This question paper contains 16 printed pages and 7 Pages of Tables attached]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **416**

Unique Paper Code : **227304** **C**

Name of the Paper : **Introductory Econometrics**

Name of the Course : **B.A. (Hons.) Economics**

Semester : **III**

Duration : **3 Hours** Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Note : Answers may be written *either* in English *or* in Hindi; but the same medium should be used throughout the paper.

टिप्पणी : इस प्रश्न-पत्र का उत्तर अंग्रेज़ी **या** हिन्दी किसी एक भाषा में दीजिए; लेकिन सभी उत्तरों का माध्यम एक ही होना चाहिए ।

The question paper consists of *seven* questions. Attempt any *five* questions.

Each question carries **15** marks. Use of simple Non-programmable calculator is allowed. Statistical tables are attached for your reference.

इस प्रश्न-पत्र में 7 प्रश्न हैं। किन्हीं **पाँच** प्रश्नों के उत्तर दीजिये।

प्रत्येक प्रश्न **15** अंक का है। सरल अप्रोग्रामीय कैलकुलेटर का प्रयोग अनुमोदित है।

संदर्भ के लिए सांख्यिकीय सारणियाँ संलग्न हैं।

1. Are the following statements correct ? Justify your answers carefully and provide proofs wherever necessary :

   (*i*) If you choose a higher level of significance, a regression coefficient is more likely to be significant.

(*ii*) An increase in the number of explanatory variables in a multiple regression model will necessarily increase adjusted R squared.

(*iii*) The variance of OLS estimators will be high if the variance inflation factor is low.

(*iv*) A Durbin-Watson test statistic close to zero indicates the presence of positive autocorrelation.

(*v*) In the regression model $Y_i = B_1 + B_2X_i + u_i$, if the error variance is proportional to the square of the explanatory variable, then the weighted least squares estimators will be obtained by running a regression through the origin. 3×5=15

क्या निम्नलिखित कथन सही हैं ? ध्यानपूर्वक अपने उत्तर की पुष्टि कीजिए तथा आवश्यकतानुसार सिद्ध कीजिए :

(*i*) यदि आप ऊँचा सांख्यिकीय सार्थकता स्तर चयन करते हैं तो एक समाश्रयण गुणांक के सांख्यिकीय रूप से सार्थक होने की संभावना अधिक होगी।

(*ii*) यदि एक बहुसमाश्रयण प्रतिमान में व्याख्यात्मक चरों की संख्या में वृद्धि होती है तो समायोजित R^2 में वृद्धि अवश्य होगी।

(*iii*) OLS आकलकों का प्रसरण उच्च होगा यदि प्रसरण स्फीति कारक (V.I.F.) निम्न हो।

(*iv*) Durbin-Watson परीक्षण प्रतिदर्शज का मान शून्य के समीप रहना धनात्मक स्वसहसंबंध की उपस्थिति का संकेत देता हैं।

(*v*) यदि एक समाश्रयण प्रतिमान $Y_i = B_1 + B_2X_i + u_i$ में त्रुटि का प्रसरण व्याख्यात्मक चर के वर्ग से समानुपाती हो तो WLS आकलक मूल-बिंदु से गुज़रते एक समाश्रयण से प्राप्त होंगे।

2. (*i*) Using cross-section data on total sales and profits for 27 German companies in 1995, the following model is estimated :

$$\text{Profits}_i = B_1 + B_2 \text{ Sales}_i + u_i$$

where

Profits : Total profits in millions of dollars

Sales : Total sales in billions of dollars

The regression results are given below :

	Estimates of Coefficients	**Standard errors**
CONSTANT	83.5753	118.131
SALES	18.4338	4.4463

$r^2 = 0.4074$

(*a*) Construct a 95% confidence interval for the slope coefficient. What can you say about its statistical significance ?

(*b*) Prove that in a simple regression model with an intercept, the F statistic for goodness of fit of the model is equal to the square of the *t* statistic for a two sided *t* test on the slope coefficient. Verify this statement for the regression results given in this question.

