0.06	0.05	0.04	0.07	0.07
5	0.84	0.85	0.97	0.97	0.94	0.95	0.95	0.96	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.02	0.02	0.05	0.04	0.05	0.04	0.06
6	0.84	0.85	0.98	0.98	0.93	0.94	0.95	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.02	0.02	0.07	0.06	0.05	0.04	0.04
7	0.86	0.87	0.98	0.98	0.93	0.94	0.94	0.95	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.13	0.02	0.02	0.07	0.06	0.06	0.05	0.06
8	0.82	0.85	0.98	0.98	0.93	0.96	0.96	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.15	0.02	0.02	0.07	0.04	0.04	0.04	0.05
10	0.86	0.88	0.98	0.99	0.93	0.93	0.94	0.96	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.12	0.02	0.01	0.07	0.07	0.06	0.04	0.06
12	0.80	0.83	0.97	0.97	0.91	0.95	0.94	0.95	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.20	0.17	0.03	0.03	0.09	0.05	0.06	0.05	0.04
L=6,K/L=0.50 so k=3,n=200,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.30	0.29	0.07	0.07	0.19	0.15	0.14	0.14	0.12	0.77	0.76	0.50	0.49	0.64	0.59	0.59	0.59	0.58	0.15	0.14	0.03	0.02	0.07	0.06	0.06	0.04	0.04
2	0.51	0.53	0.48	0.45	0.61	0.58	0.58	0.53	0.52	0.96	0.96	0.81	0.80	0.91	0.88	0.89	0.87	0.85	0.17	0.15	0.03	0.03	0.08	0.05	0.05	0.06	0.05
3	0.58	0.61	0.76	0.75	0.76	0.78	0.78	0.79	0.75	0.99	0.99	0.94	0.93	0.98	0.97	0.97	0.97	0.95	0.16	0.15	0.02	0.02	0.07	0.04	0.05	0.05	0.04
4	0.59	0.61	0.90	0.90	0.78	0.85	0.85	0.86	0.84	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	0.99	0.17	0.16	0.03	0.03	0.07	0.05	0.05	0.05	0.05
5	0.57	0.60	0.93	0.93	0.80	0.85	0.84	0.82	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.15	0.02	0.02	0.07	0.05	0.05	0.06	0.05
6	0.47	0.49	0.91	0.92	0.74	0.83	0.79	0.80	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.02	0.02	0.07	0.05	0.06	0.05	0.04
7	0.58	0.60	0.94	0.95	0.79	0.84	0.88	0.87	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.15	0.02	0.02	0.07	0.06	0.04	0.05	0.04
8	0.56	0.60	0.93	0.94	0.77	0.85	0.85	0.87	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.16	0.03	0.02	0.09	0.05	0.05	0.04	0.04
10	0.58	0.61	0.93	0.94	0.80	0.86	0.88	0.86	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.03	0.02	0.08	0.05	0.04	0.05	0.05
12	0.59	0.61	0.93	0.94	0.80	0.85	0.86	0.86	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.02	0.02	0.07	0.05	0.05	0.04	0.04
L=6,K/L=0.25 so k=2,n=200,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.28	0.29	0.18	0.16	0.28	0.25	0.26	0.22	0.27	0.78	0.77	0.55	0.54	0.66	0.56	0.58	0.52	0.63	0.17	0.16	0.04	0.04	0.08	0.06	0.05	0.05	0.06
2	0.45	0.47	0.58	0.56	0.60	0.59	0.60	0.58	0.57	0.96	0.96	0.81	0.80	0.90	0.84	0.87	0.84	0.85	0.16	0.15	0.02	0.02	0.07	0.05	0.06	0.05	0.05
3	0.46	0.48	0.78	0.77	0.70	0.75	0.75	0.74	0.77	0.99	0.99	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.17	0.16	0.03	0.02	0.07	0.05	0.05	0.05	0.04
4	0.48	0.50	0.88	0.89	0.72	0.79	0.82	0.78	0.79	1.00	1.00	0.99	0.99	1.00	1.00	0.99	1.00	0.99	0.17	0.16	0.03	0.02	0.08	0.06	0.05	0.06	0.06
5	0.51	0.52	0.91	0.91	0.76	0.82	0.83	0.84	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.02	0.02	0.06	0.05	0.04	0.05	0.05
6	0.47	0.49	0.91	0.92	0.74	0.83	0.79	0.80	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.02	0.02	0.07	0.05	0.06	0.05	0.04
7	0.46	0.48	0.89	0.91	0.70	0.81	0.80	0.82	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.17	0.03	0.02	0.09	0.05	0.06	0.05	0.05
8	0.52	0.53	0.94	0.95	0.76	0.84	0.80	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.02	0.01	0.06	0.04	0.06	0.05	0.05
10	0.50	0.52	0.92	0.93	0.76	0.83	0.80	0.85	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.14	0.02	0.02	0.07	0.05	0.06	0.04	0.04
12	0.47	0.50	0.90	0.92	0.73	0.83	0.84	0.82	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.03	0.02	0.08	0.05	0.04	0.05	0.04

Appendix B:Results for Constant Coefficient Model

Table B1: Results for Constant Coefficient Model when n=25

Table B1(Constant Coefficient Model Results)L=6,K/L=1 so k=6,n=25,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.23	0.17	0.17	0.18	0.07	0.07	0.07	0.19									
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.17	0.17	0.20	0.09	0.09	0.09	0.21									
3.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.40	0.19	0.19	0.27	0.18	0.19	0.18	0.25									
4.00	0.07	0.06	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.58	0.57	0.25	0.24	0.40	0.34	0.31	0.31	0.36									
5.00	0.17	0.16	0.00	0.00	0.04	0.04	0.02	0.03	0.03	0.70	0.69	0.31	0.29	0.51	0.49	0.44	0.44	0.51									
6.00	0.37	0.35	0.03	0.02	0.14	0.10	0.08	0.08	0.10	0.81	0.80	0.43	0.42	0.66	0.59	0.56	0.55	0.61									
7.00	0.58	0.55	0.12	0.09	0.32	0.24	0.23	0.27	0.27	0.90	0.90	0.60	0.58	0.81	0.76	0.74	0.74	0.77									
8.00	0.82	0.81	0.33	0.29	0.61	0.48	0.48	0.52	0.49	0.97	0.96	0.77	0.75	0.91	0.87	0.86	0.87	0.87									
10.00	0.97	0.97	0.72	0.70	0.90	0.89	0.88	0.84	0.87	1.00	1.00	0.94	0.94	0.98	0.98	0.98	0.97	0.98									
12.00	1.00	1.00	0.98	0.98	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=25,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.24	0.17	0.17	0.19	0.07	0.07	0.07	0.19	0.23	0.23	0.16	0.16	0.17	0.05	0.06	0.06	0.06
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.28	0.18	0.18	0.21	0.09	0.10	0.09	0.22	0.20	0.20	0.12	0.12	0.14	0.06	0.04	0.06	0.07
3.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.41	0.21	0.21	0.29	0.20	0.17	0.19	0.28	0.19	0.18	0.08	0.08	0.10	0.06	0.06	0.06	0.06
4.00	0.08	0.07	0.00	0.00	0.02	0.01	0.01	0.01	0.02	0.59	0.57	0.27	0.26	0.41	0.33	0.34	0.33	0.39	0.17	0.16	0.04	0.04	0.08	0.06	0.04	0.04	0.07
5.00	0.19	0.17	0.00	0.00	0.05	0.05	0.04	0.04	0.04	0.69	0.68	0.33	0.32	0.52	0.46	0.45	0.41	0.48	0.16	0.15	0.03	0.03	0.07	0.05	0.06	0.06	0.06
6.00	0.29	0.29	0.06	0.05	0.16	0.12	0.10	0.11	0.12	0.81	0.80	0.43	0.41	0.64	0.58	0.58	0.58	0.61	0.21	0.19	0.02	0.02	0.07	0.06	0.04	0.08	0.06
7.00	0.49	0.49	0.12	0.11	0.34	0.31	0.31	0.25	0.31	0.90	0.89	0.58	0.57	0.78	0.76	0.74	0.72	0.76	0.18	0.16	0.03	0.02	0.08	0.04	0.04	0.07	0.06
8.00	0.65	0.65	0.31	0.29	0.56	0.49	0.49	0.49	0.51	0.95	0.95	0.74	0.73	0.89	0.86	0.85	0.86	0.86	0.18	0.17	0.03	0.02	0.08	0.06	0.06	0.05	0.06
10.00	0.83	0.84	0.77	0.75	0.87	0.83	0.85	0.83	0.80	1.00	1.00	0.94	0.94	0.98	0.97	0.97	0.97	0.97	0.15	0.14	0.02	0.02	0.06	0.05	0.04	0.04	0.06
12.00	0.84	0.85	0.96	0.96	0.92	0.95	0.93	0.94	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.02	0.02	0.07	0.04	0.07	0.06	0.05

L=6,K/L=0.50 so k=3,n=25,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.18	0.18	0.20	0.07	0.07	0.06	0.21	0.20	0.20	0.15	0.15	0.16	0.06	0.06	0.06	0.07
2.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.30	0.21	0.21	0.24	0.09	0.11	0.09	0.26	0.21	0.20	0.13	0.13	0.15	0.06	0.05	0.06	0.06
3.00	0.06	0.06	0.00	0.00	0.03	0.01	0.01	0.01	0.01	0.48	0.47	0.28	0.28	0.35	0.23	0.22	0.22	0.32	0.20	0.20	0.08	0.08	0.11	0.06	0.05	0.05	0.07
4.00	0.15	0.15	0.02	0.02	0.07	0.07	0.06	0.09	0.07	0.61	0.61	0.36	0.36	0.46	0.38	0.39	0.39	0.48	0.18	0.17	0.05	0.05	0.10	0.05	0.06	0.06	0.06
5.00	0.27	0.27	0.06	0.06	0.19	0.17	0.12	0.14	0.16	0.76	0.75	0.45	0.45	0.61	0.55	0.52	0.51	0.56	0.17	0.16	0.04	0.04	0.08	0.06	0.06	0.05	0.04
6.00	0.34	0.35	0.17	0.16	0.29	0.23	0.29	0.26	0.25	0.83	0.82	0.56	0.55	0.70	0.63	0.66	0.64	0.67	0.17	0.16	0.03	0.03	0.08	0.07	0.06	0.05	0.05
7.00	0.45	0.46	0.31	0.29	0.47	0.43	0.47	0.43	0.44	0.92	0.91	0.67	0.66	0.83	0.78	0.80	0.80	0.79	0.17	0.16	0.02	0.02	0.07	0.05	0.06	0.06	0.05
8.00	0.51	0.51	0.49	0.49	0.58	0.57	0.56	0.59	0.59	0.96	0.96	0.80	0.79	0.90	0.89	0.88	0.89	0.88	0.17	0.16	0.02	0.02	0.07	0.05	0.05	0.04	0.05
10.00	0.56	0.58	0.88	0.88	0.77	0.81	0.84	0.79	0.78	0.99	0.99	0.97	0.97	0.99	0.99	0.98	0.98	0.97	0.17	0.17	0.01	0.01	0.07	0.06	0.04	0.06	0.06
12.00	0.52	0.54	0.93	0.93	0.77	0.82	0.83	0.82	0.85	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.18	0.17	0.02	0.02	0.08	0.06	0.06	0.06	0.06

L=6,K/L=0.25 so k=2,n=25,alpha=0.05,sigma=1																											
	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.25	0.24	0.17	0.17	0.18	0.08	0.06	0.07	0.23	0.22	0.22	0.17	0.17	0.18	0.06	0.05	0.06	0.08
2.00	0.05	0.05	0.01	0.01	0.02	0.02	0.01	0.01	0.04	0.30	0.29	0.20	0.20	0.22	0.11	0.10	0.11	0.30	0.22	0.21	0.16	0.16	0.17	0.05	0.05	0.06	0.07
3.00	0.10	0.10	0.03	0.02	0.06	0.07	0.05	0.05	0.07	0.44	0.43	0.31	0.31	0.34	0.23	0.20	0.21	0.40	0.18	0.18	0.11	0.11	0.12	0.07	0.05	0.05	0.06
4.00	0.17	0.16	0.08	0.08	0.15	0.12	0.17	0.12	0.20	0.63	0.62	0.41	0.41	0.51	0.36	0.38	0.35	0.51	0.19	0.19	0.08	0.08	0.11	0.06	0.06	0.06	0.07
5.00	0.23	0.24	0.15	0.14	0.24	0.24	0.20	0.23	0.30	0.70	0.70	0.49	0.48	0.58	0.49	0.48	0.51	0.66	0.19	0.18	0.06	0.06	0.10	0.06	0.06	0.06	0.06
6.00	0.34	0.35	0.24	0.23	0.37	0.37	0.32	0.34	0.38	0.81	0.81	0.57	0.56	0.69	0.65	0.59	0.62	0.70	0.17	0.16	0.04	0.04	0.08	0.05	0.05	0.06	0.06
7.00	0.38	0.39	0.41	0.41	0.50	0.51	0.48	0.50	0.54	0.91	0.90	0.70	0.69	0.83	0.79	0.77	0.77	0.82	0.17	0.17	0.03	0.03	0.08	0.06	0.06	0.06	0.05
8.00	0.41	0.43	0.59	0.58	0.62	0.65	0.65	0.60	0.61	0.96	0.96	0.82	0.82	0.92	0.89	0.89	0.87	0.88	0.19	0.18	0.03	0.03	0.08	0.05	0.05	0.06	0.06
10.00	0.48	0.49	0.84	0.85	0.72	0.77	0.79	0.81	0.79	0.99	0.99	0.96	0.95	0.98	0.98	0.98	0.99	0.98	0.17	0.16	0.02	0.02	0.07	0.05	0.05	0.04	0.05
12.00	0.49	0.50	0.89	0.89	0.74	0.79	0.79	0.77	0.83	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.02	0.02	0.07	0.06	0.06	0.06	0.05

L=6,K/L=0.1 so k=1,n=25,alpha=0.05,sigma=1																											
ility of getting true model										Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.13	0.13	0.18	0.18	0.17	0.07	0.06	0.04	0.19	0.24	0.24	0.19	0.19	0.21	0.09	0.07	0.05	0.21	0.23	0.22	0.17	0.17	0.18	0.06	0.05	0.06	0.06
2.00	0.18	0.18	0.26	0.26	0.25	0.08	0.08	0.10	0.30	0.35	0.35	0.27	0.27	0.29	0.11	0.11	0.13	0.39	0.21	0.21	0.15	0.15	0.16	0.06	0.06	0.05	0.06
3.00	0.25	0.26	0.40	0.40	0.37	0.21	0.20	0.21	0.50	0.51	0.50	0.42	0.42	0.45	0.28	0.26	0.27	0.57	0.20	0.19	0.12	0.12	0.13	0.05	0.06	0.05	0.06
4.00	0.29	0.30	0.52	0.52	0.45	0.33	0.33	0.38	0.62	0.66	0.65	0.55	0.55	0.58	0.46	0.43	0.47	0.77	0.20	0.19	0.10	0.10	0.12	0.06	0.06	0.05	0.05
5.00	0.28	0.28	0.58	0.59	0.47	0.45	0.45	0.47	0.67	0.78	0.78	0.64	0.64	0.69	0.59	0.63	0.60	0.82	0.20	0.20	0.09	0.08	0.12	0.06	0.06	0.06	0.07
6.00	0.38	0.39	0.74	0.74	0.62	0.52	0.53	0.54	0.72	0.86	0.86	0.79	0.79	0.81	0.71	0.73	0.74	0.91	0.17	0.16	0.05	0.05	0.08	0.06	0.06	0.06	0.06
7.00	0.35	0.36	0.80	0.80	0.64	0.66	0.64	0.66	0.76	0.93	0.93	0.87	0.87	0.90	0.88	0.84	0.85	0.95	0.18	0.17	0.04	0.04	0.08	0.06	0.06	0.05	0.05
8.00	0.38	0.39	0.88	0.89	0.67	0.71	0.69	0.69	0.74	0.98	0.98	0.96	0.96	0.97	0.93	0.91	0.92	0.97	0.18	0.17	0.02	0.02	0.08	0.05	0.06	0.06	0.06
10.00	0.44	0.45	0.90	0.90	0.73	0.74	0.74	0.74	0.79	1.00	1.00	0.99	0.99	1.00	0.99	0.99	0.98	1.00	0.16	0.15	0.02	0.02	0.06	0.06	0.06	0.05	0.05
12.00	0.41	0.44	0.92	0.93	0.74	0.74	0.79	0.74	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.02	0.01	0.06	0.06	0.05	0.06	0.05

Table B2: Results for Constant Coefficient Model when n=50

Table B2(Constant Coefficient Model Results)L=6,K/L=1so k=6,n=50,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.26	0.17	0.17	0.19	0.08	0.08	0.09	0.19									
2.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.33	0.17	0.17	0.22	0.15	0.15	0.15	0.23									
3.00	0.06	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.59	0.59	0.25	0.24	0.41	0.38	0.37	0.36	0.41									
4.00	0.36	0.35	0.01	0.00	0.11	0.10	0.09	0.13	0.12	0.83	0.83	0.42	0.41	0.67	0.65	0.63	0.66	0.67									
5.00	0.65	0.63	0.09	0.08	0.34	0.29	0.30	0.31	0.31	0.93	0.93	0.62	0.61	0.82	0.80	0.80	0.81	0.81									
6.00	0.85	0.84	0.28	0.25	0.62	0.58	0.57	0.60	0.59	0.97	0.97	0.78	0.78	0.92	0.91	0.90	0.91	0.91									
7.00	0.97	0.97	0.66	0.64	0.88	0.86	0.83	0.86	0.86	0.99	0.99	0.93	0.93	0.98	0.98	0.97	0.97	0.97									
8.00	1.00	1.00	0.86	0.85	0.96	0.98	0.96	0.96	0.97	1.00	1.00	0.97	0.97	0.99	1.00	0.99	0.99	0.99									
10.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=50,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.25	0.17	0.17	0.19	0.10	0.08	0.09	0.20	0.23	0.23	0.17	0.17	0.18	0.04	0.05	0.06	0.05
2.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.19	0.19	0.23	0.16	0.14	0.13	0.25	0.17	0.17	0.08	0.08	0.10	0.06	0.05	0.07	0.05
3.00	0.08	0.07	0.00	0.00	0.02	0.01	0.00	0.01	0.02	0.60	0.60	0.26	0.26	0.41	0.38	0.38	0.38	0.41	0.13	0.13	0.02	0.02	0.06	0.07	0.04	0.05	0.04
4.00	0.35	0.34	0.02	0.01	0.13	0.15	0.14	0.15	0.14	0.83	0.83	0.44	0.43	0.67	0.66	0.65	0.66	0.65	0.18	0.18	0.02	0.02	0.07	0.05	0.06	0.06	0.04
5.00	0.54	0.54	0.12	0.11	0.37	0.34	0.31	0.31	0.34	0.91	0.91	0.62	0.61	0.81	0.80	0.79	0.80	0.80	0.15	0.15	0.01	0.01	0.05	0.07	0.07	0.06	0.05
6.00	0.71	0.70	0.36	0.33	0.63	0.57	0.57	0.58	0.61	0.97	0.97	0.78	0.78	0.92	0.91	0.90	0.90	0.91	0.17	0.17	0.02	0.02	0.06	0.06	0.06	0.05	0.05
7.00	0.80	0.80	0.67	0.66	0.84	0.86	0.81	0.82	0.81	0.99	0.99	0.92	0.92	0.98	0.98	0.97	0.97	0.98	0.18	0.17	0.01	0.01	0.06	0.04	0.06	0.05	0.05
8.00	0.83	0.83	0.90	0.90	0.92	0.91	0.91	0.91	0.91	1.00	1.00	0.98	0.98	1.00	0.99	0.99	0.99	0.99	0.17	0.16	0.02	0.02	0.06	0.06	0.05	0.06	0.05
10.00	0.81	0.82	0.98	0.98	0.92	0.94	0.94	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.19	0.18	0.02	0.02	0.08	0.06	0.06	0.05	0.05
12.00	0.82	0.83	0.98	0.99	0.95	0.95	0.96	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.17	0.02	0.01	0.05	0.05	0.04	0.05	0.05

L=6,K/L=0.50 so k=3,n=50,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.27	0.19	0.19	0.20	0.10	0.09	0.10	0.24	0.20	0.20	0.15	0.15	0.16	0.05	0.05	0.06	0.06
2.00	0.02	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.37	0.37	0.25	0.25	0.28	0.16	0.17	0.17	0.32	0.19	0.19	0.09	0.09	0.11	0.06	0.05	0.05	0.05
3.00	0.13	0.13	0.01	0.01	0.07	0.05	0.05	0.06	0.07	0.63	0.62	0.35	0.35	0.47	0.43	0.40	0.43	0.48	0.15	0.15	0.03	0.03	0.07	0.06	0.05	0.05	0.06
4.00	0.35	0.35	0.08	0.08	0.27	0.30	0.29	0.29	0.29	0.84	0.83	0.51	0.50	0.69	0.70	0.69	0.68	0.70	0.16	0.16	0.02	0.01	0.05	0.05	0.05	0.05	0.05
5.00	0.47	0.48	0.31	0.31	0.52	0.45	0.49	0.51	0.45	0.94	0.94	0.70	0.70	0.86	0.81	0.83	0.83	0.81	0.17	0.16	0.03	0.02	0.06	0.05	0.05	0.05	0.04
6.00	0.53	0.53	0.53	0.52	0.64	0.65	0.63	0.68	0.69	0.97	0.96	0.82	0.82	0.92	0.92	0.92	0.92	0.94	0.17	0.17	0.02	0.02	0.06	0.05	0.06	0.05	0.05
7.00	0.54	0.55	0.78	0.77	0.77	0.80	0.79	0.77	0.80	1.00	1.00	0.93	0.93	0.98	0.98	0.98	0.98	0.98	0.19	0.19	0.02	0.01	0.07	0.05	0.05	0.06	0.05
8.00	0.57	0.58	0.89	0.89	0.80	0.87	0.84	0.83	0.84	1.00	1.00	0.97	0.97	1.00	1.00	1.00	0.99	1.00	0.17	0.17	0.01	0.01	0.07	0.05	0.06	0.05	0.05
10.00	0.58	0.59	0.95	0.95	0.82	0.85	0.83	0.84	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.02	0.02	0.07	0.05	0.06	0.06	0.04
12.00	0.58	0.59	0.94	0.95	0.82	0.85	0.86	0.87	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.02	0.02	0.06	0.05	0.05	0.05	0.05

