```
* This code simulates the model y=b0+b1*X1+b2*X2+eps (DGP). X1, X2, and eps are normal random variables.
* The user specifies the mean and the variance of X1 and X2, the variance of eps, and the sample size.
* The Gauss-Markov Assumptions hold (i.e., E(eps)=0, Var(eps) is constant, the regressors and the error term are independent, the error term is not autocorrelated).
* The code computes OLS estimates of b0, b1, and b2, and compares them with the true values in the DGP.

clear all

mata

/* Define the sample size, n, and the true values of b0, b1, and b2 in the DGP of y. */
n=100;
b0=2;
b1=3;
b2=1.5;

/* Define the standard deviation of the error term, errorsd; */
/* the mean and the standard deviation of X1, X1 mean and X1sd respectively; */
/* the mean and the standard deviation of X2, X2 mean and X2sd respectively. */
errorsd=2;
X1mean=0;
X1sd=3;
X2mean=0;
X2sd=3;

/* The code generates the random error term, the random regressors, and the dependent variable through the DGP. */
eps=rnormal(n,1,0,errorsd);
X1=rnormal(n,1,X1mean,X1sd);
X2=rnormal(n,1,X2mean,X2sd);
c=J(n,1,1);
X=(c,X1,X2);
y=b0*c+b1*X1+b2*X2+eps;

/* The code calculates the OLS estimates of b0, b1, and b2; and the associated differences from the true values in the DGP. */
OLS_EST=luinv(X'*X)*X'*y;
Diff_EST=OLS_EST-(b0,b1,b2)';
OLS_EST
Diff_EST

end
```

```
* This code simulates the model y=b0+b1*X1+b2*X2+eps (DGP). X1, X2, and eps are normal
random variables.
* The user specifies the mean and the variance of X1 and X2, the variance of eps, and the
sample size.
* The Gauss-Markov Assumptions hold (i.e., E(eps)=0, Var(eps) is constant, the regressors
and the error term are independent, the error term is not autocorrelated).
* The code computes the average OLS estimates of b0, b1, and b2, and estimates the bias of
each estimator.

clear all

mata

/* Define the sample size, n, and the true values of b0, b1, and b2 in the DGP of y. */
n=10;
b0=2;
b1=3;
b2=1.5;

/* Define the number of replications to estimate the sampling distribution of the OLS
estimators. */
m=10000;

/* Define the standard deviation of the error term, errorsd; */
/* the mean and the standard deviation of X1, X1 mean and X1sd respectively; */
/* the mean and the standard deviation of X2, X2 mean and X2sd respectively. */
errorsd=2;
X1mean=0;
X1sd=3;
X2mean=0;
X2sd=3;

/* The code produces the sampling distribution of the estimators of b0, b1, and b2. */
b0_S=J(m,1,0);
b1_S=J(m,1,0);
b2_S=J(m,1,0);

for (i=1;i<=m;i++){

/* The code generates the random error term, the random regressors, and the dependent
variable through the DGP. */
eps=rnormal(n,1,0,errorsd);
X1=rnormal(n,1,X1mean,X1sd);
X2=rnormal(n,1,X2mean,X2sd);
c=J(n,1,1);
X=(c,X1,X2);
y=b0*c+b1*X1+b2*X2+eps;

/* The code calculates the OLS estimates of b0, b1, and b2. */
OLS_EST=luinv(X'*X)*X'*y;
b0_S[i,1]=OLS_EST[1,1];
b1_S[i,1]=OLS_EST[2,1];
b2_S[i,1]=OLS_EST[3,1];

}

/* The code computes the mean of the sampling distributions of the OLS estimators of b0, b1,
and b2, and estimates the corresponding biases */
mean_b0_S=mean(b0_S);
mean_b1_S=mean(b1_S);
mean_b2_S=mean(b2_S);
mean_OLS_EST=(mean_b0_S,mean_b1_S,mean_b2_S)';
Bias_EST=mean_OLS_EST-(b0,b1,b2)';
mean_OLS_EST
Bias_EST

end
```