(*c*) Find the forecasted mean profits if annual sales are 25 billion dollars. Explain the concept of a confidence band for true mean profits. 3,4,4

(*ii*) The basic framework of multiple regression analysis, the classical linear regression model. is based on a set of assumptions. What are these assumptions ? Present a brief description of each one of them. 4

(*i*) सन् 1995 के 27 जर्मन कंपनियों की कुल विक्रय तथा लाभ के वर्गगत आंकड़ों से निम्नलिखित प्रतिमान को आकलित किया गया है :

$$\text{Profits}_i = B_1 + B_2 \text{ Sales}_i + u_i$$

इस आकलित प्रतिमान में

Profits : दस लाख (मिलियन) डॉलर में कुल लाभ तथा

Sales : अरब (बिलियन) डॉलर में कुल लाभ विक्रय

इस समाश्रयण के परिणाम निम्नलिखित हैं :

	Estimates of Coefficients	**Standard errors**
CONSTANT	83.5753	118.131
SALES	18.4338	4.4463

$r^2 = 0.4074$

(*a*) ढाल गुणांक के लिए 95 प्रतिशत विश्वास्यता अंतराल का निर्माण कीजिए। इस ढाल गुणांक की सांख्यिकीय सार्थकता के बारे में आप क्या कह सकते हैं ? बताइए।

(*b*) प्रमाणित कीजिए कि एक अंत:खंड युक्त सरल समाश्रयण प्रतिमान में प्रतिमान की उपयुक्तता (Goodness of fit of the model) हेतु प्रयुक्त प्रतिदर्शज का मान ढाल गुणांक के द्विपक्षीय t के वर्गफल के बराबर होता है। इस कथन की सत्यता की जाँच इस प्रश्न में दिए गए समाश्रयण परिणामों के लिए कीजिए।

(*c*) यदि वार्षिक विक्रय 25 बिलियन डॉलर हो तो पूर्वानुमानित माध्य लाभ का मान क्या होगा ? बताइये। वास्तविक माध्य लाभ के विश्वास्यता अंतराल की अवधारणा की व्याख्या कीजिए।

(*ii*) CLRM जो बहुरेखीय समाश्रयण विश्लेषण का मौलिक ढांचा है—मान्यताओं के एक समूह पर आधारित है। ये मान्यताएँ क्या हैं ? बताइये। प्रत्येक मान्यता का संक्षिप्त वर्णन कीजिए।

3. Using quarterly data for 10 years ($n = 40$) for the U.S. economy, the following model of demand for new cars was estimated :

$$NUMCARS_i = B_1 + B_2\ PRICE_i + B_3\ INCOME_i + B_4\ INTRATE_i + u_i$$

where

NUMCARS : Number of new car sales per thousand people

PRICE : New car price index

INCOME : Per capita real disposable income (in dollars)

INTRATE : Interest rate (in percent)

The table below gives estimates of the coefficients and their standard errors :

	Estimates of Coefficients	**Standard errors**
CONSTANT	–7.4534	13.5782
PRICE	–0.0714	0.0032
INCOME	0.0032	0.0017
INTRATE	–0.1537	0.0491

(*i*) A priori, what are the expected signs of the partial slope coefficients ? Are the results in accordance with these expectations ?

(*ii*) Interpret the various partial slope coefficients and test whether they are individually statistically different from zero. Use 10% level of significance.

(*iii*) The adjusted R squared reported for this model is 0.758. Test the model for overall goodness of fit at 5% level of significance.