L=6,K/L=0.50 so k=2,n=50,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.03	0.03	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.29	0.28	0.22	0.22	0.23	0.10	0.08	0.08	0.27	0.20	0.20	0.14	0.14	0.15	0.06	0.05	0.05	0.06
2.00	0.05	0.05	0.00	0.00	0.03	0.02	0.02	0.01	0.04	0.38	0.38	0.28	0.28	0.30	0.16	0.15	0.15	0.37	0.19	0.19	0.12	0.12	0.12	0.05	0.05	0.06	0.05
3.00	0.19	0.19	0.05	0.04	0.15	0.15	0.14	0.14	0.17	0.64	0.64	0.43	0.43	0.51	0.41	0.40	0.42	0.56	0.18	0.18	0.06	0.06	0.08	0.05	0.06	0.05	0.07
4.00	0.39	0.40	0.26	0.26	0.39	0.36	0.39	0.39	0.35	0.87	0.87	0.60	0.60	0.73	0.65	0.68	0.69	0.71	0.16	0.16	0.02	0.02	0.06	0.05	0.06	0.05	0.05
5.00	0.41	0.42	0.37	0.37	0.53	0.56	0.55	0.54	0.53	0.92	0.92	0.68	0.68	0.83	0.83	0.83	0.83	0.82	0.17	0.16	0.02	0.02	0.07	0.06	0.05	0.06	0.06
6.00	0.44	0.45	0.60	0.61	0.66	0.66	0.65	0.67	0.70	0.96	0.96	0.82	0.82	0.92	0.92	0.91	0.90	0.92	0.17	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.05
7.00	0.47	0.48	0.82	0.83	0.76	0.78	0.77	0.78	0.76	0.99	0.99	0.94	0.94	0.98	0.98	0.97	0.98	0.98	0.17	0.16	0.01	0.01	0.06	0.05	0.05	0.05	0.06
8.00	0.51	0.52	0.90	0.90	0.80	0.77	0.83	0.80	0.81	1.00	1.00	0.98	0.98	1.00	1.00	0.99	0.99	0.99	0.16	0.15	0.01	0.01	0.05	0.06	0.04	0.05	0.05
10.00	0.46	0.47	0.94	0.95	0.79	0.82	0.81	0.81	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.17	0.02	0.01	0.06	0.05	0.05	0.05	0.05
12.00	0.49	0.50	0.96	0.96	0.79	0.81	0.81	0.79	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.05	0.05	0.06	0.05

L=6,K/L=0.50 so k=1,n=50,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.15	0.16	0.21	0.21	0.20	0.07	0.07	0.07	0.22	0.27	0.27	0.21	0.21	0.22	0.10	0.10	0.10	0.30	0.21	0.21	0.16	0.16	0.16	0.06	0.06	0.06	0.08
2.00	0.23	0.23	0.33	0.33	0.32	0.12	0.13	0.12	0.36	0.44	0.43	0.34	0.34	0.36	0.18	0.17	0.18	0.44	0.20	0.19	0.13	0.13	0.14	0.06	0.05	0.06	0.06
3.00	0.30	0.30	0.55	0.55	0.49	0.32	0.37	0.33	0.62	0.72	0.71	0.58	0.58	0.62	0.43	0.48	0.43	0.75	0.19	0.19	0.09	0.09	0.11	0.06	0.05	0.05	0.05
4.00	0.37	0.37	0.77	0.77	0.65	0.55	0.57	0.55	0.73	0.90	0.90	0.80	0.80	0.83	0.74	0.75	0.72	0.91	0.16	0.16	0.05	0.05	0.08	0.05	0.06	0.05	0.06
5.00	0.40	0.41	0.83	0.83	0.70	0.62	0.69	0.65	0.75	0.96	0.96	0.91	0.91	0.93	0.84	0.87	0.85	0.96	0.17	0.17	0.04	0.04	0.08	0.06	0.04	0.06	0.05
6.00	0.41	0.41	0.91	0.91	0.72	0.73	0.75	0.73	0.79	0.98	0.98	0.96	0.96	0.97	0.94	0.95	0.96	0.98	0.17	0.17	0.02	0.02	0.06	0.05	0.05	0.05	0.05
7.00	0.42	0.42	0.93	0.94	0.73	0.74	0.74	0.74	0.79	0.99	0.99	0.98	0.98	0.99	0.99	1.00	0.99	1.00	0.17	0.16	0.02	0.01	0.07	0.06	0.06	0.06	0.05
8.00	0.39	0.40	0.91	0.91	0.69	0.75	0.74	0.74	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.02	0.02	0.07	0.05	0.06	0.06	0.04
10.00	0.38	0.39	0.94	0.94	0.71	0.74	0.74	0.73	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.18	0.01	0.01	0.07	0.06	0.06	0.06	0.05
12.00	0.42	0.42	0.93	0.94	0.72	0.75	0.72	0.77	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.06	0.05	0.06	0.05	0.06

Table B3: Results for Constant Coefficient Model when n=100

Table B3(Constant Coefficient Model Results)L=6,K/L=1 so k=6,n=100,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.33	0.17	0.27	0.22	0.24	0.30	0.29	0.32									
2.00	0.06	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.55	0.66	0.25	0.34	0.67	0.65	0.63	0.63	0.67									
3.00	0.46	0.48	0.01	0.01	0.15	0.10	0.08	0.13	0.10	0.83	0.83	0.42	0.41	0.67	0.65	0.63	0.66	0.92									
4.00	0.65	0.63	0.09	0.08	0.34	0.55	0.54	0.54	0.61	0.93	0.93	0.62	0.61	0.82	0.80	0.80	0.81	0.98									
5.00	0.85	0.84	0.28	0.25	0.62	0.58	0.57	0.83	0.86	0.97	0.97	0.78	0.78	0.92	0.91	0.90	0.91	1.00									
6.00	0.97	0.97	0.66	0.64	0.88	0.86	0.83	0.86	0.99	0.99	0.99	0.93	0.93	0.98	0.98	0.97	0.97	1.00									
7.00	1.00	1.00	0.86	0.85	0.96	0.98	0.96	0.96	1.00	1.00	1.00	0.97	0.97	0.99	1.00	0.99	0.99	1.00									
8.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
10.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=100,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.19	0.19	0.21	0.11	0.13	0.11	0.24	0.16	0.16	0.08	0.08	0.10	0.07	0.05	0.04	0.06
2.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.47	0.21	0.21	0.30	0.26	0.27	0.28	0.33	0.13	0.13	0.04	0.04	0.07	0.06	0.06	0.04	0.05
3.00	0.31	0.32	0.01	0.00	0.13	0.15	0.13	0.13	0.15	0.83	0.83	0.41	0.41	0.66	0.69	0.67	0.66	0.68	0.18	0.18	0.02	0.02	0.06	0.05	0.06	0.03	0.06
4.00	0.76	0.76	0.30	0.29	0.65	0.66	0.65	0.63	0.63	0.98	0.98	0.77	0.77	0.93	0.93	0.92	0.92	0.92	0.15	0.15	0.01	0.01	0.05	0.06	0.05	0.03	0.05
5.00	0.82	0.82	0.65	0.64	0.87	0.87	0.87	0.87	0.85	1.00	1.00	0.92	0.91	0.98	0.98	0.98	0.98	0.98	0.17	0.17	0.00	0.00	0.05	0.05	0.04	0.05	0.05
6.00	0.85	0.85	0.88	0.87	0.94	0.92	0.95	0.95	0.92	1.00	1.00	0.98	0.98	1.00	0.99	1.00	1.00	1.00	0.15	0.15	0.02	0.02	0.05	0.06	0.04	0.05	0.05
7.00	0.85	0.85	0.97	0.97	0.95	0.96	0.95	0.95	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.02	0.02	0.05	0.04	0.05	0.05	0.04
8.00	0.84	0.85	0.99	0.99	0.94	0.95	0.94	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.06	0.05	0.06	0.05	0.05
10.00	0.85	0.85	0.99	0.99	0.95	0.94	0.96	0.95	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.05	0.06	0.04	0.05	0.05
12.00	0.83	0.83	0.99	0.99	0.96	0.94	0.95	0.95	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.04	0.06	0.05	0.05	0.05

L=6,K/L=0.50 so k=3,n=100,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.31	0.20	0.20	0.23	0.12	0.11	0.14	0.28	0.20	0.20	0.13	0.13	0.14	0.05	0.06	0.05	0.07
2.00	0.06	0.06	0.00	0.00	0.00	0.02	0.01	0.01	0.03	0.51	0.51	0.29	0.29	0.35	0.29	0.27	0.27	0.40	0.16	0.16	0.05	0.05	0.07	0.05	0.06	0.06	0.07
3.00	0.40	0.40	0.09	0.09	0.28	0.28	0.26	0.26	0.28	0.85	0.85	0.48	0.47	0.68	0.67	0.68	0.69	0.69	0.14	0.14	0.02	0.02	0.05	0.04	0.04	0.06	0.06
4.00	0.53	0.53	0.51	0.51	0.69	0.67	0.68	0.67	0.70	0.98	0.98	0.81	0.80	0.93	0.92	0.92	0.93	0.92	0.17	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.04
5.00	0.59	0.59	0.78	0.78	0.82	0.79	0.81	0.79	0.83	1.00	1.00	0.93	0.93	0.98	0.98	0.98	0.98	0.98	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.04
6.00	0.58	0.58	0.93	0.93	0.82	0.84	0.87	0.85	0.85	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.05	0.04	0.05	0.05
7.00	0.55	0.56	0.96	0.96	0.83	0.84	0.88	0.87	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.17	0.01	0.01	0.06	0.05	0.04	0.04	0.05
8.00	0.58	0.59	0.98	0.98	0.85	0.84	0.86	0.85	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.06	0.05	0.05	0.05
10.00	0.57	0.57	0.98	0.98	0.85	0.86	0.87	0.85	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.05	0.05	0.04
12.00	0.58	0.58	0.96	0.96	0.85	0.85	0.85	0.89	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.05	0.05	0.04	0.05

L=6,K/L=0.25 so k=2,n=100,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.03	0.03	0.00	0.00	0.00	0.01	0.03	0.01	0.01	0.32	0.32	0.25	0.25	0.27	0.12	0.13	0.12	0.29	0.19	0.19	0.12	0.12	0.13	0.05	0.05	0.05	0.08
2.00	0.11	0.10	0.01	0.00	0.05	0.07	0.07	0.06	0.08	0.49	0.49	0.32	0.32	0.36	0.28	0.27	0.25	0.47	0.18	0.18	0.09	0.09	0.11	0.06	0.06	0.06	0.05
3.00	0.36	0.37	0.19	0.19	0.38	0.41	0.37	0.34	0.43	0.85	0.84	0.56	0.55	0.70	0.68	0.68	0.66	0.74	0.16	0.16	0.03	0.03	0.06	0.05	0.05	0.05	0.05
4.00	0.44	0.45	0.58	0.57	0.67	0.68	0.67	0.67	0.68	0.97	0.97	0.80	0.79	0.91	0.93	0.90	0.93	0.92	0.17	0.17	0.01	0.01	0.05	0.06	0.05	0.06	0.06
5.00	0.49	0.49	0.82	0.82	0.76	0.79	0.79	0.78	0.75	0.99	0.99	0.93	0.93	0.98	0.99	0.98	0.98	0.97	0.17	0.17	0.01	0.01	0.05	0.05	0.05	0.05	0.05
6.00	0.48	0.48	0.93	0.93	0.80	0.78	0.79	0.80	0.81	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.06	0.06	0.05	0.05
7.00	0.48	0.48	0.96	0.95	0.79	0.83	0.83	0.83	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.06	0.05	0.05	0.04	0.05
8.00	0.48	0.49	0.96	0.96	0.80	0.81	0.81	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.06	0.05	0.05	0.05	0.05
10.00	0.54	0.54	0.96	0.96	0.84	0.83	0.79	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.04	0.05	0.06	0.04	0.04
12.00	0.51	0.51	0.95	0.95	0.84	0.81	0.83	0.81	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.04	0.06	0.04	0.05	0.05

L=6,K/L=0.1so k=1,n=100,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.17	0.17	0.28	0.28	0.27	0.08	0.10	0.11	0.30	0.36	0.36	0.28	0.28	0.29	0.10	0.12	0.14	0.36	0.21	0.21	0.14	0.14	0.15	0.05	0.04	0.05	0.06
2.00	0.26	0.26	0.43	0.43	0.40	0.19	0.23	0.22	0.54	0.56	0.55	0.44	0.44	0.47	0.27	0.30	0.27	0.65	0.19	0.19	0.11	0.11	0.13	0.05	0.05	0.05	0.06
3.00	0.42	0.42	0.76	0.76	0.67	0.51	0.52	0.55	0.72	0.88	0.88	0.78	0.78	0.81	0.69	0.64	0.70	0.91	0.16	0.16	0.05	0.05	0.07	0.05	0.05	0.05	0.06
4.00	0.42	0.42	0.92	0.93	0.76	0.72	0.70	0.70	0.78	0.98	0.98	0.96	0.96	0.97	0.94	0.93	0.92	0.99	0.16	0.16	0.02	0.01	0.05	0.05	0.06	0.06	0.05
5.00	0.39	0.39	0.95	0.95	0.74	0.78	0.78	0.77	0.79	1.00	1.00	0.99	0.99	0.99	0.98	0.99	0.99	1.00	0.17	0.16	0.01	0.01	0.06	0.04	0.05	0.05	0.05
6.00	0.42	0.43	0.96	0.96	0.77	0.77	0.77	0.79	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.05	0.05	0.05	0.05	0.05
7.00	0.41	0.41	0.96	0.96	0.75	0.78	0.74	0.75	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.06	0.05	0.04
8.00	0.44	0.44	0.96	0.96	0.78	0.77	0.73	0.73	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.05	0.05	0.06	0.06	0.05
10.00	0.41	0.41	0.97	0.97	0.78	0.81	0.78	0.78	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.04	0.05	0.05	0.05
12.00	0.44	0.44	0.98	0.98	0.79	0.79	0.75	0.81	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.00	0.00	0.05	0.04	0.06	0.04	0.05

Table B4: Results for Constant Coefficient Model when n=200

Table B4(Constant Coefficient Model Results)L=6,K/L=1 so k=6,n=200,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.06	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.38	0.38	0.28	0.27	0.24	0.23	0.25	0.26	0.28									
2.00	0.46	0.48	0.01	0.01	0.15	0.10	0.08	0.13	0.10	0.55	0.66	0.25	0.34	0.43	0.45	0.48	0.46	0.47									
3.00	0.65	0.63	0.09	0.08	0.34	0.55	0.54	0.54	0.61	0.83	0.83	0.42	0.41	0.77	0.85	0.83	0.90	0.93									
4.00	0.85	0.84	0.28	0.25	0.62	0.58	0.57	0.83	0.86	0.93	0.93	0.77	0.78	0.92	0.95	0.92	0.91	1.00									
5.00	0.97	0.97	0.66	0.64	0.88	0.86	0.83	0.86	0.99	1.00	1.00	0.95	0.93	1.00	1.00	1.00	1.00	1.00									
6.00	1.00	1.00	0.86	0.85	0.96	0.98	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
7.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
8.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
10.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=200,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.39	0.19	0.19	0.24	0.19	0.18	0.19	0.28	0.18	0.17	0.07	0.07	0.08	0.07	0.05	0.04	0.08
2.00	0.10	0.10	0.00	0.00	0.02	0.04	0.02	0.02	0.03	0.68	0.68	0.26	0.25	0.44	0.47	0.45	0.46	0.49	0.20	0.20	0.01	0.01	0.04	0.05	0.05	0.06	0.05
3.00	0.77	0.77	0.23	0.22	0.63	0.61	0.64	0.62	0.63	0.97	0.97	0.74	0.74	0.92	0.91	0.92	0.92	0.92	0.12	0.12	0.00	0.00	0.03	0.06	0.05	0.04	0.05
4.00	0.84	0.84	0.88	0.88	0.94	0.95	0.96	0.94	0.95	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.00	0.00	0.03	0.04	0.03	0.04	0.05
5.00	0.87	0.87	0.98	0.98	0.96	0.94	0.96	0.97	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.13	0.13	0.01	0.01	0.04	0.06	0.04	0.03	0.06
6.00	0.85	0.86	1.00	1.00	0.96	0.94	0.95	0.95	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.14	0.00	0.00	0.04	0.06	0.05	0.05	0.06
7.00	0.84	0.84	1.00	1.00	0.96	0.97	0.95	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.00	0.00	0.04	0.03	0.05	0.04	0.05
8.00	0.82	0.82	1.00	1.00	0.95	0.94	0.95	0.95	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.18	0.00	0.00	0.05	0.06	0.05	0.05	0.06
10.00	0.85	0.86	0.99	0.99	0.95	0.97	0.95	0.95	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.14	0.01	0.01	0.05	0.03	0.05	0.05	0.07
12.00	0.85	0.85	0.99	0.99	0.95	0.92	0.95	0.93	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.05	0.08	0.05	0.07	0.06

L=6,K/L=0.50 so k=3,n=200,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.03	0.03	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.40	0.40	0.25	0.25	0.29	0.21	0.17	0.17	0.34	0.18	0.18	0.08	0.08	0.10	0.04	0.05	0.06	0.09
2.00	0.20	0.20	0.01	0.01	0.08	0.09	0.07	0.09	0.11	0.69	0.68	0.35	0.35	0.48	0.46	0.47	0.48	0.54	0.16	0.16	0.02	0.02	0.05	0.05	0.06	0.05	0.06
3.00	0.60	0.60	0.42	0.42	0.67	0.70	0.67	0.68	0.69	0.98	0.98	0.76	0.76	0.92	0.93	0.92	0.93	0.92	0.15	0.14	0.00	0.00	0.05	0.05	0.05	0.05	0.04
4.00	0.58	0.58	0.92	0.92	0.87	0.86	0.81	0.85	0.84	1.00	1.00	0.98	0.98	1.00	0.99	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.04	0.05	0.06	0.05	0.05
5.00	0.58	0.58	0.98	0.98	0.85	0.84	0.88	0.83	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.04	0.06	0.04
6.00	0.62	0.62	0.96	0.96	0.87	0.85	0.88	0.82	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.05	0.05	0.04	0.06	0.06
7.00	0.57	0.58	0.98	0.98	0.85	0.85	0.87	0.86	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.04	0.05	0.06
8.00	0.58	0.58	0.98	0.99	0.86	0.86	0.85	0.86	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.00	0.05	0.05	0.05	0.05	0.05
9.00	0.62	0.62	0.99	0.99	0.90	0.86	0.86	0.86	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.14	0.00	0.00	0.03	0.05	0.05	0.05	0.05
10.00	0.56	0.56	0.97	0.97	0.86	0.87	0.85	0.88	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.18	0.01	0.01	0.05	0.05	0.05	0.04	0.06

L=6,K/L=0.25 so k=2,n=200,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.05	0.05	0.00	0.00	0.02	0.03	0.02	0.03	0.05	0.40	0.40	0.29	0.29	0.31	0.19	0.19	0.20	0.41	0.20	0.20	0.11	0.11	0.12	0.05	0.05	0.05	0.07
2.00	0.22	0.22	0.03	0.03	0.15	0.13	0.21	0.18	0.21	0.69	0.69	0.43	0.43	0.52	0.43	0.49	0.49	0.58	0.18	0.18	0.04	0.04	0.07	0.05	0.04	0.05	0.07
3.00	0.44	0.44	0.50	0.49	0.65	0.68	0.71	0.72	0.73	0.96	0.96	0.75	0.75	0.90	0.91	0.94	0.93	0.94	0.17	0.17	0.01	0.01	0.05	0.05	0.05	0.05	0.05
4.00	0.49	0.49	0.93	0.93	0.83	0.83	0.80	0.80	0.83	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.04	0.04	0.05	0.05	0.04
5.00	0.54	0.54	0.97	0.97	0.85	0.80	0.78	0.80	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.04	0.05	0.06	0.05	0.05
6.00	0.53	0.53	0.98	0.98	0.87	0.82	0.84	0.81	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.00	0.00	0.04	0.05	0.04	0.05	0.05
7.00	0.52	0.53	0.98	0.98	0.84	0.81	0.84	0.79	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.14	0.01	0.01	0.04	0.05	0.04	0.06	0.06
8.00	0.52	0.53	0.97	0.98	0.83	0.81	0.80	0.82	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.05	0.05	0.06	0.05	0.06
10.00	0.47	0.48	0.96	0.96	0.80	0.84	0.78	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.04	0.06	0.05	0.05
12.00	0.54	0.54	0.98	0.98	0.85	0.79	0.82	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.14	0.01	0.01	0.04	0.06	0.05	0.05	0.05

L=6,K/L=0.1so k=1,n=200,alpha=0.05,sigma=1

	Probability of getting true model									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.25	0.25	0.36	0.36	0.34	0.15	0.18	0.12	0.46	0.45	0.45	0.36	0.36	0.38	0.21	0.22	0.18	0.57	0.19	0.19	0.13	0.13	0.14	0.06	0.06	0.06	0.07
2.00	0.31	0.31	0.62	0.62	0.52	0.39	0.32	0.34	0.68	0.76	0.76	0.63	0.63	0.66	0.50	0.42	0.44	0.84	0.19	0.19	0.08	0.08	0.10	0.05	0.05	0.04	0.07
3.00	0.41	0.42	0.93	0.93	0.80	0.72	0.72	0.67	0.76	0.98	0.98	0.95	0.95	0.96	0.92	0.91	0.92	0.97	0.16	0.16	0.01	0.01	0.04	0.04	0.05	0.06	0.05
4.00	0.43	0.43	0.97	0.97	0.80	0.76	0.78	0.79	0.78	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.04	0.05	0.05	0.05	0.05
5.00	0.41	0.41	0.97	0.97	0.79	0.78	0.78	0.78	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.05
6.00	0.42	0.42	0.97	0.97	0.79	0.77	0.78	0.79	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.05
7.00	0.41	0.42	0.96	0.96	0.79	0.81	0.75	0.76	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.04	0.05	0.05	0.04
8.00	0.40	0.40	0.97	0.97	0.80	0.73	0.77	0.76	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.04	0.06	0.05	0.05	0.04
10.00	0.40	0.40	0.98	0.98	0.79	0.78	0.78	0.79	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.00	0.00	0.04	0.05	0.05	0.05	0.05
12.00	0.44	0.44	0.97	0.97	0.82	0.77	0.77	0.78	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.04	0.05	0.05	0.05	0.05

Appendix C:Results for Fixed Effect Model

Table C1: Results for Fixed Effect Model when n=25

Table C1(Results for FEM model)L=6,K/L=1 so k=6,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.24	0.17	0.17	0.19	0.08	0.07	0.07	0.19									
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.17	0.17	0.19	0.09	0.09	0.10	0.21									
3.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.41	0.19	0.19	0.28	0.20	0.19	0.18	0.25									
4.00	0.06	0.05	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.59	0.58	0.25	0.24	0.40	0.35	0.33	0.31	0.36									
5.00	0.14	0.14	0.00	0.00	0.04	0.03	0.03	0.03	0.04	0.69	0.68	0.31	0.29	0.50	0.47	0.44	0.45	0.51									
6.00	0.32	0.30	0.03	0.03	0.13	0.08	0.08	0.07	0.10	0.80	0.79	0.44	0.42	0.64	0.59	0.58	0.57	0.61									
7.00	0.59	0.56	0.10	0.09	0.33	0.28	0.28	0.25	0.27	0.90	0.90	0.59	0.57	0.79	0.76	0.76	0.75	0.77									
8.00	0.76	0.74	0.26	0.24	0.51	0.52	0.49	0.49	0.49	0.95	0.95	0.74	0.72	0.88	0.88	0.87	0.86	0.87									
10.00	0.98	0.98	0.73	0.71	0.91	0.90	0.87	0.87	0.87	1.00	1.00	0.94	0.94	0.98	0.98	0.98	0.98	0.98									
12.00	1.00	1.00	0.98	0.97	0.99	1.00	0.99	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.23	0.17	0.17	0.19	0.07	0.07	0.06	0.19	0.22	0.22	0.15	0.15	0.17	0.06	0.05	0.06	0.15
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.27	0.18	0.18	0.20	0.09	0.09	0.10	0.22	0.22	0.21	0.13	0.13	0.16	0.07	0.06	0.07	0.10
3.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.40	0.21	0.21	0.29	0.20	0.17	0.18	0.28	0.20	0.19	0.09	0.09	0.12	0.06	0.06	0.05	0.08
4.00	0.09	0.08	0.00	0.00	0.02	0.02	0.00	0.01	0.02	0.59	0.58	0.27	0.27	0.41	0.33	0.31	0.31	0.39	0.17	0.17	0.05	0.05	0.10	0.05	0.07	0.06	0.04
5.00	0.19	0.17	0.01	0.01	0.05	0.06	0.07	0.04	0.04	0.70	0.69	0.33	0.33	0.52	0.48	0.45	0.44	0.48	0.18	0.17	0.04	0.03	0.08	0.05	0.04	0.06	0.06
6.00	0.33	0.34	0.04	0.03	0.17	0.13	0.14	0.08	0.12	0.81	0.80	0.43	0.42	0.65	0.60	0.57	0.55	0.61	0.16	0.15	0.03	0.03	0.07	0.05	0.03	0.07	0.06
7.00	0.56	0.55	0.13	0.11	0.35	0.31	0.28	0.31	0.31	0.91	0.91	0.61	0.59	0.80	0.77	0.74	0.75	0.76	0.15	0.15	0.02	0.02	0.05	0.05	0.05	0.06	0.06
8.00	0.65	0.65	0.32	0.28	0.54	0.53	0.52	0.48	0.51	0.95	0.94	0.75	0.73	0.88	0.88	0.85	0.85	0.86	0.18	0.17	0.02	0.02	0.06	0.04	0.06	0.04	0.06
10.00	0.81	0.81	0.75	0.74	0.84	0.82	0.84	0.86	0.80	0.99	0.99	0.93	0.93	0.98	0.98	0.98	0.98	0.97	0.15	0.14	0.02	0.02	0.07	0.07	0.06	0.04	0.06
12.00	0.81	0.82	0.95	0.96	0.90	0.95	0.91	0.95	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.19	0.18	0.03	0.02	0.10	0.05	0.06	0.04	0.05

L=6,K/L=0.50 so k=3,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPWISE	
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.19	0.19	0.20	0.06	0.07	0.08	0.21	0.21	0.20	0.15	0.15	0.16	0.06	0.06	0.05	0.16
2.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.30	0.21	0.21	0.23	0.10	0.09	0.10	0.26	0.20	0.20	0.13	0.13	0.15	0.06	0.05	0.06	0.12
3.00	0.06	0.06	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.48	0.47	0.29	0.29	0.36	0.22	0.24	0.23	0.32	0.17	0.16	0.07	0.07	0.10	0.04	0.06	0.07	0.10
4.00	0.15	0.15	0.02	0.02	0.09	0.09	0.07	0.06	0.07	0.64	0.63	0.37	0.36	0.49	0.42	0.40	0.38	0.48	0.18	0.17	0.05	0.05	0.09	0.07	0.06	0.06	0.06
5.00	0.23	0.23	0.05	0.05	0.18	0.14	0.15	0.11	0.16	0.73	0.73	0.44	0.43	0.60	0.53	0.53	0.49	0.56	0.18	0.17	0.04	0.04	0.08	0.06	0.06	0.05	0.04
6.00	0.30	0.31	0.15	0.14	0.30	0.26	0.24	0.28	0.25	0.82	0.81	0.53	0.53	0.70	0.66	0.65	0.65	0.67	0.18	0.17	0.03	0.03	0.07	0.06	0.08	0.05	0.05
7.00	0.44	0.45	0.30	0.29	0.49	0.44	0.42	0.44	0.44	0.92	0.91	0.69	0.68	0.85	0.80	0.79	0.79	0.79	0.18	0.17	0.03	0.03	0.08	0.06	0.06	0.06	0.05
8.00	0.48	0.49	0.48	0.48	0.59	0.60	0.59	0.62	0.64	0.97	0.96	0.80	0.80	0.91	0.90	0.89	0.89	0.88	0.19	0.18	0.04	0.03	0.09	0.06	0.06	0.05	0.05
10.00	0.60	0.61	0.83	0.83	0.78	0.81	0.79	0.81	0.78	0.99	0.99	0.96	0.96	0.99	0.99	0.98	0.98	0.97	0.15	0.14	0.02	0.02	0.06	0.06	0.06	0.05	0.06
12.00	0.56	0.57	0.91	0.92	0.78	0.81	0.83	0.87	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.03	0.02	0.08	0.07	0.06	0.05	0.06

L=6,K/L=0.25 so k=2,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPWISE	
1.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.25	0.24	0.19	0.19	0.20	0.07	0.08	0.08	0.23	0.22	0.21	0.16	0.16	0.17	0.05	0.07	0.05	0.16
2.00	0.03	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.04	0.31	0.30	0.22	0.22	0.24	0.10	0.11	0.10	0.30	0.21	0.20	0.15	0.15	0.16	0.05	0.06	0.05	0.13
3.00	0.10	0.09	0.01	0.01	0.07	0.04	0.04	0.05	0.07	0.44	0.43	0.30	0.30	0.36	0.21	0.21	0.23	0.40	0.19	0.19	0.11	0.11	0.13	0.06	0.06	0.06	0.11
4.00	0.18	0.18	0.07	0.07	0.15	0.14	0.15	0.15	0.20	0.62	0.61	0.41	0.40	0.49	0.39	0.35	0.38	0.51	0.20	0.20	0.08	0.08	0.12	0.06	0.06	0.05	0.09
5.00	0.24	0.25	0.14	0.13	0.24	0.23	0.20	0.21	0.30	0.72	0.72	0.48	0.48	0.60	0.52	0.49	0.47	0.66	0.18	0.18	0.06	0.06	0.10	0.07	0.05	0.05	0.06
6.00	0.32	0.32	0.23	0.22	0.37	0.34	0.32	0.28	0.38	0.82	0.82	0.57	0.56	0.71	0.63	0.61	0.59	0.70	0.18	0.17	0.05	0.05	0.09	0.05	0.06	0.06	0.06
7.00	0.39	0.40	0.44	0.44	0.52	0.45	0.50	0.51	0.54	0.90	0.90	0.71	0.70	0.83	0.76	0.77	0.80	0.82	0.17	0.16	0.04	0.04	0.07	0.06	0.06	0.06	0.05
8.00	0.41	0.42	0.59	0.58	0.59	0.67	0.65	0.60	0.61	0.97	0.97	0.82	0.81	0.91	0.90	0.89	0.86	0.88	0.18	0.17	0.03	0.03	0.08	0.05	0.05	0.05	0.06
10.00	0.50	0.51	0.82	0.83	0.73	0.76	0.78	0.74	0.79	0.99	0.99	0.95	0.95	0.99	0.97	0.98	0.98	0.98	0.16	0.15	0.02	0.02	0.07	0.05	0.05	0.06	0.05
12.00	0.46	0.47	0.90	0.90	0.73	0.76	0.79	0.80	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.17	0.02	0.02	0.08	0.06	0.06	0.05	0.05

L=6,K/L=.1 so k=1,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.15	0.15	0.22	0.22	0.21	0.06	0.06	0.07	0.17	0.31	0.31	0.22	0.22	0.24	0.09	0.08	0.10	0.21	0.22	0.22	0.16	0.16	0.17	0.05	0.06	0.05	0.18
2.00	0.20	0.20	0.30	0.30	0.28	0.10	0.14	0.14	0.29	0.42	0.41	0.30	0.30	0.32	0.15	0.18	0.19	0.34	0.21	0.21	0.14	0.14	0.15	0.05	0.05	0.06	0.15
3.00	0.33	0.33	0.57	0.57	0.50	0.34	0.33	0.35	0.41	0.71	0.71	0.59	0.59	0.61	0.46	0.42	0.46	0.53	0.18	0.18	0.09	0.09	0.11	0.05	0.06	0.06	0.13
4.00	0.39	0.39	0.77	0.77	0.65	0.53	0.49	0.56	0.57	0.89	0.89	0.81	0.81	0.84	0.71	0.68	0.75	0.72	0.16	0.16	0.05	0.05	0.08	0.05	0.06	0.06	0.09
5.00	0.43	0.44	0.86	0.87	0.71	0.65	0.65	0.66	0.64	0.97	0.97	0.93	0.93	0.95	0.86	0.87	0.86	0.82	0.16	0.16	0.03	0.03	0.07	0.05	0.06	0.05	0.08
6.00	0.40	0.41	0.90	0.90	0.74	0.70	0.71	0.73	0.69	0.99	0.99	0.96	0.96	0.97	0.95	0.94	0.94	0.88	0.17	0.16	0.02	0.02	0.06	0.06	0.05	0.05	0.07
7.00	0.40	0.41	0.92	0.92	0.74	0.74	0.76	0.78	0.73	1.00	1.00	0.98	0.98	0.99	0.99	0.99	0.99	0.93	0.17	0.17	0.02	0.02	0.06	0.06	0.05	0.05	0.06
8.00	0.37	0.38	0.94	0.94	0.72	0.78	0.78	0.78	0.76	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.98	0.17	0.17	0.01	0.01	0.07	0.05	0.05	0.05	0.05
10.00	0.39	0.40	0.94	0.94	0.75	0.74	0.74	0.74	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.06	0.06	0.06	0.05
12.00	0.40	0.41	0.92	0.92	0.72	0.75	0.78	0.76	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.02	0.02	0.06	0.05	0.05	0.05	0.05

Table C2: Results for Fixed Effect Model when n=50

Table C2(Results for FEM model)L=6,K/L=1so k=6,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.17	0.17	0.19	0.09	0.08	0.09	0.20									
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.17	0.17	0.22	0.15	0.14	0.15	0.24									
3.00	0.05	0.05	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.60	0.60	0.23	0.23	0.40	0.37	0.37	0.39	0.40									
4.00	0.33	0.32	0.01	0.01	0.12	0.11	0.09	0.09	0.11	0.83	0.83	0.43	0.43	0.67	0.65	0.64	0.65	0.66									
5.00	0.64	0.62	0.08	0.07	0.33	0.27	0.32	0.30	0.28	0.93	0.92	0.62	0.61	0.82	0.79	0.81	0.81	0.80									
6.00	0.84	0.84	0.31	0.28	0.63	0.59	0.55	0.59	0.59	0.97	0.97	0.78	0.77	0.92	0.91	0.90	0.91	0.91									
7.00	0.95	0.95	0.64	0.62	0.88	0.85	0.86	0.87	0.87	0.99	0.99	0.92	0.92	0.98	0.97	0.97	0.98	0.98									
8.00	1.00	1.00	0.85	0.85	0.97	0.98	0.96	0.95	0.96	1.00	1.00	0.97	0.97	0.99	1.00	0.99	0.99	0.99									
10.00	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.18	0.18	0.20	0.08	0.08	0.09	0.20	0.17	0.17	0.09	0.09	0.11	0.06	0.04	0.05	0.19
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.34	0.20	0.20	0.24	0.14	0.16	0.15	0.25	0.17	0.16	0.08	0.08	0.10	0.05	0.04	0.05	0.11
3.00	0.09	0.09	0.00	0.00	0.02	0.01	0.01	0.01	0.02	0.61	0.61	0.26	0.26	0.42	0.37	0.37	0.38	0.41	0.19	0.18	0.03	0.03	0.09	0.06	0.07	0.04	0.04
4.00	0.36	0.36	0.02	0.02	0.18	0.13	0.12	0.14	0.14	0.83	0.83	0.47	0.46	0.69	0.66	0.65	0.65	0.65	0.16	0.15	0.00	0.00	0.05	0.05	0.05	0.06	0.04
5.00	0.56	0.57	0.11	0.11	0.37	0.34	0.31	0.34	0.34	0.92	0.92	0.61	0.61	0.82	0.81	0.78	0.80	0.80	0.15	0.15	0.02	0.02	0.07	0.05	0.05	0.04	0.05
6.00	0.72	0.73	0.32	0.30	0.63	0.59	0.59	0.59	0.61	0.97	0.97	0.78	0.77	0.92	0.90	0.90	0.91	0.91	0.16	0.16	0.01	0.01	0.06	0.05	0.06	0.07	0.05
7.00	0.82	0.83	0.68	0.66	0.85	0.83	0.82	0.82	0.81	0.99	0.99	0.93	0.92	0.98	0.97	0.97	0.97	0.98	0.14	0.14	0.02	0.01	0.05	0.05	0.06	0.04	0.08
8.00	0.83	0.84	0.89	0.88	0.91	0.92	0.93	0.91	0.91	1.00	1.00	0.98	0.98	1.00	0.99	1.00	1.00	0.99	0.17	0.16	0.01	0.01	0.07	0.06	0.05	0.07	0.05
10.00	0.83	0.83	0.98	0.98	0.94	0.94	0.96	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.06	0.04	0.04	0.05
12.00	0.79	0.79	0.98	0.98	0.92	0.95	0.94	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.21	0.21	0.02	0.02	0.08	0.05	0.06	0.04	0.05

L=6,K/L=0.50 so k=3,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.18	0.18	0.19	0.09	0.09	0.09	0.24	0.23	0.22	0.16	0.16	0.17	0.06	0.06	0.06	0.16
2.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.38	0.38	0.25	0.25	0.27	0.15	0.17	0.16	0.32	0.18	0.18	0.10	0.10	0.11	0.05	0.05	0.06	0.09
3.00	0.16	0.16	0.01	0.01	0.08	0.05	0.07	0.06	0.07	0.64	0.64	0.35	0.35	0.49	0.41	0.44	0.41	0.48	0.16	0.16	0.04	0.04	0.07	0.05	0.06	0.06	0.06
4.00	0.35	0.36	0.13	0.13	0.28	0.28	0.32	0.29	0.29	0.85	0.84	0.54	0.54	0.71	0.69	0.69	0.69	0.70	0.15	0.15	0.02	0.02	0.06	0.05	0.05	0.05	0.05
5.00	0.45	0.46	0.29	0.28	0.50	0.46	0.47	0.49	0.49	0.92	0.92	0.66	0.66	0.84	0.82	0.84	0.83	0.81	0.16	0.16	0.02	0.02	0.06	0.06	0.05	0.05	0.04
6.00	0.57	0.58	0.53	0.51	0.70	0.65	0.67	0.65	0.69	0.97	0.97	0.81	0.81	0.93	0.93	0.92	0.92	0.94	0.15	0.15	0.01	0.01	0.06	0.07	0.05	0.06	0.05
7.00	0.59	0.60	0.77	0.77	0.76	0.79	0.80	0.79	0.80	0.99	0.99	0.94	0.94	0.98	0.98	0.98	0.98	0.98	0.16	0.15	0.02	0.02	0.07	0.05	0.06	0.06	0.05
8.00	0.56	0.57	0.87	0.87	0.83	0.83	0.85	0.82	0.84	1.00	1.00	0.97	0.97	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.01	0.01	0.05	0.06	0.05	0.06	0.05
10.00	0.62	0.63	0.96	0.97	0.84	0.87	0.82	0.88	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.14	0.01	0.01	0.06	0.05	0.06	0.04	0.04
12.00	0.61	0.62	0.95	0.95	0.84	0.84	0.83	0.86	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.02	0.02	0.06	0.05	0.06	0.05	0.05

L=6,K/L=0.25 so k=2,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor
1.00	0.03	0.03	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.28	0.28	0.20	0.20	0.21	0.08	0.08	0.10	0.27	0.22	0.21	0.15	0.15	0.16	0.05	0.05	0.05	0.15
2.00	0.05	0.05	0.00	0.00	0.02	0.02	0.02	0.03	0.04	0.38	0.37	0.28	0.28	0.30	0.16	0.16	0.17	0.37	0.18	0.18	0.11	0.11	0.12	0.05	0.05	0.05	0.12
3.00	0.19	0.19	0.04	0.04	0.15	0.15	0.13	0.15	0.17	0.64	0.64	0.41	0.41	0.51	0.42	0.40	0.42	0.56	0.18	0.18	0.06	0.06	0.09	0.05	0.04	0.05	0.07
4.00	0.38	0.38	0.22	0.22	0.40	0.35	0.42	0.38	0.35	0.85	0.85	0.58	0.58	0.72	0.66	0.71	0.67	0.71	0.16	0.16	0.02	0.02	0.06	0.06	0.05	0.06	0.05
5.00	0.43	0.44	0.43	0.43	0.56	0.52	0.57	0.54	0.53	0.94	0.94	0.73	0.72	0.86	0.81	0.83	0.82	0.82	0.16	0.16	0.02	0.02	0.07	0.06	0.05	0.05	0.06
6.00	0.45	0.46	0.59	0.59	0.68	0.65	0.64	0.71	0.70	0.97	0.96	0.81	0.81	0.91	0.91	0.89	0.92	0.92	0.16	0.16	0.01	0.01	0.05	0.06	0.05	0.04	0.05
7.00	0.48	0.48	0.82	0.82	0.76	0.76	0.75	0.78	0.76	1.00	1.00	0.93	0.93	0.98	0.98	0.98	0.97	0.98	0.17	0.17	0.01	0.01	0.06	0.06	0.06	0.05	0.06
8.00	0.54	0.54	0.92	0.92	0.80	0.80	0.79	0.80	0.81	1.00	1.00	0.98	0.97	1.00	0.99	0.99	1.00	0.99	0.15	0.14	0.01	0.01	0.05	0.05	0.05	0.05	0.05
10.00	0.47	0.48	0.95	0.95	0.77	0.80	0.81	0.80	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.01	0.01	0.06	0.05	0.05	0.05	0.05
12.00	0.48	0.48	0.94	0.94	0.76	0.81	0.80	0.78	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.02	0.01	0.07	0.05	0.05	0.06	0.05

L=6,K/L=.1 so k=1,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	Stepw	Autor
1.00	0.14	0.14	0.20	0.20	0.18	0.06	0.06	0.08	0.23	0.25	0.25	0.20	0.20	0.21	0.08	0.08	0.10	0.29	0.22	0.21	0.16	0.16	0.17	0.06	0.05	0.05	0.17
2.00	0.22	0.22	0.31	0.31	0.28	0.16	0.11	0.11	0.38	0.40	0.40	0.31	0.31	0.32	0.18	0.15	0.16	0.44	0.20	0.20	0.14	0.14	0.15	0.05	0.05	0.05	0.15
3.00	0.32	0.33	0.57	0.57	0.50	0.30	0.34	0.35	0.62	0.70	0.70	0.59	0.59	0.62	0.43	0.43	0.45	0.75	0.18	0.18	0.09	0.09	0.10	0.06	0.05	0.05	0.08
4.00	0.40	0.40	0.78	0.78	0.64	0.55	0.55	0.58	0.76	0.90	0.90	0.81	0.81	0.85	0.72	0.74	0.72	0.93	0.17	0.17	0.05	0.05	0.08	0.06	0.05	0.05	0.05
5.00	0.44	0.44	0.89	0.89	0.71	0.63	0.68	0.65	0.73	0.95	0.95	0.91	0.91	0.93	0.82	0.86	0.86	0.96	0.16	0.15	0.02	0.02	0.07	0.05	0.05	0.05	0.06
6.00	0.42	0.42	0.91	0.91	0.77	0.75	0.73	0.73	0.80	0.99	0.99	0.96	0.96	0.97	0.95	0.94	0.95	0.99	0.17	0.17	0.02	0.02	0.05	0.05	0.05	0.05	0.04
7.00	0.41	0.42	0.93	0.93	0.72	0.74	0.78	0.76	0.80	0.99	0.99	0.99	0.99	0.99	1.00	0.99	0.99	1.00	0.16	0.15	0.01	0.01	0.06	0.06	0.05	0.05	0.04
8.00	0.42	0.43	0.95	0.95	0.76	0.79	0.76	0.77	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.04
10.00	0.40	0.40	0.91	0.91	0.73	0.75	0.75	0.76	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.02	0.02	0.06	0.06	0.05	0.05	0.05
12.00	0.39	0.40	0.94	0.94	0.73	0.75	0.75	0.77	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.05	0.05	0.05	0.06

Table C3: Results for Fixed Effect Model when n=100

Table C3(Results for FEM model)L=6,K/L=1 so k=6,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.17	0.17	0.19	0.09	0.10	0.09	0.23									
2	0.34	0.32	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.35	0.35	0.17	0.17	0.22	0.25	0.24	0.25	0.32									
3	0.72	0.70	0.24	0.26	0.57	0.60	0.59	0.60	0.61	0.90	0.92	0.39	0.34	0.60	0.63	0.64	0.62	0.62									
4	0.99	0.84	0.88	0.88	0.94	0.95	0.96	0.94	0.98	0.83	0.83	0.53	0.53	92.67	0.89	0.88	0.92	0.94									
5.00	1.00	0.87	0.98	0.98	0.96	0.94	0.96	0.97	1.00	1.00	1.00	0.92	0.93	0.98	0.97	0.97	0.98	1.00									
6.00	1.00	0.86	1.00	1.00	0.96	0.94	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
7.00	1.00	1.00	0.85	0.85	0.97	0.98	0.96	0.95	1.00	0.99	0.99	0.92	0.92	1.00	1.00	1.00	1.00	1.00									
8.00	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.97	1.00	1.00	1.00	1.00	1.00									
10.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.31	0.18	0.18	0.21	0.11	0.11	0.12	0.24	0.18	0.18	0.11	0.11	0.12	0.06	0.06	0.05	0.08
2.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.48	0.21	0.21	0.31	0.27	0.26	0.27	0.33	0.16	0.16	0.04	0.04	0.07	0.05	0.06	0.05	0.06
3.00	0.37	0.37	0.02	0.02	0.15	0.13	0.13	0.15	0.15	0.84	0.84	0.43	0.43	0.67	0.67	0.67	0.67	0.68	0.15	0.14	0.01	0.01	0.05	0.06	0.06	0.04	0.06
4.00	0.75	0.75	0.32	0.31	0.66	0.62	0.65	0.66	0.63	0.97	0.97	0.78	0.78	0.93	0.92	0.92	0.93	0.92	0.13	0.13	0.02	0.01	0.05	0.06	0.05	0.07	0.05
5.00	0.84	0.85	0.65	0.64	0.89	0.88	0.86	0.85	0.85	1.00	1.00	0.92	0.92	0.99	0.99	0.98	0.98	0.98	0.14	0.14	0.01	0.01	0.04	0.06	0.05	0.06	0.05
6.00	0.85	0.85	0.89	0.88	0.92	0.94	0.91	0.95	0.92	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.02	0.02	0.07	0.05	0.07	0.04	0.06
7.00	0.84	0.85	0.99	0.99	0.96	0.96	0.94	0.97	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.04	0.04	0.06	0.03	0.03
8.00	0.87	0.88	1.00	1.00	0.96	0.95	0.95	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.13	0.12	0.00	0.00	0.04	0.05	0.05	0.04	0.05
10.00	0.87	0.87	0.99	0.99	0.97	0.95	0.96	0.93	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.13	0.13	0.01	0.01	0.03	0.05	0.04	0.07	0.04
12.00	0.84	0.85	0.99	0.99	0.95	0.95	0.95	0.94	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.05	0.05	0.05	0.06	0.06

L=6,K/L=0.50 so k=3,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.32	0.31	0.22	0.22	0.24	0.12	0.12	0.12	0.28	0.20	0.19	0.12	0.12	0.13	0.06	0.05	0.04	0.11
2.00	0.07	0.07	0.00	0.00	0.01	0.03	0.02	0.02	0.03	0.50	0.49	0.29	0.29	0.35	0.29	0.26	0.28	0.40	0.16	0.16	0.06	0.06	0.08	0.04	0.04	0.05	0.07
3.00	0.35	0.36	0.07	0.07	0.26	0.26	0.29	0.25	0.28	0.85	0.85	0.48	0.48	0.69	0.68	0.70	0.67	0.69	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.06
4.00	0.53	0.54	0.47	0.46	0.67	0.69	0.70	0.69	0.70	0.97	0.97	0.79	0.79	0.92	0.93	0.93	0.92	0.92	0.16	0.16	0.01	0.01	0.05	0.06	0.05	0.04	0.04
5.00	0.59	0.59	0.80	0.79	0.82	0.80	0.83	0.78	0.83	1.00	1.00	0.93	0.93	0.98	0.98	0.99	0.98	0.98	0.16	0.16	0.01	0.01	0.04	0.05	0.05	0.05	0.04
6.00	0.57	0.57	0.92	0.92	0.84	0.86	0.87	0.84	0.85	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.05	0.05	0.05
7.00	0.58	0.58	0.98	0.98	0.86	0.83	0.87	0.84	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.00	0.00	0.05	0.06	0.04	0.06	0.05
8.00	0.60	0.60	0.98	0.98	0.86	0.85	0.87	0.87	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.06	0.04	0.05	0.05
10.00	0.59	0.59	0.96	0.96	0.85	0.86	0.88	0.85	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.04	0.05	0.04
12.00	0.56	0.56	0.97	0.97	0.83	0.83	0.88	0.87	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.06	0.05	0.04	0.05

L=6,K/L=0.25 so k=2,n=100,alpha=0.05,sigma=1																											
	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.03	0.03	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.33	0.33	0.24	0.24	0.26	0.11	0.12	0.14	0.29	0.21	0.20	0.13	0.13	0.14	0.06	0.05	0.06	0.14
2.00	0.10	0.10	0.02	0.02	0.08	0.05	0.07	0.05	0.08	0.48	0.48	0.34	0.34	0.38	0.25	0.29	0.26	0.47	0.18	0.18	0.09	0.09	0.10	0.06	0.05	0.05	0.08
3.00	0.34	0.34	0.17	0.17	0.39	0.38	0.36	0.40	0.43	0.84	0.83	0.55	0.55	0.71	0.67	0.66	0.69	0.74	0.17	0.17	0.02	0.02	0.05	0.05	0.06	0.06	0.05
4.00	0.47	0.48	0.58	0.58	0.71	0.68	0.67	0.67	0.68	0.98	0.98	0.80	0.80	0.93	0.92	0.92	0.92	0.92	0.16	0.16	0.01	0.01	0.05	0.05	0.06	0.05	0.06
5.00	0.49	0.50	0.82	0.81	0.77	0.77	0.76	0.81	0.75	1.00	1.00	0.93	0.93	0.98	0.98	0.98	0.98	0.97	0.16	0.16	0.01	0.01	0.05	0.05	0.06	0.04	0.05
6.00	0.49	0.49	0.94	0.94	0.80	0.82	0.79	0.82	0.81	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.06	0.05	0.05
7.00	0.52	0.52	0.96	0.96	0.81	0.82	0.80	0.81	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.05	0.05	0.05	0.05	0.05
8.00	0.52	0.53	0.97	0.97	0.83	0.80	0.84	0.81	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.04	0.05	0.05
10.00	0.48	0.48	0.98	0.98	0.78	0.83	0.81	0.81	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.05	0.05	0.05	0.04
12.00	0.53	0.54	0.96	0.96	0.80	0.82	0.78	0.77	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.06	0.05	0.06	0.06	0.05
n=100,alpha=0.05,sigma=1																											
P(true model)									Potency									Gauge									
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.16	0.16	0.26	0.26	0.24	0.11	0.10	0.09	0.36	0.31	0.31	0.26	0.26	0.27	0.15	0.13	0.11	0.45	0.21	0.21	0.15	0.15	0.16	0.05	0.05	0.06	0.14
2.00	0.25	0.25	0.44	0.44	0.39	0.24	0.20	0.23	0.52	0.54	0.54	0.46	0.46	0.47	0.28	0.27	0.31	0.63	0.19	0.19	0.11	0.11	0.13	0.05	0.05	0.06	0.10
3.00	0.40	0.41	0.78	0.78	0.68	0.55	0.57	0.54	0.71	0.88	0.88	0.79	0.79	0.83	0.72	0.70	0.69	0.91	0.16	0.16	0.04	0.04	0.07	0.06	0.04	0.05	0.07
4.00	0.42	0.42	0.93	0.93	0.75	0.73	0.75	0.70	0.75	0.99	0.99	0.96	0.96	0.97	0.93	0.94	0.95	0.99	0.15	0.15	0.01	0.01	0.06	0.05	0.04	0.06	0.05
5.00	0.46	0.47	0.95	0.95	0.78	0.73	0.80	0.76	0.78	1.00	1.00	0.99	0.99	1.00	0.99	0.99	0.99	1.00	0.15	0.15	0.01	0.01	0.05	0.06	0.04	0.05	0.05
6.00	0.40	0.40	0.94	0.94	0.74	0.77	0.76	0.80	0.76	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.05	0.05	0.04	0.05
7.00	0.39	0.39	0.95	0.95	0.76	0.77	0.76	0.78	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.06	0.05	0.06
8.00	0.41	0.42	0.95	0.95	0.76	0.76	0.79	0.77	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.05	0.05	0.04
10.00	0.42	0.43	0.96	0.96	0.79	0.78	0.75	0.79	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.06
12.00	0.42	0.42	0.95	0.95	0.77	0.77	0.73	0.77	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.06	0.05	0.05

Table C4: Results for Fixed Effect Model when n=200

Table C4(Results for FEM model)L=6,K/L=1so k=6,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.39	0.18	0.15	0.22	0.16	0.14	0.18	0.26									
2.00	0.15	0.14	0.00	0.00	0.04	0.02	0.01	0.01	0.04	0.75	0.78	0.24	0.22	0.43	0.45	0.45	0.44	0.47									
3.00	0.72	0.70	0.20	0.21	0.55	0.55	0.55	0.57	0.61	1.00	1.00	0.72	0.70	0.89	0.88	0.90	0.90	0.92									
4.00	0.99	0.84	0.79	0.78	0.94	0.95	0.96	0.94	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
5.00	1.00	0.87	1.00	1.00	0.96	0.94	0.96	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
6.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
7.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
8.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
10.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.38	0.38	0.19	0.19	0.24	0.19	0.18	0.19	0.27	0.17	0.17	0.07	0.07	0.09	0.05	0.04	0.05	0.09
2.00	0.17	0.17	0.00	0.00	0.02	0.02	0.02	0.03	0.02	0.69	0.69	0.25	0.25	0.46	0.46	0.44	0.48	0.49	0.15	0.15	0.01	0.01	0.04	0.07	0.05	0.05	0.06
3.00	0.74	0.74	0.22	0.22	0.61	0.65	0.60	0.56	0.65	0.98	0.98	0.73	0.73	0.92	0.92	0.91	0.90	0.93	0.16	0.16	0.01	0.01	0.06	0.04	0.05	0.06	0.06
4.00	0.83	0.83	0.87	0.87	0.94	0.92	0.93	0.95	0.92	1.00	1.00	0.97	0.97	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.00	0.00	0.05	0.07	0.06	0.04	0.06
5.00	0.83	0.83	0.99	0.99	0.96	0.96	0.94	0.94	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.00	0.00	0.04	0.04	0.06	0.05	0.06
6.00	0.80	0.80	0.99	0.99	0.95	0.95	0.94	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.20	0.20	0.01	0.01	0.05	0.05	0.06	0.04	0.05
7.00	0.83	0.83	0.99	0.99	0.94	0.96	0.95	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.06	0.04	0.05	0.04	0.04
8.00	0.84	0.85	0.99	0.99	0.95	0.95	0.96	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.05	0.05	0.04	0.05	0.05
10.00	0.81	0.81	1.00	1.00	0.95	0.95	0.95	0.95	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.19	0.19	0.00	0.00	0.05	0.05	0.05	0.05	0.06
12.00	0.84	0.85	1.00	1.00	0.95	0.95	0.95	0.96	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.00	0.00	0.05	0.05	0.05	0.04	0.07

L=6,K/L=0.50 so k=3,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.05	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.42	0.42	0.25	0.25	0.29	0.18	0.20	0.20	0.35	0.17	0.17	0.08	0.08	0.09	0.05	0.05	0.05	0.09
2.00	0.20	0.19	0.01	0.01	0.07	0.07	0.09	0.09	0.11	0.69	0.69	0.35	0.35	0.48	0.44	0.48	0.46	0.54	0.15	0.15	0.02	0.02	0.04	0.05	0.05	0.05	0.06
3.00	0.55	0.55	0.40	0.39	0.65	0.69	0.68	0.69	0.69	0.97	0.97	0.74	0.74	0.90	0.93	0.93	0.93	0.93	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.04	0.06
4.00	0.57	0.58	0.95	0.95	0.88	0.85	0.85	0.85	0.86	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.00	0.00	0.04	0.05	0.05	0.05	0.04
5.00	0.61	0.61	0.98	0.98	0.86	0.85	0.86	0.84	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.06	0.04
6.00	0.62	0.62	0.99	0.99	0.88	0.84	0.85	0.86	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.00	0.00	0.04	0.06	0.05	0.05	0.04
7.00	0.62	0.62	0.99	0.99	0.87	0.85	0.88	0.85	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.00	0.00	0.04	0.06	0.04	0.05	0.05
8.00	0.58	0.58	0.98	0.98	0.86	0.83	0.87	0.88	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.06	0.04	0.04	0.04
10.00	0.59	0.59	0.98	0.98	0.87	0.87	0.86	0.88	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.04	0.06
12.00	0.57	0.57	0.99	0.99	0.87	0.87	0.83	0.86	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.16	0.00	0.00	0.05	0.05	0.06	0.05	0.04

L=6,K/L=0.25 so k=2,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autor
1.0	0.06	0.06	0.00	0.00	0.01	0.04	0.03	0.03	0.08	0.42	0.42	0.29	0.29	0.31	0.21	0.19	0.21	0.41	0.20	0.20	0.10	0.10	0.12	0.05	0.05	0.05	0.11
2.0	0.25	0.25	0.04	0.04	0.16	0.20	0.17	0.18	0.20	0.69	0.69	0.44	0.44	0.54	0.47	0.47	0.48	0.59	0.15	0.15	0.04	0.04	0.07	0.05	0.05	0.05	0.06
3.0	0.46	0.46	0.51	0.51	0.66	0.69	0.67	0.71	0.64	0.98	0.98	0.76	0.76	0.92	0.92	0.93	0.91	0.91	0.17	0.17	0.01	0.01	0.05	0.05	0.06	0.04	0.06
4.0	0.49	0.49	0.93	0.93	0.82	0.81	0.82	0.81	0.83	1.00	1.00	0.98	0.98	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.04
5.0	0.50	0.50	0.97	0.97	0.83	0.82	0.85	0.82	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.04	0.05	0.04
6.0	0.54	0.54	0.98	0.98	0.86	0.83	0.82	0.85	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.00	0.00	0.04	0.05	0.05	0.04	0.06
7.0	0.51	0.52	0.96	0.97	0.83	0.81	0.84	0.82	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.05	0.05	0.04	0.05	0.04
8.0	0.47	0.47	0.98	0.98	0.81	0.80	0.81	0.78	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.05	0.06	0.06
10.0	0.47	0.47	0.96	0.96	0.80	0.82	0.80	0.77	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.17	0.17	0.01	0.01	0.05	0.05	0.05	0.06	0.06
12.0	0.54	0.54	0.98	0.98	0.86	0.81	0.83	0.81	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.00	0.04	0.05	0.05	0.05	0.05

L=6,K/L=.1 so k=1,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autor	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autor
1.0	0.22	0.22	0.37	0.37	0.36	0.16	0.14	0.16	0.39	0.46	0.46	0.37	0.37	0.39	0.21	0.18	0.21	0.48	0.20	0.20	0.13	0.13	0.14	0.06	0.05	0.06	0.13
2.0	0.31	0.31	0.62	0.62	0.54	0.38	0.36	0.37	0.66	0.72	0.72	0.63	0.63	0.64	0.50	0.49	0.48	0.80	0.19	0.18	0.08	0.08	0.10	0.05	0.05	0.05	0.08
3.0	0.41	0.41	0.94	0.94	0.79	0.71	0.72	0.76	0.78	0.98	0.98	0.96	0.96	0.97	0.94	0.92	0.95	0.98	0.16	0.16	0.01	0.01	0.05	0.05	0.05	0.05	0.05
4.0	0.38	0.38	0.96	0.96	0.77	0.78	0.77	0.79	0.79	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	0.18	0.18	0.01	0.01	0.05	0.05	0.05	0.05	0.05
5.0	0.43	0.43	0.97	0.97	0.84	0.74	0.79	0.77	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.03	0.05	0.05	0.05	0.04
6.0	0.43	0.43	0.97	0.97	0.78	0.79	0.76	0.77	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.05	0.04	0.05	0.05	0.05
7.0	0.40	0.40	0.97	0.97	0.80	0.77	0.76	0.77	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.04	0.05	0.05	0.05	0.05
8.0	0.41	0.42	0.97	0.97	0.79	0.75	0.80	0.80	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.04	0.06	0.04	0.05	0.06
10.0	0.45	0.45	0.97	0.97	0.81	0.76	0.77	0.76	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.01	0.01	0.04	0.05	0.05	0.05	0.05
12.0	0.41	0.42	0.97	0.97	0.79	0.74	0.74	0.76	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.04	0.06	0.06	0.06	0.04

Appendix D:Results for Random Effect Model

Table D1: Results for Random Effect Model when n=25

Table D1(Results for REM Models)L=6,K/L=.1 so k=1,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.17	0.17	0.17	0.04	0.04	0.05	0.19									
2.00	0.00	0.00	0.00	0.00	[illegible]	0.00	0.00	0.00	0.00	0.22	0.22	0.17	0.17	0.18	0.07	0.07	0.07	0.21									
3.00	0.00	0.00	0.00	0.00	[illegible]	[illegible]	0.00	0.00	0.00	0.28	0.27	0.17	0.17	0.20	0.15	0.16	0.14	0.26									
4.00	0.01	0.01	0.00	0.00	[illegible]	0.00	0.00	0.00	0.01	0.38	0.37	0.19	0.19	0.25	0.29	0.26	0.26	0.38									
5.00	0.02	0.02	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.46	0.45	0.20	0.20	0.32	0.41	0.36	0.38	0.46									
6.00	0.07	0.05	0.00	0.00	0.01	0.07	0.04	0.05	0.10	0.55	0.54	0.23	0.22	0.38	0.52	0.51	0.51	0.59									
7.00	0.17	0.15	0.00	0.00	0.05	0.21	0.19	0.17	0.24	0.69	0.68	0.32	0.31	0.52	0.70	0.69	0.67	0.76									
8.00	0.28	0.25	0.04	0.02	0.13	0.42	0.37	0.43	0.46	0.78	0.76	0.42	0.39	0.63	0.84	0.81	0.83	0.87									
10.00	0.59	0.58	0.21	0.18	0.45	0.85	0.85	0.84	0.86	0.90	0.90	0.67	0.64	0.84	0.97	0.97	0.97	0.97									
12.00	0.82	0.81	0.52	0.49	0.72	0.98	0.98	0.98	1.00	0.96	0.96	0.87	0.86	0.94	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.20	0.17	0.17	0.17	0.05	0.05	0.05	0.20	0.20	0.19	0.18	0.18	0.18	0.04	0.06	0.05	0.07
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.22	0.17	0.17	0.18	0.07	0.06	0.06	0.22	0.22	0.21	0.17	0.17	0.18	0.05	0.05	0.04	0.05
3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.28	0.19	0.19	0.21	0.16	0.15	0.14	0.27	0.17	0.17	0.10	0.10	0.11	0.04	0.07	0.05	0.06
4.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.41	0.40	0.20	0.20	0.28	0.28	0.26	0.25	0.36	0.14	0.13	0.06	0.06	0.09	0.04	0.07	0.04	0.07
5.00	0.05	0.05	0.00	0.00	0.01	0.03	0.04	0.02	0.04	0.49	0.47	0.22	0.22	0.32	0.39	0.39	0.37	0.47	0.12	0.12	0.04	0.04	0.06	0.05	0.03	0.04	0.05
6.00	0.08	0.07	0.01	0.00	0.02	0.08	0.07	0.05	0.12	0.56	0.55	0.26	0.25	0.40	0.52	0.49	0.46	0.57	0.15	0.14	0.04	0.04	0.08	0.05	0.03	0.03	0.04
7.00	0.19	0.17	0.01	0.01	0.07	0.24	0.22	0.22	0.27	0.68	0.67	0.32	0.31	0.50	0.68	0.67	0.68	0.75	0.15	0.14	0.02	0.02	0.07	0.03	0.04	0.03	0.06
8.00	0.30	0.30	0.05	0.04	0.19	0.42	0.40	0.42	0.49	0.78	0.77	0.44	0.43	0.63	0.82	0.81	0.81	0.85	0.12	0.11	0.02	0.02	0.05	0.03	0.04	0.04	0.06
10.00	0.55	0.55	0.24	0.21	0.43	0.82	0.80	0.79	0.82	0.89	0.89	0.66	0.64	0.82	0.97	0.96	0.96	0.97	0.12	0.11	0.01	0.01	0.04	0.04	0.04	0.04	0.05
12.00	0.72	0.73	0.55	0.53	0.71	0.94	0.94	0.95	0.94	0.96	0.96	0.86	0.85	0.93	1.00	1.00	1.00	1.00	0.12	0.10	0.01	0.01	0.05	0.03	0.05	0.03	0.06

L=6,K/L=0.50 so k=3,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.19	0.17	0.17	0.17	0.05	0.04	0.06	0.21	0.21	0.20	0.17	0.17	0.18	0.04	0.04	0.04	0.08
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.18	0.18	0.19	0.09	0.09	0.08	0.27	0.20	0.19	0.15	0.15	0.16	0.06	0.04	0.04	0.06
3.00	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.33	0.33	0.23	0.23	0.26	0.20	0.15	0.16	0.33	0.17	0.17	0.11	0.11	0.13	0.04	0.04	0.04	0.08
4.00	0.06	0.06	0.01	0.01	0.02	0.04	0.04	0.04	0.07	0.45	0.43	0.28	0.28	0.35	0.34	0.33	0.32	0.46	0.15	0.14	0.07	0.07	0.09	0.04	0.04	0.03	0.06
5.00	0.12	0.12	0.02	0.01	0.07	0.09	0.11	0.09	0.12	0.54	0.53	0.33	0.32	0.42	0.46	0.46	0.44	0.54	0.13	0.12	0.05	0.05	0.07	0.04	0.04	0.03	0.05
6.00	0.17	0.17	0.03	0.03	0.07	0.23	0.19	0.20	0.23	0.60	0.59	0.37	0.36	0.47	0.62	0.57	0.58	0.64	0.13	0.13	0.05	0.05	0.08	0.05	0.05	0.03	0.05
7.00	0.31	0.31	0.08	0.07	0.22	0.41	0.43	0.42	0.45	0.74	0.74	0.45	0.44	0.60	0.76	0.75	0.76	0.79	0.12	0.11	0.03	0.03	0.05	0.03	0.04	0.03	0.05
8.00	0.39	0.39	0.17	0.16	0.32	0.55	0.59	0.57	0.60	0.80	0.79	0.55	0.54	0.69	0.85	0.87	0.85	0.87	0.11	0.11	0.01	0.01	0.04	0.04	0.04	0.04	0.05
10.00	0.50	0.51	0.40	0.39	0.56	0.82	0.82	0.86	0.82	0.93	0.93	0.74	0.73	0.86	0.97	0.97	0.98	0.98	0.14	0.13	0.02	0.02	0.06	0.04	0.03	0.03	0.05
12.00	0.63	0.66	0.73	0.72	0.79	0.90	0.87	0.89	0.84	0.99	0.99	0.91	0.90	0.97	1.00	1.00	1.00	1.00	0.13	0.12	0.02	0.02	0.05	0.03	0.05	0.04	0.05

L=6,K/L=0.25 so k=2,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.19	0.19	0.16	0.16	0.17	0.05	0.05	0.05	0.22	0.20	0.20	0.17	0.17	0.18	0.04	0.04	0.03	0.07
2.00	0.05	0.05	0.01	0.01	0.03	0.01	0.01	0.01	0.02	0.28	0.28	0.21	0.21	0.24	0.09	0.07	0.08	0.29	0.18	0.18	0.15	0.15	0.16	0.04	0.05	0.04	0.07
3.00	0.07	0.07	0.00	0.00	0.04	0.05	0.05	0.06	0.09	0.32	0.32	0.23	0.23	0.26	0.17	0.20	0.18	0.43	0.18	0.18	0.14	0.14	0.15	0.05	0.04	0.03	0.60
4.00	0.13	0.14	0.02	0.02	0.09	0.12	0.12	0.15	0.19	0.45	0.45	0.32	0.32	0.37	0.31	0.33	0.34	0.55	0.16	0.15	0.10	0.10	0.11	0.04	0.04	0.03	0.07
5.00	0.18	0.18	0.06	0.05	0.12	0.20	0.20	0.22	0.30	0.54	0.53	0.36	0.36	0.42	0.44	0.43	0.45	0.64	0.15	0.14	0.09	0.09	0.10	0.04	0.05	0.04	0.07
6.00	0.26	0.26	0.10	0.09	0.21	0.33	0.32	0.31	0.38	0.64	0.63	0.45	0.44	0.54	0.58	0.56	0.56	0.69	0.14	0.13	0.06	0.06	0.08	0.04	0.04	0.04	0.05
7.00	0.34	0.34	0.17	0.16	0.30	0.46	0.49	0.49	0.50	0.74	0.73	0.52	0.52	0.63	0.70	0.73	0.71	0.80	0.13	0.12	0.04	0.04	0.07	0.04	0.04	0.03	0.05
8.00	0.40	0.41	0.28	0.27	0.44	0.64	0.61	0.61	0.64	0.83	0.82	0.60	0.59	0.74	0.85	0.84	0.84	0.87	0.14	0.13	0.03	0.03	0.06	0.03	0.04	0.04	0.05
10.00	0.49	0.50	0.53	0.52	0.61	0.83	0.78	0.81	0.80	0.93	0.93	0.76	0.76	0.87	0.98	0.97	0.97	0.98	0.14	0.13	0.02	0.02	0.06	0.04	0.04	0.04	0.05
12.00	0.57	0.59	0.77	0.76	0.76	0.86	0.84	0.86	0.85	0.98	0.98	0.90	0.90	0.95	1.00	1.00	1.00	1.00	0.12	0.11	0.02	0.02	0.04	0.04	0.04	0.04	0.04

L=6,K/L=.1 so k=1,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1.00	0.14	0.14	0.16	0.16	0.16	0.05	0.05	0.05	0.23	0.19	0.19	0.17	0.17	0.17	0.06	0.05	0.05	0.26	0.19	0.19	0.17	0.17	0.17	0.04	0.03	0.04	0.08
2.00	0.20	0.21	0.23	0.23	0.23	0.08	0.06	0.09	0.28	0.27	0.27	0.23	0.23	0.24	0.10	0.07	0.10	0.37	0.19	0.18	0.15	0.15	0.16	0.04	0.05	0.04	0.08
3.00	0.24	0.24	0.31	0.31	0.29	0.16	0.17	0.19	0.50	0.36	0.35	0.31	0.31	0.33	0.20	0.21	0.22	0.58	0.18	0.18	0.14	0.14	0.15	0.04	0.04	0.04	0.76
4.00	0.34	0.34	0.48	0.48	0.45	0.31	0.35	0.30	0.61	0.56	0.56	0.50	0.50	0.52	0.39	0.41	0.37	0.73	0.16	0.16	0.11	0.10	0.12	0.05	0.03	0.04	0.08
5.00	0.35	0.36	0.52	0.52	0.48	0.45	0.42	0.48	0.66	0.62	0.62	0.53	0.53	0.57	0.56	0.50	0.56	0.84	0.16	0.15	0.10	0.10	0.11	0.04	0.04	0.04	0.08
6.00	0.44	0.44	0.66	0.66	0.59	0.52	0.52	0.53	0.72	0.77	0.77	0.68	0.68	0.70	0.65	0.67	0.67	0.86	0.14	0.14	0.07	0.07	0.08	0.04	0.04	0.04	0.06
7.00	0.47	0.48	0.75	0.75	0.66	0.66	0.68	0.64	0.78	0.83	0.83	0.78	0.78	0.79	0.80	0.82	0.80	0.95	0.13	0.13	0.05	0.05	0.07	0.04	0.04	0.04	0.05
8.00	0.51	0.53	0.84	0.85	0.77	0.76	0.72	0.74	0.78	0.92	0.91	0.88	0.88	0.89	0.93	0.88	0.90	0.98	0.13	0.12	0.03	0.03	0.05	0.04	0.04	0.04	0.05
10.00	0.56	0.58	0.90	0.91	0.78	0.80	0.81	0.82	0.79	0.97	0.97	0.94	0.94	0.95	0.99	0.98	1.00	0.99	0.11	0.10	0.02	0.02	0.05	0.04	0.04	0.04	0.05
12.00	0.54	0.55	0.91	0.92	0.76	0.80	0.81	0.79	0.79	0.99	0.99	0.98	0.98	0.99	1.00	1.00	1.00	1.00	0.12	0.12	0.02	0.02	0.05	0.04	0.04	0.04	0.05

Table D2: Results for Random Effect Model when n=50

Table D2(Results for REM Models)L=6,K/L=1so k=6,n=50,alpha=0.05,sigma=1																											
	P(true model)									Potency										Gauge							
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.21	0.17	0.17	0.17	0.08	0.07	0.07	0.21									
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.17	0.17	0.19	0.12	0.13	0.12	0.24									
3.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.41	0.40	0.18	0.18	0.26	0.35	0.36	0.36	0.39									
4.00	0.08	0.08	0.00	0.00	0.02	0.08	0.09	0.07	0.09	0.59	0.59	0.26	0.25	0.43	0.62	0.61	0.60	0.63									
5.00	0.16	0.16	0.01	0.00	0.05	0.23	0.25	0.22	0.28	0.70	0.70	0.34	0.33	0.53	0.77	0.77	0.77	0.80									
6.00	0.33	0.32	0.02	0.02	0.16	0.56	0.53	0.53	0.59	0.81	0.81	0.47	0.46	0.69	0.90	0.88	0.89	0.91									
7.00	0.51	0.50	0.11	0.09	0.31	0.85	0.83	0.86	0.85	0.88	0.88	0.61	0.61	0.79	0.97	0.97	0.97	0.97									
8.00	0.68	0.67	0.25	0.24	0.50	0.95	0.96	0.96	0.97	0.93	0.93	0.73	0.72	0.87	0.99	0.99	0.99	1.00									
10.00	0.89	0.89	0.68	0.67	0.82	1.00	1.00	1.00	1.00	0.98	0.98	0.92	0.92	0.96	1.00	1.00	1.00	1.00									
12.00	0.97	0.97	0.90	0.90	0.95	1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.99	1.00	1.00	1.00	1.00									
L=6,K/L=0.75 so k=5,n=50,alpha=0.05,sigma=1																											
	P(true model)									Potency										Gauge							
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.00	0.22	0.22	0.17	0.17	0.18	0.08	0.07	0.07	0.22	0.19	0.18	0.13	0.13	0.13	0.05	0.05	0.05	0.05
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.18	0.18	0.19	0.13	0.14	0.13	0.25	0.17	0.17	0.12	0.12	0.12	0.06	0.05	0.04	0.05
3.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.40	0.40	0.21	0.21	0.27	0.37	0.37	0.35	0.41	0.12	0.12	0.05	0.05	0.07	0.06	0.05	0.04	0.05
4.00	0.11	0.10	0.00	0.00	0.03	0.10	0.11	0.11	0.12	0.60	0.60	0.29	0.28	0.43	0.63	0.62	0.63	0.64	0.12	0.12	0.03	0.03	0.05	0.04	0.06	0.06	0.05
5.00	0.19	0.19	0.02	0.02	0.08	0.33	0.33	0.27	0.34	0.71	0.71	0.37	0.36	0.56	0.79	0.79	0.76	0.80	0.17	0.16	0.01	0.01	0.07	0.04	0.05	0.03	0.05
6.00	0.34	0.34	0.07	0.06	0.20	0.57	0.54	0.56	0.61	0.80	0.80	0.49	0.48	0.67	0.90	0.89	0.89	0.91	0.13	0.12	0.02	0.02	0.05	0.04	0.04	0.03	0.05
7.00	0.49	0.49	0.17	0.17	0.35	0.83	0.81	0.85	0.83	0.88	0.87	0.62	0.62	0.79	0.97	0.96	0.97	0.97	0.15	0.14	0.00	0.00	0.05	0.04	0.04	0.04	0.04
8.00	0.63	0.63	0.33	0.32	0.54	0.92	0.92	0.93	0.94	0.93	0.92	0.75	0.75	0.87	0.99	0.99	0.99	0.99	0.12	0.11	0.01	0.01	0.05	0.06	0.04	0.04	0.03
10.00	0.82	0.82	0.71	0.70	0.84	0.96	0.97	0.96	0.95	0.98	0.98	0.92	0.92	0.97	1.00	1.00	1.00	1.00	0.12	0.11	0.01	0.01	0.04	0.04	0.03	0.04	0.05
12.00	0.83	0.84	0.91	0.91	0.91	0.96	0.94	0.95	0.95	0.99	0.99	0.98	0.98	0.99	1.00	1.00	1.00	1.00	0.14	0.13	0.01	0.01	0.05	0.04	0.06	0.05	0.05
L=6,K/L=0.50 so k=3,n=50,alpha=0.05,sigma=1																											
	P(true model)									Potency										Gauge							
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.22	0.22	0.18	0.18	0.19	0.09	0.09	0.07	0.25	0.19	0.19	0.15	0.15	0.15	0.04	0.04	0.05	0.07
2.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.28	0.27	0.20	0.20	0.22	0.16	0.14	0.15	0.31	0.19	0.19	0.13	0.13	0.14	0.05	0.05	0.04	0.05
3.00	0.03	0.03	0.00	0.00	0.01	0.05	0.06	0.05	0.06	0.45	0.45	0.29	0.28	0.35	0.38	0.39	0.40	0.49	0.13	0.13	0.06	0.06	0.07	0.05	0.04	0.04	0.07
4.00	0.18	0.17	0.01	0.01	0.10	0.27	0.25	0.27	0.25	0.63	0.63	0.38	0.37	0.50	0.66	0.66	0.66	0.68	0.11	0.10	0.02	0.02	0.04	0.04	0.04	0.05	0.05
5.00	0.27	0.26	0.05	0.05	0.16	0.52	0.50	0.48	0.45	0.73	0.72	0.44	0.43	0.58	0.84	0.82	0.82	0.81	0.12	0.12	0.02	0.02	0.05	0.04	0.04	0.04	0.05
6.00	0.38	0.38	0.16	0.15	0.34	0.66	0.64	0.67	0.67	0.81	0.81	0.55	0.54	0.71	0.91	0.91	0.92	0.92	0.12	0.11	0.01	0.01	0.05	0.05	0.05	0.05	0.04
7.00	0.49	0.49	0.31	0.29	0.49	0.78	0.81	0.82	0.80	0.90	0.90	0.68	0.67	0.82	0.97	0.98	0.98	0.97	0.12	0.12	0.01	0.01	0.04	0.05	0.05	0.04	0.04
8.00	0.55	0.56	0.48	0.48	0.58	0.85	0.85	0.84	0.89	0.93	0.93	0.77	0.77	0.87	1.00	1.00	0.99	1.00	0.11	0.11	0.01	0.01	0.04	0.05	0.05	0.05	0.03
10.00	0.64	0.64	0.85	0.84	0.81	0.90	0.88	0.88	0.85	0.99	0.99	0.95	0.95	0.98	1.00	1.00	1.00	1.00	0.13	0.12	0.01	0.01	0.05	0.04	0.04	0.04	0.05
12.00	0.71	0.72	0.94	0.94	0.88	0.86	0.87	0.88	0.85	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.12	0.11	0.01	0.01	0.04	0.05	0.04	0.04	0.05

L=6,K/L=0.25 so k=2,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.03	0.03	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.21	0.21	0.18	0.18	0.18	0.07	0.06	0.08	0.25	0.20	0.20	0.16	0.16	0.17	0.05	0.04	0.04	0.07
2.00	0.05	0.05	0.00	0.00	0.01	0.02	0.01	0.03	0.02	0.28	0.28	0.23	0.23	0.23	0.14	0.13	0.14	0.35	0.17	0.17	0.14	0.14	0.14	0.05	0.04	0.05	0.05
3.00	0.11	0.11	0.01	0.01	0.07	0.14	0.11	0.09	0.18	0.47	0.47	0.33	0.33	0.39	0.39	0.37	0.37	0.56	0.15	0.15	0.09	0.09	0.10	0.05	0.04	0.05	0.07
4.00	0.22	0.22	0.07	0.07	0.17	0.36	0.34	0.40	0.37	0.61	0.60	0.44	0.44	0.51	0.65	0.64	0.66	0.71	0.13	0.13	0.05	0.05	0.07	0.05	0.06	0.04	0.05
5.00	0.33	0.34	0.14	0.13	0.26	0.55	0.53	0.55	0.55	0.73	0.73	0.52	0.52	0.61	0.82	0.79	0.81	0.82	0.12	0.12	0.04	0.04	0.06	0.04	0.05	0.04	0.04
6.00	0.42	0.43	0.29	0.28	0.43	0.67	0.68	0.69	0.70	0.82	0.82	0.62	0.61	0.73	0.90	0.90	0.91	0.91	0.11	0.11	0.02	0.02	0.05	0.04	0.05	0.04	0.04
7.00	0.54	0.54	0.47	0.47	0.61	0.83	0.78	0.81	0.79	0.89	0.89	0.73	0.72	0.83	0.97	0.98	0.97	0.97	0.10	0.10	0.01	0.01	0.03	0.04	0.05	0.04	0.05
8.00	0.55	0.56	0.61	0.61	0.71	0.83	0.82	0.82	0.81	0.94	0.94	0.81	0.81	0.90	0.99	0.99	0.99	0.99	0.12	0.12	0.01	0.01	0.04	0.04	0.04	0.04	0.04
10.00	0.57	0.58	0.85	0.85	0.79	0.84	0.81	0.83	0.83	0.99	0.99	0.94	0.93	0.97	1.00	1.00	1.00	1.00	0.13	0.12	0.01	0.01	0.04	0.04	0.05	0.05	0.04
12.00	0.57	0.59	0.93	0.93	0.82	0.83	0.85	0.83	0.81	1.00	1.00	0.98	0.98	0.99	1.00	1.00	1.00	1.00	0.13	0.12	0.01	0.01	0.05	0.04	0.04	0.05	0.05

L=6,K/L=.1 so k=1,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Autom
1.00	0.20	0.20	0.23	0.23	0.23	0.05	0.08	0.08	0.24	0.25	0.25	0.23	0.23	0.23	0.07	0.10	0.10	0.28	0.19	0.19	0.15	0.15	0.16	0.05	0.05	0.04	0.08
2.00	0.20	0.20	0.26	0.26	0.25	0.11	0.15	0.12	0.44	0.30	0.30	0.26	0.26	0.27	0.17	0.18	0.14	0.51	0.18	0.18	0.15	0.15	0.15	0.05	0.05	0.04	0.08
3.00	0.30	0.31	0.46	0.46	0.42	0.31	0.33	0.33	0.63	0.51	0.51	0.46	0.46	0.48	0.40	0.43	0.41	0.75	0.16	0.16	0.11	0.11	0.12	0.05	0.05	0.05	0.08
4.00	0.37	0.37	0.57	0.57	0.51	0.59	0.58	0.53	0.75	0.66	0.66	0.58	0.58	0.61	0.74	0.72	0.70	0.92	0.15	0.15	0.09	0.09	0.10	0.04	0.05	0.05	0.05
5.00	0.44	0.45	0.73	0.73	0.65	0.66	0.67	0.64	0.76	0.81	0.81	0.75	0.75	0.77	0.85	0.84	0.83	0.96	0.14	0.14	0.05	0.05	0.07	0.05	0.05	0.05	0.05
6.00	0.48	0.49	0.81	0.82	0.72	0.73	0.73	0.77	0.78	0.88	0.87	0.82	0.82	0.84	0.94	0.93	0.92	0.99	0.13	0.13	0.04	0.04	0.06	0.05	0.05	0.03	0.05
7.00	0.48	0.49	0.87	0.87	0.71	0.81	0.76	0.76	0.77	0.92	0.92	0.89	0.89	0.90	0.98	0.98	0.99	1.00	0.13	0.13	0.03	0.03	0.06	0.04	0.05	0.05	0.05
8.00	0.52	0.52	0.90	0.91	0.79	0.79	0.77	0.81	0.81	0.95	0.95	0.94	0.94	0.94	0.99	1.00	0.99	1.00	0.12	0.12	0.02	0.02	0.04	0.04	0.05	0.04	0.04
10.00	0.54	0.55	0.94	0.94	0.82	0.80	0.79	0.81	0.79	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.12	0.11	0.01	0.01	0.04	0.04	0.05	0.04	0.05
12.00	0.59	0.59	0.97	0.97	0.86	0.80	0.78	0.80	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.01	0.01	0.03	0.04	0.05	0.04	0.05

Table D3: Results for Random Effect Model when n=100

Table D3(Results for REM Models)L=6,K/L=1 so k=6,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autos
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.20	0.14	0.15	0.15	0.11	0.09	0.10	0.22									
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.25	0.15	0.16	0.20	0.23	0.26	0.22	0.31									
3	0.10	0.10	0.00	0.00	0.00	0.05	0.04	0.06	0.08	0.48	0.47	0.20	0.22	0.36	0.63	0.64	0.66	0.67									
4	0.35	0.36	0.00	0.00	0.201	0.54	0.56	0.56	0.58	0.59	0.59	0.43	0.42	0.53	0.89	0.89	0.90	0.91									
5	0.49	0.50	0.00	0.00	0.27	0.86	0.89	0.88	0.90	0.70	0.70	0.58	0.57	0.73	0.97	1.00	0.98	0.98									
6	0.58	0.57	0.12	0.14	0.35	0.94	0.94	0.96	0.98	0.81	0.81	0.70	0.72	0.79	1.00	1.00	1.00	1.00									
7	0.69	0.68	0.33	0.32	0.55	1.00	1.00	1.00	1.00	0.88	0.88	0.68	0.83	0.90	1.00	1.00	1.00	1.00									
8	0.82	0.84	0.42	0.41	0.82	1.00	1.00	1.00	1.00	1.00	1.00	0.881	0.875	0.99	1.00	1.00	1.00	1.00									
10	0.90	0.91	0.81	0.81	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12	1.00	1.00	0.99	0.98	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autos
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.17	0.17	0.18	0.12	0.11	0.11	0.24	0.18	0.18	0.15	0.15	0.15	0.04	0.05	0.04	0.05
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.32	0.19	0.19	0.22	0.25	0.26	0.24	0.33	0.11	0.11	0.05	0.05	0.07	0.04	0.06	0.05	0.05
3.00	0.11	0.10	0.00	0.00	0.03	0.12	0.14	0.13	0.12	0.61	0.60	0.25	0.25	0.42	0.65	0.66	0.66	0.66	0.14	0.14	0.02	0.02	0.05	0.06	0.05	0.04	0.05
4.00	0.39	0.39	0.04	0.04	0.23	0.65	0.62	0.60	0.64	0.83	0.83	0.46	0.45	0.69	0.92	0.92	0.91	0.92	0.11	0.11	0.00	0.00	0.03	0.04	0.04	0.05	0.06
5.00	0.61	0.60	0.15	0.15	0.42	0.86	0.86	0.83	0.85	0.92	0.92	0.63	0.62	0.83	0.98	0.98	0.98	0.98	0.10	0.10	0.00	0.00	0.03	0.05	0.04	0.06	0.06
6.00	0.70	0.70	0.33	0.32	0.62	0.92	0.94	0.92	0.91	0.95	0.95	0.76	0.75	0.90	1.00	1.00	1.00	1.00	0.12	0.12	0.02	0.02	0.04	0.06	0.04	0.06	0.07
7.00	0.81	0.81	0.66	0.65	0.82	0.97	0.96	0.93	0.95	0.99	0.99	0.90	0.90	0.97	1.00	1.00	1.00	1.00	0.13	0.13	0.01	0.00	0.04	0.03	0.04	0.07	0.05
8.00	0.85	0.85	0.83	0.83	0.90	0.93	0.96	0.97	0.96	0.99	0.99	0.96	0.96	0.99	1.00	1.00	1.00	1.00	0.12	0.12	0.01	0.01	0.04	0.07	0.04	0.03	0.04
10.00	0.90	0.90	0.97	0.97	0.96	0.94	0.95	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.01	0.01	0.03	0.06	0.05	0.04	0.05
12.00	0.90	0.90	1.00	1.00	0.96	0.95	0.94	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.04	0.05	0.06	0.04	0.04

L=6,K/L=0.50 so k=3,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autos
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.21	0.21	0.21	0.11	0.11	0.11	0.26	0.16	0.16	0.13	0.13	0.13	0.04	0.04	0.05	0.07
2.00	0.02	0.02	0.00	0.00	0.01	0.02	0.01	0.02	0.04	0.35	0.35	0.25	0.25	0.28	0.27	0.26	0.27	0.41	0.14	0.14	0.09	0.09	0.10	0.05	0.05	0.05	0.07
3.00	0.21	0.21	0.02	0.02	0.09	0.28	0.23	0.26	0.23	0.62	0.62	0.34	0.34	0.47	0.68	0.66	0.67	0.68	0.11	0.11	0.03	0.03	0.04	0.06	0.05	0.05	0.05
4.00	0.41	0.42	0.11	0.11	0.33	0.70	0.72	0.66	0.66	0.82	0.82	0.52	0.52	0.70	0.92	0.93	0.92	0.92	0.10	0.10	0.01	0.01	0.03	0.05	0.04	0.05	0.05
5.00	0.57	0.57	0.29	0.29	0.52	0.82	0.83	0.82	0.81	0.91	0.91	0.65	0.65	0.82	0.98	0.98	0.98	0.98	0.10	0.09	0.00	0.00	0.02	0.05	0.04	0.05	0.05
6.00	0.62	0.62	0.47	0.47	0.68	0.88	0.88	0.85	0.84	0.94	0.94	0.77	0.77	0.89	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.03	0.04	0.04	0.05	0.05
7.00	0.66	0.67	0.69	0.69	0.83	0.85	0.88	0.85	0.88	0.98	0.98	0.88	0.88	0.96	1.00	1.00	1.00	1.00	0.11	0.10	0.00	0.00	0.02	0.05	0.04	0.05	0.04
8.00	0.69	0.69	0.89	0.89	0.88	0.86	0.86	0.86	0.86	0.99	0.99	0.97	0.96	0.99	1.00	1.00	1.00	1.00	0.11	0.11	0.01	0.01	0.03	0.05	0.05	0.05	0.05
10.00	0.77	0.77	0.97	0.97	0.95	0.86	0.86	0.89	0.85	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.08	0.08	0.00	0.00	0.01	0.05	0.05	0.04	0.05
12.00	0.72	0.73	0.99	0.99	0.94	0.88	0.85	0.84	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.04	0.05	0.06	0.04

L=6,K/L=0.25 so k=2,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.02	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.02	0.25	0.25	0.20	0.20	0.22	0.11	0.11	0.11	0.30	0.18	0.18	0.15	0.15	0.15	0.05	0.03	0.04	0.05
2.00	0.08	0.08	0.01	0.01	0.03	0.06	0.06	0.07	0.07	0.39	0.39	0.30	0.30	0.32	0.26	0.25	0.26	0.43	0.15	0.15	0.10	0.10	0.11	0.05	0.04	0.04	0.05
3.00	0.28	0.28	0.07	0.07	0.20	0.36	0.41	0.37	0.39	0.66	0.65	0.45	0.45	0.53	0.66	0.68	0.66	0.73	0.12	0.11	0.04	0.04	0.06	0.05	0.05	0.05	0.05
4.00	0.47	0.47	0.26	0.26	0.48	0.71	0.68	0.70	0.65	0.84	0.84	0.61	0.61	0.74	0.93	0.93	0.92	0.90	0.10	0.10	0.02	0.02	0.04	0.05	0.05	0.05	0.05
5.00	0.52	0.53	0.45	0.45	0.61	0.79	0.78	0.78	0.79	0.90	0.90	0.72	0.72	0.83	0.98	0.98	0.98	0.98	0.10	0.10	0.01	0.01	0.03	0.05	0.05	0.05	0.05
6.00	0.61	0.62	0.61	0.61	0.72	0.81	0.82	0.82	0.84	0.94	0.94	0.81	0.81	0.89	1.00	1.00	1.00	1.00	0.09	0.09	0.00	0.00	0.02	0.05	0.05	0.04	0.04
7.00	0.61	0.61	0.77	0.77	0.80	0.84	0.82	0.83	0.81	0.97	0.97	0.89	0.89	0.95	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.03	0.04	0.05	0.05	0.05
8.00	0.63	0.64	0.91	0.90	0.88	0.81	0.82	0.85	0.82	0.99	0.99	0.96	0.96	0.98	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.05	0.05	0.04	0.05
10.00	0.68	0.69	0.98	0.98	0.91	0.80	0.84	0.84	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.09	0.09	0.00	0.00	0.02	0.06	0.05	0.04	0.05
12.00	0.67	0.68	0.99	0.99	0.90	0.81	0.81	0.84	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.09	0.00	0.00	0.02	0.05	0.05	0.04	0.05

L=6,K/L=.1 so k=1,n=100,alpha=0.05,sigma=1

P(true model)									Potency									Gauge									
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.00	0.20	0.20	0.23	0.23	0.22	0.08	0.11	0.11	0.31	0.28	0.28	0.23	0.23	0.24	0.11	0.13	0.15	0.35	0.18	0.18	0.15	0.15	0.16	0.05	0.05	0.06	0.07
2.00	0.27	0.27	0.35	0.35	0.34	0.23	0.22	0.21	0.52	0.40	0.40	0.35	0.35	0.36	0.29	0.27	0.27	0.62	0.17	0.16	0.13	0.13	0.13	0.05	0.04	0.05	0.05
3.00	0.46	0.46	0.64	0.64	0.61	0.53	0.56	0.57	0.66	0.73	0.73	0.64	0.64	0.66	0.71	0.69	0.72	0.92	0.12	0.12	0.07	0.07	0.08	0.05	0.04	0.05	0.07
4.00	0.55	0.56	0.83	0.83	0.77	0.73	0.70	0.73	0.78	0.90	0.90	0.84	0.84	0.87	0.94	0.92	0.93	0.99	0.11	0.11	0.03	0.03	0.05	0.05	0.05	0.05	0.05
5.00	0.54	0.54	0.90	0.90	0.80	0.74	0.75	0.80	0.76	0.94	0.94	0.91	0.91	0.93	0.99	0.99	0.99	1.00	0.12	0.11	0.02	0.02	0.04	0.06	0.05	0.04	0.05
6.00	0.59	0.59	0.94	0.94	0.84	0.77	0.79	0.77	0.79	0.97	0.97	0.95	0.95	0.96	0.99	1.00	1.00	1.00	0.10	0.10	0.01	0.01	0.03	0.05	0.05	0.05	0.04
7.00	0.58	0.58	0.98	0.98	0.86	0.77	0.80	0.75	0.78	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.03	0.05	0.05	0.06	0.05
8.00	0.59	0.59	0.97	0.97	0.88	0.77	0.78	0.79	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.01	0.01	0.03	0.05	0.05	0.04	0.04
10.00	0.65	0.65	0.99	0.99	0.91	0.79	0.80	0.79	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.09	0.09	0.00	0.00	0.02	0.05	0.05	0.05	0.06
12.00	0.54	0.55	0.96	0.96	0.83	0.78	0.83	0.78	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.11	0.11	0.01	0.01	0.04	0.05	0.04	0.05	0.05

Table D4: Results for Random Effect Model when n=200

Table D4(Results for REM Models)L=6,K/L=1 so k=6,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.18	0.18	0.16	0.17	0.18	0.15	0.26									
2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.45	0.47	0.19	0.19	0.20	0.44	0.46	0.45	0.47									
3.00	0.10	0.10	0.00	0.00	0.00	0.55	0.57	0.56	0.59	0.90	0.92	0.31	0.32	0.62	0.92	0.89	0.91	0.92									
4.00	0.35	0.36	0.10	0.11	0.20	0.94	0.96	0.96	0.98	0.99	0.99	0.58	0.58	0.87	0.99	1.00	1.00	1.00									
5.00	0.49	0.50	0.20	0.21	0.37	1.00	1.00	1.00	1.00	1.00	1.00	0.68	0.69	0.92	1.00	1.00	1.00	1.00									
6.00	0.58	0.57	0.32	0.34	0.61	1.00	1.00	1.00	1.00	1.00	1.00	0.82	0.82	0.96	1.00	1.00	1.00	1.00									
7.00	0.69	0.68	0.39	0.39	0.80	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	1.00	1.00	1.00	1.00									
8.00	0.82	0.84	0.49	0.49	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
10.00	0.90	0.91	0.81	0.81	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12.00	1.00	1.00	0.99	0.98	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
										L=6,K/L=0.75 so k=5,n=200,alpha=0.05,sigma=1																	
	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.18	0.18	0.19	0.19	0.18	0.17	0.27	0.15	0.15	0.09	0.09	0.10	0.05	0.05	0.06	0.06
2.00	0.03	0.03	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.47	0.47	0.21	0.21	0.29	0.46	0.47	0.46	0.48	0.13	0.12	0.03	0.03	0.05	0.07	0.05	0.04	0.04
3.00	0.38	0.37	0.02	0.02	0.17	0.63	0.65	0.65	0.63	0.82	0.82	0.39	0.39	0.65	0.92	0.92	0.93	0.91	0.09	0.09	0.00	0.00	0.03	0.05	0.04	0.07	0.06
4.00	0.72	0.72	0.32	0.31	0.63	0.93	0.94	0.94	0.95	0.96	0.96	0.74	0.74	0.90	1.00	1.00	1.00	1.00	0.11	0.11	0.00	0.00	0.02	0.06	0.05	0.03	0.04
5.00	0.82	0.82	0.63	0.63	0.83	0.96	0.95	0.95	0.95	0.99	0.99	0.89	0.89	0.97	1.00	1.00	1.00	1.00	0.12	0.12	0.00	0.00	0.02	0.04	0.05	0.05	0.05
6.00	0.88	0.88	0.83	0.83	0.93	0.95	0.94	0.94	0.96	1.00	1.00	0.96	0.96	0.99	1.00	1.00	1.00	1.00	0.11	0.10	0.00	0.00	0.03	0.05	0.06	0.06	0.04
7.00	0.87	0.87	0.97	0.97	0.96	0.95	0.94	0.94	0.94	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.00	0.00	0.03	0.05	0.06	0.06	0.06
8.00	0.89	0.89	0.99	0.99	0.98	0.95	0.96	0.96	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.11	0.11	0.00	0.00	0.02	0.05	0.04	0.04	0.05
10.00	0.88	0.88	1.00	1.00	0.98	0.94	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.00	0.00	0.02	0.06	0.05	0.05	0.05
12.00	0.90	0.90	1.00	1.00	0.98	0.96	0.97	0.95	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.04	0.03	0.05	0.06
										L=6,K/L=0.50 so k=3,n=200,alpha=0.05,sigma=1																	
	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.31	0.31	0.24	0.24	0.24	0.17	0.20	0.18	0.34	0.14	0.14	0.10	0.10	0.10	0.06	0.04	0.05	0.05
2.00	0.03	0.03	0.00	0.00	0.01	0.06	0.10	0.07	0.11	0.46	0.46	0.29	0.29	0.33	0.48	0.46	0.45	0.52	0.11	0.11	0.05	0.05	0.06	0.06	0.04	0.05	0.05
3.00	0.38	0.38	0.06	0.06	0.25	0.64	0.67	0.63	0.67	0.83	0.83	0.47	0.47	0.67	0.91	0.94	0.91	0.91	0.10	0.10	0.00	0.00	0.03	0.06	0.06	0.05	0.05
4.00	0.62	0.62	0.45	0.44	0.68	0.87	0.85	0.87	0.84	0.95	0.95	0.76	0.76	0.91	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.03	0.04	0.05	0.04	0.05
5.00	0.71	0.71	0.69	0.69	0.81	0.85	0.86	0.85	0.87	0.98	0.98	0.88	0.88	0.96	1.00	1.00	1.00	1.00	0.09	0.09	0.00	0.00	0.03	0.05	0.05	0.05	0.05
6.00	0.72	0.72	0.85	0.85	0.87	0.84	0.85	0.88	0.85	1.00	1.00	0.95	0.95	0.98	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.03	0.06	0.05	0.04	0.05
7.00	0.73	0.73	0.95	0.95	0.91	0.87	0.89	0.87	0.85	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.09	0.09	0.00	0.00	0.03	0.05	0.04	0.04	0.05
8.00	0.67	0.67	0.99	0.99	0.91	0.88	0.85	0.88	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.00	0.00	0.03	0.04	0.06	0.04	0.05
10.00	0.74	0.75	0.98	0.98	0.94	0.88	0.87	0.83	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.09	0.09	0.01	0.01	0.02	0.04	0.05	0.06	0.06
12.00	0.71	0.71	0.99	0.99	0.93	0.85	0.86	0.87	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.11	0.10	0.00	0.00	0.02	0.05	0.05	0.04	0.06

	L=6,K/L=0.25 so k=2,n=200,alpha=0.05,sigma=1																										
	P(true model)									Potency									Gauge								
	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1.00	0.03	0.03	0.00	0.00	0.01	0.02	0.04	0.03	0.05	0.31	0.31	0.26	0.26	0.27	0.18	0.20	0.19	0.42	0.16	0.16	0.12	0.12	0.12	0.04	0.05	0.05	0.08
2.00	0.11	0.11	0.01	0.01	0.04	0.16	0.17	0.17	0.17	0.49	0.49	0.38	0.38	0.40	0.46	0.47	0.46	0.56	0.12	0.12	0.06	0.06	0.07	0.05	0.05	0.05	0.08
3.00	0.44	0.44	0.13	0.13	0.35	0.69	0.64	0.71	0.64	0.83	0.83	0.55	0.55	0.68	0.91	0.91	0.93	0.91	0.09	0.09	0.01	0.01	0.02	0.05	0.06	0.05	0.05
4.00	0.62	0.61	0.51	0.50	0.74	0.83	0.82	0.82	0.82	0.95	0.95	0.76	0.75	0.90	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.05	0.05	0.05	0.05
5.00	0.62	0.62	0.76	0.75	0.83	0.83	0.84	0.82	0.80	0.98	0.98	0.88	0.88	0.96	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.05	0.04	0.05	0.06
6.00	0.65	0.66	0.89	0.89	0.88	0.83	0.81	0.81	0.82	0.99	0.99	0.96	0.96	0.99	1.00	1.00	1.00	1.00	0.11	0.11	0.01	0.01	0.03	0.04	0.05	0.05	0.05
7.00	0.64	0.65	0.97	0.97	0.90	0.82	0.82	0.82	0.84	1.00	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.05	0.05	0.05	0.04
8.00	0.67	0.67	0.98	0.98	0.89	0.82	0.84	0.79	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.03	0.05	0.04	0.06	0.05
10.00	0.64	0.64	0.98	0.99	0.90	0.81	0.85	0.82	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.11	0.11	0.00	0.00	0.03	0.05	0.04	0.05	0.05
12.00	0.65	0.65	0.98	0.98	0.89	0.85	0.81	0.81	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.11	0.11	0.00	0.00	0.03	0.04	0.05	0.05	0.05

	L=6,K/L=.1 so k=1,n=200,alpha=0.05,sigma=1																										
	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1.00	0.26	0.26	0.33	0.33	0.32	0.13	0.11	0.15	0.41	0.37	0.37	0.33	0.33	0.34	0.17	0.18	0.18	0.52	0.16	0.16	0.13	0.13	0.14	0.05	0.05	0.05	0.08
2.00	0.55	0.35	0.48	0.48	0.45	0.39	0.36	0.37	0.62	0.54	0.54	0.48	0.48	0.50	0.49	0.47	0.47	0.78	0.15	0.15	0.10	0.10	0.11	0.05	0.04	0.05	0.08
3.00	0.48	0.48	0.79	0.79	0.72	0.71	0.70	0.75	0.83	0.84	0.84	0.80	0.80	0.81	0.94	0.91	0.93	0.99	0.12	0.12	0.04	0.04	0.06	0.05	0.05	0.04	0.04
4.00	0.54	0.54	0.92	0.93	0.83	0.78	0.77	0.78	0.81	0.95	0.95	0.94	0.94	0.94	1.00	1.00	1.00	1.00	0.11	0.11	0.02	0.01	0.04	0.05	0.05	0.05	0.04
5.00	0.57	0.57	0.96	0.96	0.88	0.81	0.75	0.77	0.75	0.99	0.99	0.98	0.98	0.99	1.00	1.00	1.00	1.00	0.10	0.10	0.01	0.01	0.02	0.04	0.05	0.05	0.05
6.00	0.60	0.60	0.98	0.98	0.88	0.82	0.80	0.78	0.79	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.09	0.09	0.00	0.00	0.02	0.04	0.04	0.05	0.05
7.00	0.60	0.60	0.99	0.99	0.91	0.81	0.76	0.75	0.78	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	0.10	0.09	0.00	0.00	0.02	0.04	0.05	0.05	0.05
8.00	0.62	0.62	0.98	0.98	0.88	0.78	0.79	0.79	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.05	0.04	0.05	0.05
10.00	0.62	0.63	0.99	0.99	0.90	0.79	0.77	0.77	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.09	0.09	0.00	0.00	0.02	0.05	0.05	0.05	0.05
12.00	0.59	0.59	0.99	0.99	0.90	0.77	0.79	0.79	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.10	0.10	0.00	0.00	0.02	0.05	0.05	0.05	0.05

Appendix E:Results for Random Coefficient Model

Table E1: Results for Random Coefficient Model when n=25

Table E1 (Results for RCM Model)L=6,K/L=.1 so k=1,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.17	0.17	0.21	0.02	0.02	0.02	0.17									
2	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.32	0.18	0.18	0.24	0.02	0.04	0.01	0.18									
3	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.40	0.21	0.21	0.26	0.06	0.03	0.04	0.20									
4	0.04	0.04	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.55	0.55	0.27	0.26	0.44	0.07	0.08	0.10	0.27									
5	0.08	0.08	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.63	0.61	0.30	0.29	0.46	0.11	0.13	0.10	0.30									
6	0.18	0.16	0.02	0.02	0.06	0.00	0.00	0.00	0.00	0.69	0.68	0.37	0.37	0.56	0.16	0.17	0.16	0.33									
7	0.40	0.38	0.06	0.02	0.20	0.00	0.00	0.00	0.00	0.85	0.84	0.55	0.52	0.75	0.23	0.20	0.21	0.39									
8	0.64	0.56	0.12	0.08	0.36	0.02	0.06	0.02	0.04	0.92	0.90	0.69	0.68	0.84	0.40	0.40	0.34	0.52									
10	0.92	0.90	0.66	0.60	0.84	0.14	0.14	0.20	0.28	0.98	0.98	0.93	0.90	0.97	0.63	0.57	0.61	0.78									
12	0.96	0.95	0.71	0.70	0.91	0.21	0.22	0.26	0.36	1.00	1.00	0.98	0.97	0.99	0.74	0.71	0.74	0.88									

L=6,K/L=0.75 so k=5,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.19	0.19	0.20	0.02	0.01	0.02	0.20	0.08	0.06	0.04	0.04	0.04	0.00	0.00	0.00	0.01
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.28	0.18	0.18	0.20	0.02	0.02	0.03	0.20	0.20	0.20	0.08	0.08	0.12	0.00	0.00	0.04	0.01
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.37	0.20	0.20	0.25	0.06	0.05	0.04	0.24	0.10	0.10	0.08	0.08	0.08	0.02	0.00	0.00	0.00
4	0.06	0.06	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.57	0.56	0.25	0.24	0.39	0.07	0.06	0.07	0.29	0.06	0.06	0.02	0.02	0.04	0.00	0.02	0.06	0.00
5	0.04	0.04	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.64	0.63	0.30	0.30	0.47	0.12	0.11	0.08	0.29	0.24	0.24	0.06	0.06	0.14	0.00	0.00	0.00	0.00
6	0.28	0.26	0.06	0.02	0.16	0.00	0.00	0.00	0.03	0.75	0.74	0.40	0.40	0.60	0.20	0.15	0.23	0.34	0.10	0.10	0.02	0.02	0.06	0.00	0.02	0.02	0.00
7	0.42	0.40	0.14	0.10	0.28	0.02	0.00	0.00	0.02	0.83	0.82	0.55	0.54	0.72	0.28	0.29	0.23	0.43	0.12	0.12	0.04	0.02	0.08	0.00	0.00	0.04	0.00
8	0.46	0.46	0.26	0.20	0.40	0.04	0.04	0.04	0.08	0.88	0.88	0.69	0.66	0.82	0.41	0.38	0.38	0.58	0.14	0.12	0.00	0.00	0.04	0.00	0.00	0.00	0.00
10	0.70	0.70	0.52	0.50	0.76	0.28	0.20	0.16	0.28	0.98	0.98	0.88	0.88	0.96	0.66	0.62	0.68	0.76	0.20	0.18	0.04	0.02	0.06	0.00	0.02	0.00	0.00
12	0.84	0.85	0.61	0.59	0.84	0.34	0.35	0.33	0.41	1.00	1.00	0.94	0.95	0.98	0.75	0.75	0.76	0.90	0.20	0.19	0.04	0.02	0.05	0.00	0.02	0.01	0.00

L=6,K/L=0.50 so k=3,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPW	Autom
1	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.26	0.20	0.20	0.22	0.02	0.01	0.01	0.22	0.21	0.20	0.14	0.14	0.15	0.00	0.01	0.01	0.05
2	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.31	0.22	0.22	0.25	0.02	0.02	0.02	0.26	0.20	0.19	0.13	0.13	0.15	0.01	0.01	0.01	0.05
3	0.04	0.04	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.44	0.43	0.29	0.29	0.35	0.06	0.06	0.04	0.27	0.17	0.17	0.08	0.08	0.10	0.01	0.01	0.00	0.04
4	0.14	0.15	0.02	0.01	0.08	0.01	0.00	0.01	0.00	0.58	0.58	0.36	0.36	0.46	0.13	0.12	0.13	0.32	0.15	0.14	0.05	0.05	0.08	0.01	0.01	0.01	0.04
5	0.22	0.20	0.05	0.04	0.12	0.01	0.01	0.00	0.00	0.70	0.69	0.43	0.42	0.56	0.20	0.18	0.17	0.39	0.14	0.13	0.02	0.02	0.06	0.01	0.01	0.01	0.03
6	0.31	0.31	0.12	0.11	0.24	0.03	0.02	0.02	0.05	0.79	0.78	0.51	0.50	0.65	0.27	0.27	0.24	0.51	0.15	0.14	0.03	0.03	0.07	0.01	0.01	0.00	0.03
7	0.43	0.43	0.28	0.26	0.40	0.06	0.08	0.07	0.13	0.88	0.88	0.65	0.64	0.79	0.39	0.40	0.39	0.58	0.15	0.14	0.03	0.03	0.07	0.00	0.01	0.01	0.02
8	0.51	0.51	0.43	0.42	0.54	0.37	0.36	0.35	0.41	0.94	0.94	0.75	0.75	0.87	0.54	0.53	0.51	0.60	0.14	0.13	0.02	0.02	0.07	0.01	0.01	0.01	0.01
10	0.62	0.64	0.78	0.77	0.77	0.52	0.50	0.44	0.66	0.99	0.99	0.93	0.93	0.98	0.80	0.79	0.76	0.87	0.14	0.13	0.02	0.01	0.06	0.00	0.00	0.00	0.01
12	0.65	0.66	0.93	0.94	0.81	0.86	0.88	0.86	0.92	1.00	1.00	0.99	0.99	1.00	0.95	0.97	0.96	0.99	0.13	0.13	0.02	0.01	0.06	0.01	0.01	0.01	0.01

L=6,K/L=0.25 so k=2,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton
1	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.28	0.27	0.22	0.22	0.23	0.03	0.02	0.02	0.25	0.19	0.19	0.14	0.14	0.15	0.00	0.01	0.00	0.07
2	0.08	0.08	0.02	0.02	0.08	0.00	0.00	0.00	0.00	0.34	0.34	0.27	0.27	0.31	0.01	0.04	0.05	0.39	0.17	0.16	0.13	0.13	0.13	0.00	0.01	0.01	0.06
3	0.08	0.08	0.00	0.00	0.06	0.00	0.02	0.00	0.00	0.46	0.46	0.32	0.32	0.37	0.03	0.10	0.07	0.34	0.17	0.17	0.11	0.10	0.12	0.01	0.01	0.00	0.05
4	0.22	0.26	0.06	0.04	0.12	0.00	0.02	0.02	0.07	0.58	0.58	0.37	0.36	0.46	0.06	0.17	0.13	0.43	0.17	0.15	0.09	0.09	0.11	0.01	0.01	0.03	0.05
5	0.30	0.30	0.24	0.24	0.26	0.02	0.04	0.06	0.12	0.77	0.77	0.54	0.54	0.61	0.12	0.17	0.17	0.50	0.18	0.18	0.05	0.05	0.09	0.01	0.01	0.01	0.04
6	0.42	0.42	0.22	0.22	0.38	0.16	0.02	0.10	0.22	0.81	0.81	0.55	0.55	0.71	0.30	0.22	0.25	0.61	0.12	0.12	0.04	0.04	0.08	0.00	0.02	0.01	0.01
7	0.38	0.38	0.26	0.26	0.40	0.12	0.16	0.08	0.37	0.82	0.82	0.59	0.59	0.71	0.32	0.37	0.29	0.71	0.14	0.13	0.04	0.04	0.07	0.01	0.02	0.02	0.01
8	0.64	0.64	0.68	0.68	0.74	0.24	0.34	0.34	0.41	0.96	0.96	0.84	0.84	0.91	0.55	0.57	0.53	0.70	0.11	0.11	0.01	0.01	0.05	0.00	0.01	0.01	0.02
10	0.56	0.60	0.72	0.70	0.76	0.54	0.42	0.62	0.65	1.00	1.00	0.88	0.87	0.95	0.70	0.63	0.76	0.85	0.13	0.12	0.02	0.02	0.06	0.01	0.01	0.01	0.01
12	0.66	0.65	0.77	0.78	0.78	0.62	0.55	0.70	0.78	1.00	1.00	0.96	0.97	1.00	0.81	0.77	0.85	0.93	0.12	0.11	0.01	0.01	0.05	0.01	0.01	0.01	0.01

L=6,K/L=.1 so k=1,n=25,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEPV	Auton
1	0.10	0.10	0.16	0.16	0.14	0.00	0.00	0.06	0.09	0.24	0.24	0.18	0.18	0.22	0.00	0.00	0.06	0.50	0.22	0.22	0.17	0.17	0.18	0.00	0.00	0.01	0.08
2	0.14	0.14	0.26	0.26	0.18	0.00	0.02	0.02	0.12	0.30	0.30	0.26	0.26	0.26	0.00	0.02	0.02	0.50	0.22	0.20	0.15	0.15	0.17	0.00	0.01	0.01	0.05
3	0.34	0.34	0.50	0.50	0.50	0.14	0.06	0.08	0.19	0.60	0.60	0.54	0.54	0.54	0.14	0.06	0.08	0.69	0.17	0.17	0.10	0.10	0.11	0.01	0.01	0.01	0.05
4	0.30	0.32	0.68	0.70	0.50	0.16	0.16	0.12	0.21	0.80	0.80	0.74	0.74	0.76	0.16	0.16	0.22	0.73	0.18	0.18	0.07	0.06	0.10	0.01	0.00	0.01	0.05
5	0.30	0.30	0.64	0.64	0.56	0.24	0.20	0.22	0.25	0.74	0.72	0.66	0.66	0.68	0.26	0.22	0.12	0.95	0.20	0.20	0.07	0.07	0.11	0.01	0.00	0.00	0.01
6	0.26	0.28	0.64	0.64	0.42	0.24	0.38	0.42	0.53	0.82	0.82	0.68	0.68	0.72	0.30	0.38	0.42	0.87	0.25	0.23	0.08	0.08	0.14	0.01	0.00	0.00	0.03
7	0.56	0.60	0.86	0.88	0.76	0.46	0.50	0.50	0.61	0.98	0.98	0.92	0.92	0.94	0.46	0.50	0.52	0.97	0.10	0.09	0.03	0.02	0.05	0.01	0.00	0.00	0.02
8	0.40	0.40	0.82	0.82	0.70	0.54	0.68	0.72	0.82	0.98	0.98	0.98	0.98	0.98	0.58	0.68	0.72	0.95	0.15	0.14	0.04	0.04	0.06	0.01	0.02	0.00	0.02
10	0.48	0.48	0.90	0.90	0.68	0.88	0.84	0.88	0.93	0.98	0.98	0.98	0.98	0.98	0.94	0.86	0.88	1.00	0.13	0.13	0.02	0.02	0.07	0.01	0.00	0.00	0.01
12	0.51	0.50	0.95	0.94	0.76	0.90	0.88	0.92	0.96	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.96	1.00	0.12	0.12	0.02	0.02	0.06	0.01	0.00	0.00	0.01

Table E2: Results for Random Coefficient Model when n=50

Table E2 (Results for Random Coefficient Model)L=6,K/L=1so k=6,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.30	0.18	0.18	0.22	0.04	0.01	0.04	0.17									
2.0	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.37	0.18	0.18	0.24	0.05	0.05	0.04	0.20									
3.0	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.56	0.56	0.22	0.22	0.38	0.14	0.12	0.13	0.21									
4.0	0.16	0.16	0.00	0.00	0.02	0.00	0.00	0.02	0.12	0.78	0.78	0.46	0.46	0.63	0.24	0.27	0.29	0.37									
5.0	0.44	0.44	0.04	0.04	0.20	0.02	0.00	0.00	0.18	0.86	0.85	0.50	0.49	0.69	0.40	0.35	0.37	0.49									
6.0	0.68	0.66	0.08	0.08	0.40	0.02	0.00	0.04	0.23	0.94	0.94	0.72	0.72	0.87	0.52	0.52	0.50	0.63									
7.0	0.90	0.90	0.34	0.32	0.74	0.16	0.10	0.20	0.30	0.98	0.98	0.85	0.84	0.94	0.73	0.67	0.74	0.77									
8.0	0.96	0.96	0.72	0.72	0.90	0.54	0.38	0.32	0.54	0.99	0.99	0.94	0.94	0.98	0.88	0.84	0.80	0.89									
10.0	1.00	1.00	0.98	0.96	1.00	0.86	0.96	0.68	0.88	1.00	1.00	1.00	0.99	1.00	0.97	0.99	0.94	0.98									
12.0	1.00	1.00	1.00	1.00	1.00	0.86	0.96	0.68	0.94	1.00	1.00	1.00	0.99	1.00	0.97	0.99	0.94	1.00									

L=6,K/L=0.75 so k=5,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.30	0.17	0.17	0.22	0.03	0.02	0.04	0.18	0.26	0.26	0.16	0.16	0.16	0.00	0.00	0.00	0.03
2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.35	0.20	0.20	0.26	0.04	0.06	0.05	0.21	0.16	0.16	0.06	0.06	0.08	0.02	0.02	0.00	0.00
3.0	0.04	0.04	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.58	0.58	0.28	0.28	0.42	0.16	0.12	0.13	0.27	0.10	0.10	0.00	0.00	0.04	0.00	0.00	0.02	0.00
4.0	0.18	0.18	0.02	0.02	0.04	0.00	0.00	0.00	0.00	0.77	0.77	0.45	0.45	0.61	0.29	0.24	0.30	0.37	0.20	0.20	0.00	0.00	0.02	0.00	0.00	0.00	0.00
5.0	0.38	0.38	0.06	0.06	0.30	0.00	0.02	0.00	0.00	0.87	0.87	0.60	0.60	0.78	0.39	0.35	0.40	0.46	0.16	0.16	0.02	0.02	0.04	0.00	0.02	0.00	0.02
6.0	0.60	0.60	0.20	0.18	0.42	0.10	0.06	0.02	0.04	0.91	0.90	0.70	0.69	0.81	0.55	0.59	0.53	0.58	0.12	0.12	0.00	0.00	0.00	0.02	0.02	0.02	0.00
7.0	0.80	0.78	0.50	0.46	0.74	0.32	0.22	0.22	0.28	0.98	0.98	0.86	0.85	0.95	0.75	0.70	0.74	0.74	0.10	0.10	0.00	0.00	0.04	0.00	0.00	0.00	0.00
8.0	0.82	0.84	0.72	0.70	0.82	0.48	0.32	0.50	0.38	0.99	0.99	0.94	0.94	0.97	0.86	0.80	0.87	0.85	0.16	0.14	0.00	0.00	0.06	0.00	0.02	0.00	0.02
10.0	0.76	0.76	0.98	0.98	0.96	0.76	0.86	0.80	0.92	1.00	1.00	1.00	1.00	1.00	0.96	0.98	0.96	0.98	0.24	0.24	0.00	0.00	0.04	0.02	0.02	0.00	0.00
12.0	0.76	0.76	0.98	0.98	0.96	0.76	0.86	0.80	0.92	1.00	1.00	1.00	1.00	1.00	0.96	0.98	0.96	0.98	0.24	0.24	0.00	0.00	0.04	0.02	0.02	0.00	0.00

L=6,K/L=0.50 so k=3,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.0	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.37	0.23	0.23	0.27	0.01	0.02	0.03	0.30	0.20	0.20	0.11	0.11	0.15	0.00	0.01	0.01	0.04
2.0	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.41	0.29	0.29	0.32	0.04	0.03	0.09	0.27	0.15	0.15	0.05	0.05	0.08	0.01	0.01	0.01	0.04
3.0	0.20	0.20	0.02	0.02	0.06	0.00	0.00	0.00	0.00	0.61	0.61	0.37	0.37	0.45	0.11	0.16	0.11	0.32	0.15	0.14	0.02	0.02	0.07	0.01	0.00	0.01	0.03
4.0	0.30	0.32	0.10	0.10	0.24	0.10	0.02	0.04	0.00	0.84	0.83	0.52	0.52	0.68	0.36	0.37	0.33	0.44	0.11	0.09	0.01	0.01	0.03	0.02	0.01	0.01	0.02
5.0	0.36	0.36	0.28	0.26	0.44	0.06	0.08	0.06	0.12	0.88	0.88	0.66	0.65	0.79	0.41	0.45	0.46	0.59	0.19	0.19	0.01	0.01	0.07	0.01	0.00	0.03	0.01
6.0	0.58	0.58	0.46	0.46	0.60	0.12	0.22	0.20	0.22	0.96	0.96	0.79	0.79	0.91	0.55	0.57	0.63	0.65	0.14	0.13	0.01	0.01	0.05	0.03	0.01	0.01	0.01
7.0	0.60	0.58	0.74	0.72	0.74	0.42	0.42	0.44	0.60	0.99	0.98	0.89	0.88	0.96	0.78	0.74	0.73	0.83	0.15	0.14	0.01	0.01	0.05	0.01	0.00	0.01	0.01
8.0	0.56	0.58	0.76	0.76	0.78	0.70	0.68	0.62	0.72	0.98	0.98	0.93	0.92	0.97	0.89	0.86	0.86	0.91	0.17	0.15	0.01	0.00	0.05	0.01	0.00	0.02	0.01
10.0	0.64	0.64	0.92	0.92	0.86	0.94	0.92	0.94	0.94	1.00	1.00	0.99	0.99	1.00	1.00	0.98	0.98	0.99	0.15	0.15	0.01	0.01	0.05	0.02	0.01	0.00	0.00
12.0	0.67	0.67	0.95	0.95	0.93	0.94	0.95	0.96	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.13	0.01	0.01	0.05	0.02	0.00	0.00	0.00

L=6,K/L=0.25 so k=2,n=50,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.0	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.28	0.21	0.21	0.23	0.04	0.01	0.01	0.33	0.25	0.24	0.15	0.15	0.16	0.02	0.02	0.02	0.05
2.0	0.10	0.10	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.43	0.42	0.32	0.32	0.33	0.07	0.05	0.07	0.41	0.16	0.16	0.09	0.09	0.10	0.01	0.02	0.01	0.04
3.0	0.30	0.28	0.04	0.04	0.16	0.02	0.02	0.00	0.00	0.63	0.62	0.41	0.41	0.50	0.15	0.10	0.17	0.46	0.13	0.12	0.06	0.06	0.09	0.01	0.01	0.02	0.03
4.0	0.26	0.26	0.18	0.18	0.26	0.14	0.12	0.06	0.17	0.75	0.75	0.56	0.56	0.65	0.40	0.34	0.27	0.59	0.15	0.15	0.02	0.02	0.06	0.01	0.00	0.01	0.02
5.0	0.28	0.28	0.34	0.34	0.54	0.22	0.18	0.14	0.32	0.88	0.88	0.65	0.65	0.80	0.48	0.44	0.40	0.68	0.20	0.20	0.01	0.01	0.05	0.02	0.02	0.01	0.01
6.0	0.52	0.54	0.56	0.56	0.64	0.38	0.44	0.30	0.46	0.96	0.96	0.79	0.79	0.88	0.58	0.71	0.56	0.72	0.14	0.13	0.02	0.02	0.05	0.00	0.01	0.00	0.01
7.0	0.56	0.54	0.84	0.84	0.82	0.66	0.60	0.56	0.74	0.99	0.98	0.93	0.93	0.97	0.80	0.80	0.72	0.88	0.13	0.13	0.02	0.02	0.04	0.00	0.01	0.01	0.01
8.0	0.50	0.50	0.86	0.86	0.78	0.84	0.66	0.78	0.69	0.98	0.98	0.95	0.95	0.97	0.93	0.83	0.90	0.92	0.16	0.15	0.01	0.01	0.05	0.01	0.01	0.01	0.01
10.0	0.54	0.56	0.92	0.90	0.74	0.88	0.92	0.96	0.92	1.00	1.00	0.99	0.98	0.99	0.99	0.98	0.99	0.97	0.15	0.14	0.02	0.02	0.06	0.03	0.01	0.01	0.01
12.0	0.54	0.56	0.92	0.90	0.74	0.88	0.92	0.96	0.94	1.00	1.00	0.99	0.98	0.99	0.99	0.98	0.99	0.99	0.15	0.14	0.02	0.02	0.06	0.03	0.01	0.01	0.01

L=6,K/L=.1 so k=1,n=50,alpha=0.05,sigma=1

P(true model)									Potency									Gauge									
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1.0	0.20	0.22	0.38	0.38	0.36	0.04	0.02	0.00	0.17	0.42	0.42	0.38	0.38	0.38	0.04	0.04	0.00	0.17	0.19	0.18	0.12	0.12	0.14	0.01	0.02	0.01	0.05
2.0	0.26	0.26	0.32	0.32	0.30	0.12	0.08	0.04	0.50	0.44	0.44	0.32	0.32	0.32	0.12	0.08	0.04	0.50	0.18	0.18	0.14	0.14	0.14	0.00	0.01	0.01	0.03
3.0	0.34	0.36	0.58	0.58	0.56	0.14	0.20	0.18	0.77	0.66	0.66	0.58	0.58	0.62	0.14	0.20	0.18	0.80	0.16	0.15	0.08	0.08	0.09	0.01	0.01	0.00	0.02
4.0	0.36	0.36	0.74	0.76	0.60	0.44	0.26	0.40	0.89	0.84	0.84	0.80	0.80	0.82	0.44	0.28	0.40	0.89	0.17	0.16	0.06	0.05	0.09	0.00	0.01	0.01	0.02
5.0	0.46	0.46	0.84	0.84	0.72	0.46	0.42	0.44	0.96	0.88	0.88	0.86	0.86	0.88	0.48	0.46	0.46	0.96	0.16	0.16	0.03	0.03	0.06	0.01	0.01	0.01	0.01
6.0	0.42	0.46	0.82	0.82	0.66	0.64	0.56	0.40	0.97	0.92	0.92	0.90	0.90	0.90	0.64	0.60	0.50	0.97	0.14	0.13	0.04	0.04	0.08	0.00	0.01	0.02	0.01
7.0	0.44	0.44	0.90	0.90	0.62	0.82	0.76	0.70	0.98	0.98	0.98	0.98	0.98	0.98	0.84	0.78	0.76	0.98	0.17	0.16	0.02	0.02	0.09	0.01	0.00	0.01	0.00
8.0	0.48	0.48	0.93	0.93	0.78	0.84	0.82	0.88	0.99	1.00	1.00	1.00	1.00	1.00	0.90	0.86	0.90	1.00	0.13	0.13	0.01	0.01	0.05	0.01	0.01	0.01	0.00
10.0	0.53	0.53	0.94	0.95	0.72	0.96	0.94	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.18	0.18	0.02	0.02	0.07	0.01	0.01	0.01	0.00
12.0	0.58	0.58	0.99	0.97	0.82	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.16	0.01	0.01	0.06	0.01	0.01	0.01	0.00

Table E3: Results for Random Coefficient Model when n=100

Table E3(Results for Random Coefficient Model)L=6,K/L=1 so k=6,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.38	0.19	0.19	0.26	0.06	0.06	0.05	0.17									
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.49	0.21	0.21	0.36	0.10	0.12	0.09	0.23									
3	0.18	0.18	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.76	0.76	0.42	0.42	0.58	0.26	0.27	0.25	0.34									
4	0.52	0.52	0.08	0.08	0.26	0.04	0.04	0.00	0.00	0.90	0.90	0.65	0.65	0.80	0.52	0.52	0.49	0.50									
5	0.82	0.82	0.30	0.30	0.56	0.20	0.04	0.10	0.10	0.97	0.97	0.80	0.80	0.90	0.72	0.63	0.68	0.68									
6	0.96	0.96	0.48	0.48	0.86	0.42	0.32	0.30	0.30	0.99	0.99	0.89	0.89	0.97	0.84	0.81	0.85	0.84									
7	1.00	1.00	0.84	0.84	0.98	0.64	0.58	0.68	0.78	1.00	1.00	0.97	0.97	1.00	0.93	0.91	0.94	0.96									
8	1.00	1.00	0.98	0.98	1.00	0.96	0.88	0.90	0.92	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.99									
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									

L=6,K/L=0.75 so k=5,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.38	0.19	0.19	0.25	0.04	0.05	0.06	0.20	0.26	0.24	0.06	0.06	0.12	0.00	0.02	0.00	0.00
2	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.51	0.25	0.25	0.37	0.15	0.08	0.09	0.25	0.16	0.16	0.02	0.02	0.02	0.00	0.00	0.04	0.00
3	0.12	0.12	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.68	0.68	0.40	0.40	0.56	0.24	0.29	0.29	0.37	0.20	0.20	0.00	0.00	0.04	0.04	0.02	0.02	0.02
4	0.50	0.50	0.08	0.08	0.32	0.00	0.02	0.02	0.10	0.90	0.90	0.66	0.65	0.84	0.52	0.52	0.57	0.58	0.10	0.10	0.00	0.00	0.04	0.00	0.02	0.00	0.00
5	0.64	0.66	0.30	0.30	0.58	0.24	0.20	0.18	0.32	0.95	0.95	0.82	0.82	0.92	0.73	0.73	0.68	0.78	0.14	0.12	0.00	0.00	0.04	0.00	0.02	0.00	0.02
6	0.78	0.78	0.64	0.64	0.84	0.32	0.28	0.38	0.32	0.98	0.98	0.92	0.92	0.97	0.81	0.78	0.82	0.80	0.12	0.12	0.00	0.00	0.04	0.00	0.00	0.02	0.04
7	0.86	0.88	0.88	0.88	0.92	0.70	0.62	0.74	0.72	1.00	1.00	0.98	0.98	1.00	0.93	0.91	0.95	0.95	0.14	0.12	0.00	0.00	0.08	0.02	0.00	0.02	0.02
8	0.88	0.88	0.98	0.98	0.94	0.92	0.92	0.96	0.80	1.00	1.00	1.00	1.00	1.00	0.98	0.98	1.00	0.97	0.12	0.12	0.00	0.00	0.06	0.00	0.00	0.02	0.06
10	0.86	0.86	0.98	0.98	0.94	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.14	0.02	0.02	0.06	0.00	0.00	0.00	0.04
12	0.89	0.90	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.02	0.02	0.06	0.01	0.01	0.01	0.04

L=6,K/L=0.50 so k=3,n=100,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.41	0.26	0.26	0.30	0.03	0.05	0.05	0.30	0.21	0.21	0.09	0.09	0.12	0.00	0.00	0.00	0.03
2	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.53	0.36	0.36	0.42	0.06	0.10	0.06	0.38	0.11	0.11	0.01	0.01	0.05	0.01	0.00	0.03	0.03
3	0.26	0.26	0.08	0.08	0.22	0.02	0.00	0.02	0.03	0.74	0.73	0.48	0.48	0.67	0.29	0.26	0.31	0.46	0.17	0.16	0.02	0.02	0.06	0.01	0.02	0.01	0.02
4	0.42	0.44	0.20	0.20	0.44	0.14	0.12	0.10	0.23	0.91	0.91	0.66	0.66	0.82	0.51	0.52	0.51	0.63	0.15	0.14	0.01	0.01	0.04	0.01	0.01	0.01	0.01
5	0.52	0.52	0.52	0.52	0.68	0.34	0.34	0.30	0.37	0.96	0.96	0.83	0.83	0.91	0.71	0.65	0.71	0.71	0.17	0.17	0.00	0.00	0.05	0.00	0.00	0.02	0.01
6	0.50	0.48	0.72	0.72	0.76	0.52	0.60	0.60	0.70	0.99	0.98	0.91	0.90	0.97	0.82	0.85	0.83	0.89	0.19	0.19	0.00	0.00	0.06	0.01	0.00	0.00	0.01
7	0.60	0.60	0.88	0.88	0.80	0.74	0.76	0.84	0.90	1.00	1.00	0.99	0.99	0.99	0.91	0.91	0.95	0.97	0.16	0.16	0.03	0.03	0.05	0.00	0.01	0.01	0.01
8	0.58	0.58	0.94	0.94	0.88	0.94	0.92	0.90	0.96	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98	1.00	0.18	0.18	0.02	0.02	0.04	0.00	0.01	0.01	0.01
10	0.60	0.64	0.98	0.98	0.82	0.98	0.96	0.98	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.06	0.01	0.01	0.01	0.01
12	0.65	0.66	1.00	1.00	0.90	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.13	0.14	0.01	0.01	0.05	0.01	0.01	0.01	0.01

L=6,K/L=0.25 so k=2,n=100,alpha=0.05,sigma=1																											
	P(true model)									Potency										Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.08	0.08	0.02	0.02	0.04	0.00	0.00	0.00	0.00	0.38	0.38	0.28	0.28	0.29	0.00	0.05	0.07	0.39	0.19	0.19	0.12	0.12	0.13	0.02	0.01	0.01	0.06
2	0.10	0.08	0.06	0.06	0.08	0.00	0.00	0.00	0.13	0.49	0.48	0.37	0.37	0.39	0.12	0.07	0.09	0.56	0.18	0.18	0.08	0.08	0.11	0.03	0.02	0.00	0.00
3	0.32	0.34	0.24	0.22	0.36	0.10	0.20	0.02	0.28	0.79	0.78	0.59	0.58	0.66	0.36	0.37	0.29	0.59	0.15	0.15	0.02	0.02	0.03	0.01	0.01	0.01	0.03
4	0.36	0.36	0.40	0.40	0.54	0.32	0.24	0.20	0.31	0.88	0.88	0.70	0.70	0.80	0.54	0.46	0.50	0.66	0.18	0.18	0.03	0.03	0.06	0.01	0.01	0.02	0.02
5	0.58	0.58	0.68	0.68	0.84	0.56	0.48	0.54	0.57	0.99	0.99	0.84	0.84	0.97	0.75	0.72	0.72	0.79	0.14	0.14	0.01	0.01	0.03	0.01	0.01	0.00	0.00
6	0.46	0.46	0.90	0.88	0.86	0.72	0.76	0.64	0.72	0.99	0.99	0.97	0.96	0.99	0.85	0.88	0.83	0.87	0.16	0.16	0.02	0.02	0.04	0.01	0.01	0.01	0.05
7	0.64	0.64	0.96	0.96	0.86	0.90	0.74	0.82	0.90	1.00	1.00	0.99	0.99	0.99	0.98	0.88	0.94	0.99	0.11	0.11	0.01	0.01	0.04	0.02	0.01	0.02	0.02
8	0.50	0.50	0.98	0.98	0.76	0.94	0.96	0.96	0.94	1.00	1.00	1.00	1.00	1.00	0.97	1.00	0.99	0.98	0.16	0.16	0.01	0.01	0.06	0.00	0.01	0.01	0.01
10	0.50	0.52	0.94	0.94	0.76	0.94	0.96	0.90	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.02	0.02	0.07	0.02	0.01	0.03	0.02
12	0.53	0.54	0.97	0.98	0.86	0.96	0.97	0.96	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.14	0.01	0.01	0.06	0.01	0.01	0.01	0.01

L=6,K/L=.1 so k=1,n=100,alpha=0.05,sigma=1																											
	P(true model)									Potency										Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.36	0.36	0.54	0.54	0.52	0.04	0.04	0.06	0.29	0.58	0.58	0.54	0.54	0.56	0.04	0.04	0.06	0.29	0.16	0.16	0.09	0.09	0.10	0.01	0.00	0.01	0.71
2	0.26	0.26	0.58	0.58	0.48	0.06	0.06	0.10	0.64	0.68	0.68	0.58	0.58	0.62	0.06	0.06	0.10	0.64	0.19	0.19	0.08	0.08	0.12	0.02	0.02	0.00	0.05
3	0.28	0.28	0.66	0.66	0.60	0.24	0.46	0.30	0.95	0.76	0.76	0.66	0.66	0.68	0.26	0.46	0.30	1.00	0.19	0.19	0.07	0.07	0.09	0.01	0.01	0.02	0.01
4	0.38	0.38	0.86	0.86	0.68	0.52	0.48	0.56	1.00	0.92	0.92	0.92	0.92	0.92	0.56	0.48	0.60	1.00	0.19	0.19	0.03	0.03	0.07	0.01	0.00	0.01	0.00
5	0.38	0.38	0.88	0.88	0.74	0.66	0.62	0.66	0.91	1.00	1.00	1.00	1.00	1.00	0.70	0.64	0.72	0.95	0.18	0.18	0.02	0.02	0.06	0.01	0.01	0.02	0.02
6	0.30	0.30	0.96	0.96	0.76	0.70	0.88	0.84	0.90	1.00	1.00	1.00	1.00	1.00	0.78	0.90	0.86	0.93	0.17	0.17	0.01	0.01	0.05	0.02	0.01	0.01	0.02
7	0.44	0.44	0.84	0.84	0.64	0.86	0.96	0.90	0.96	1.00	1.00	0.96	0.96	0.96	0.94	0.96	0.96	0.98	0.16	0.16	0.03	0.03	0.08	0.02	0.00	0.02	0.01
8	0.42	0.42	1.00	1.00	0.74	0.94	0.88	0.94	0.92	1.00	1.00	1.00	1.00	1.00	0.98	0.98	1.00	1.00	0.15	0.15	0.00	0.00	0.06	0.01	0.02	0.01	0.02
10	0.54	0.54	1.00	1.00	0.92	0.92	0.94	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.00	0.00	0.05	0.02	0.01	0.00	0.00
12	0.57	0.56	1.00	1.00	0.96	0.98	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.11	0.02	0.02	0.05	0.01	0.01	0.01	0.01

Table E4: Results for Random Coefficient Model when n=200

Table E4(Results for Random Coefficient Model)L=6,K/L=1 so k=6,n=200,alpha=0.05,sigma=1																											
	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.45	0.14	0.13	0.26	0.11	0.12	0.12	0.22									
2	0.18	0.18	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.76	0.76	0.42	0.42	0.58	0.26	0.27	0.25	0.34									
3	0.52	0.52	0.08	0.08	0.26	0.04	0.04	0.00	0.00	0.90	0.90	0.65	0.65	0.80	0.52	0.52	0.49	0.50									
4	0.82	0.82	0.30	0.30	0.56	0.20	0.04	0.10	0.10	0.97	0.97	0.80	0.80	0.90	0.72	0.63	0.68	0.68									
5	0.96	0.96	0.48	0.48	0.86	0.42	0.32	0.30	0.30	0.99	0.99	0.89	0.89	0.97	0.84	0.81	0.85	0.84									
6	1.00	1.00	0.84	0.84	0.98	0.64	0.58	0.68	0.78	1.00	1.00	0.97	0.97	1.00	0.93	0.91	0.94	0.96									
7	1.00	1.00	0.98	0.98	1.00	0.96	0.88	0.90	0.92	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.99									
8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
L=6,K/L=0.75 so k=5,n=200,alpha=0.05,sigma=1																											
	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.51	0.25	0.25	0.37	0.15	0.08	0.09	0.25	0.16	0.16	0.02	0.02	0.02	0.00	0.00	0.04	0.00
2	0.12	0.12	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.68	0.68	0.40	0.40	0.56	0.24	0.29	0.29	0.37	0.20	0.20	0.00	0.00	0.04	0.04	0.02	0.02	0.02
3	0.50	0.50	0.08	0.08	0.32	0.00	0.02	0.02	0.10	0.90	0.90	0.66	0.65	0.84	0.52	0.52	0.57	0.58	0.10	0.10	0.00	0.00	0.04	0.00	0.02	0.00	0.00
4	0.64	0.66	0.30	0.30	0.58	0.24	0.20	0.18	0.32	0.95	0.95	0.82	0.82	0.92	0.73	0.73	0.68	0.78	0.14	0.12	0.00	0.00	0.04	0.00	0.02	0.00	0.02
5	0.78	0.78	0.64	0.64	0.84	0.32	0.28	0.38	0.32	0.98	0.98	0.92	0.92	0.97	0.81	0.78	0.82	0.80	0.12	0.12	0.00	0.00	0.04	0.00	0.00	0.02	0.04
6	0.86	0.88	0.88	0.88	0.92	0.70	0.62	0.74	0.72	1.00	1.00	0.98	0.98	1.00	0.93	0.91	0.95	0.95	0.14	0.12	0.00	0.00	0.08	0.02	0.00	0.02	0.02
7	0.88	0.88	0.98	0.98	0.94	0.92	0.92	0.96	0.80	1.00	1.00	1.00	1.00	1.00	0.98	0.98	1.00	0.97	0.12	0.12	0.00	0.00	0.06	0.00	0.00	0.02	0.06
8	0.86	0.86	0.98	0.98	0.94	0.98	1.00	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.14	0.02	0.02	0.06	0.00	0.00	0.00	0.04
10	0.89	0.90	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.02	0.02	0.06	0.01	0.01	0.01	0.04
12	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.02	0.02	0.06	0.01	0.01	0.01	0.04
L=6,K/L=0.50 so k=3,n=200,alpha=0.05,sigma=1																											
	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Auto
1	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.53	0.36	0.36	0.42	0.06	0.10	0.06	0.38	0.11	0.11	0.01	0.01	0.05	0.01	0.00	0.03	0.03
2	0.26	0.26	0.08	0.08	0.22	0.02	0.00	0.02	0.03	0.74	0.73	0.48	0.48	0.67	0.29	0.26	0.31	0.46	0.17	0.16	0.02	0.02	0.06	0.01	0.02	0.01	0.02
3	0.42	0.44	0.20	0.20	0.44	0.14	0.12	0.10	0.23	0.91	0.91	0.66	0.66	0.82	0.51	0.52	0.51	0.63	0.15	0.14	0.01	0.01	0.04	0.01	0.01	0.01	0.01
4	0.52	0.52	0.52	0.52	0.68	0.34	0.34	0.30	0.37	0.96	0.96	0.83	0.83	0.91	0.71	0.65	0.71	0.71	0.17	0.17	0.00	0.00	0.05	0.00	0.00	0.02	0.01
5	0.50	0.48	0.72	0.72	0.76	0.52	0.60	0.60	0.70	0.99	0.98	0.91	0.90	0.97	0.82	0.85	0.83	0.89	0.19	0.19	0.00	0.00	0.06	0.01	0.00	0.00	0.01
6	0.60	0.60	0.88	0.88	0.80	0.74	0.76	0.84	0.90	1.00	1.00	0.99	0.99	0.99	0.91	0.91	0.95	0.97	0.16	0.16	0.03	0.03	0.05	0.00	0.01	0.01	0.01
7	0.58	0.58	0.94	0.94	0.88	0.94	0.92	0.90	0.96	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98	1.00	0.18	0.18	0.02	0.02	0.04	0.00	0.01	0.01	0.01
8	0.60	0.64	0.98	0.98	0.82	0.98	0.96	0.98	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.16	0.15	0.01	0.01	0.06	0.01	0.01	0.01	0.01
10	0.65	0.66	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.13	0.14	0.01	0.01	0.05	0.01	0.01	0.01	0.01
12	0.66	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.13	0.14	0.01	0.01	0.05	0.01	0.01	0.01	0.01

L=6,K/L=0.25 so k=2,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.10	0.08	0.06	0.06	0.08	0.00	0.00	0.00	0.13	0.49	0.48	0.37	0.37	0.39	0.12	0.07	0.09	0.56	0.18	0.18	0.08	0.08	0.11	0.03	0.02	0.00	0.00
2	0.22	0.24	0.12	0.12	0.21	0.10	0.13	0.12	0.22	0.79	0.78	0.59	0.58	0.66	0.36	0.37	0.29	0.59	0.15	0.15	0.02	0.02	0.03	0.01	0.01	0.01	0.03
3	0.36	0.36	0.40	0.40	0.54	0.32	0.24	0.20	0.31	0.88	0.88	0.70	0.70	0.80	0.54	0.46	0.50	0.66	0.18	0.18	0.03	0.03	0.06	0.01	0.01	0.02	0.02
4	0.58	0.58	0.68	0.68	0.84	0.56	0.48	0.54	0.57	0.99	0.99	0.84	0.84	0.97	0.75	0.72	0.72	0.79	0.14	0.14	0.01	0.01	0.03	0.01	0.01	0.00	0.00
5	0.46	0.46	0.90	0.88	0.86	0.72	0.76	0.64	0.72	0.99	0.99	0.97	0.96	0.99	0.85	0.88	0.83	0.87	0.16	0.16	0.02	0.02	0.04	0.01	0.01	0.01	0.05
6	0.49	0.49	0.96	0.96	0.86	0.90	0.74	0.82	0.90	1.00	1.00	0.99	0.99	0.99	0.98	0.88	0.94	0.99	0.11	0.11	0.01	0.01	0.04	0.02	0.01	0.02	0.02
7	0.50	0.50	0.98	0.98	0.76	0.94	0.96	0.96	0.94	1.00	1.00	1.00	1.00	1.00	0.97	1.00	0.99	0.98	0.16	0.16	0.01	0.01	0.06	0.00	0.01	0.01	0.01
8	0.50	0.52	0.94	0.94	0.76	0.94	0.96	0.90	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.02	0.02	0.07	0.02	0.01	0.03	0.02
10	0.50	0.52	0.94	0.94	0.76	0.94	0.96	0.90	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.15	0.15	0.02	0.02	0.07	0.02	0.01	0.03	0.02
12	0.53	0.54	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.14	0.14	0.01	0.01	0.06	0.01	0.01	0.01	0.01

L=6,K/L=.1 so k=1,n=200,alpha=0.05,sigma=1

	P(true model)									Potency									Gauge								
t	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom	AIC	AICc	BIC	BICc	HQC	BWE	FSEL	STEP	Autom
1	0.28	0.28	0.66	0.66	0.60	0.24	0.46	0.30	0.95	0.76	0.76	0.66	0.66	0.68	0.26	0.46	0.30	1.00	0.19	0.19	0.07	0.07	0.09	0.01	0.01	0.02	0.01
2	0.38	0.38	0.86	0.86	0.68	0.52	0.48	0.56	1.00	0.92	0.92	0.92	0.92	0.92	0.56	0.48	0.60	1.00	0.19	0.19	0.03	0.03	0.07	0.01	0.00	0.01	0.00
3	0.38	0.38	0.88	0.88	0.74	0.66	0.62	0.66	0.91	1.00	1.00	1.00	1.00	1.00	0.70	0.64	0.72	0.95	0.18	0.18	0.02	0.02	0.06	0.01	0.01	0.02	0.02
4	0.30	0.30	0.96	0.96	0.76	0.70	0.88	0.84	0.90	1.00	1.00	1.00	1.00	1.00	0.78	0.90	0.86	0.93	0.17	0.17	0.01	0.01	0.05	0.02	0.01	0.01	0.02
5	0.44	0.44	0.84	0.84	0.64	0.86	0.96	0.90	0.96	1.00	1.00	0.96	0.96	0.96	0.94	0.96	0.96	0.98	0.16	0.16	0.03	0.03	0.08	0.02	0.00	0.02	0.01
6	0.42	0.42	1.00	1.00	0.74	0.94	0.88	0.94	0.92	1.00	1.00	1.00	1.00	1.00	0.98	0.98	1.00	1.00	0.15	0.15	0.00	0.00	0.06	0.01	0.02	0.01	0.02
7	0.54	0.54	1.00	1.00	0.92	0.92	0.94	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.00	0.00	0.05	0.02	0.01	0.00	0.00
8	0.57	0.56	1.00	1.00	0.96	0.98	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.11	0.02	0.02	0.05	0.01	0.01	0.01	0.01
10	0.57	0.54	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.12	0.00	0.00	0.05	0.02	0.01	0.00	0.01
12	0.58	0.56	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.11	0.02	0.02	0.05	0.01	0.01	0.01	0.01

Appendix F

Table F1:A List of Countries Included in Real Data Example

	Country Name
1	Bhutan
2	China
3	Fiji
4	Indonesia
5	India
6	Sri Lanka
7	Malaysia
8	Pakistan
9	Philippine
10	Thailand