(*iv*) Suppose unemployment rate is an important determinant of demand for new cars but is not included in the above regression model. What are the consequences of omitting this variable ? 2.6.3.4

यू. एस. अर्थव्यवस्था के 10 साल के त्रैमासिक ($n = 40$) आंकड़ों का प्रयोग करके नई गाड़ियों की मांग के निम्नलिखित प्रतिमान को आकलित किया गया है :

$$NUMCARS_i = B_1 + B_2\ PRICE_i + B_3\ INCOME_i + B_4\ INTRATE_i + u_i$$

इस प्रतिमान में

NUMCARS : प्रति हजार व्यक्तियों में नई गाड़ियों की विक्रय संख्या

PRICE : नई गाड़ियों का कीमत सूचकांक

INCOME : प्रति व्यक्ति वास्तविक प्रयोज्य आय (डॉलर में)

INTRATE : ब्याज दर (प्रतिशत में)

निम्नलिखित तालिका में गुणांक के आकलक के मान तथा उनकी मानक त्रुटियाँ दी गई हैं :

	Estimates of Coefficients	**Standard errors**
CONSTANT	–7.4534	13.5782
PRICE	–0.0714	0.0032
INCOME	0.0032	0.0017
INTRATE	–0.1537	0.0491

(*i*) आंशिक ढाल गुणांकों के प्रत्याशित चिह्न क्या हैं ? बताइये, क्या उपर्युक्त परिणाम प्रत्याशित परिणामों के अनुरूप हैं ?

(*ii*) उपर्युक्त आंशिक ढाल गुणांकों की व्याख्या कीजिए तथा परीक्षण कीजिए कि आंशिक ढाल गुणांक व्यक्तिगत सांख्यिकीय रूप से शून्य से भिन्न हैं। 10 प्रतिशत सांख्यिकीय सार्थकता का स्तर उपयोग कीजिए।

(*iii*) इस समाश्रयण प्रतिमान में समायोजित R^2 का मान 0.758 है। 5 प्रतिशत सांख्यिकीय सार्थकता के स्तर पर इस प्रतिमान की समग्र उपयुक्तता का परीक्षण कीजिए।

(*iv*) मान लीजिए कि बेरोजगारी की दर नई गाड़ियों की मांग का एक महत्वपूर्ण निर्धारक है परंतु यह चर उपर्युक्त समाश्रयण प्रतिमान में शामिल नहीं है। इस निर्धारक को छोड़ देने के क्या परिणाम हैं ? समझाइए।

4. (*i*) Using data for 526 individuals the following model of wage determination was estimated :

$$LOG(W)_i = B_0 + B_1D_i + B_2EDU_i + B_3(D * EDU)_i + u_i$$

where

W : Daily wages in rupees

D : Dummy variable for gender, D = 1 for females and 0 for males

EDU : Years of education

D*EDU : Interactive dummy

The table below gives the estimated regression coefficients and their standard errors :

	Estimated Coefficients	**Standard errors**
CONSTANT	0.3890	0.1190
D	–0.2270	0.1680
EDU	0.0820	0.0080
D*EDU	–0.0056	0.0131

(*a*) Write the regression equations relating LOG (W) to EDU for males and females separately.

(*b*) The returns to education are measured by the percentage increase in wages due to an extra year of education. Using the results from part (*a*), find the returns to education, for males and females.

(*c*) Is the difference between returns to education for males and females statistically significant at 5% level of significance ? 3,2,2

(*ii*) Consider the regression through the origin model :

$$Y_i = B_2X_i + u_i$$

(*a*) Write the normal equation and use it to derive the ordinary least square estimator, b_2 of B_2 ?

(*b*) Show that b_2 is a linear and unbiased estimator of B_2.

(*c*) Explain why the sum of the estimated residuals, Σe_i need not be zero in this regression model. 3,3,2

(*i*) 526 व्यक्तियों के आँकड़ों से मज़दूरी निर्धारण के निम्नलिखित प्रतिमान को आकलित किया गया है :

$$LOG(W)_i = B_0 + B_1D_i + B_2EDU_i + B_3(D * EDU)_i + u_i$$

इस प्रतिमान में

W : दैनिक मज़दूरी (रुपयों में)

D : लिंग के लिए डमी चर, महिलाओं के लिए D = 1 तथा पुरुषों के लिए D = 0

EDU : शिक्षा प्राप्ति (वर्षों में)

D*EDU : परस्पर प्रभाव करने वाला डमी

निम्नलिखित सारणी में समाश्रयण गुणांकों के आकलकों के मान तथा उनकी मानक त्रुटियाँ दी गई हैं :

	Estimated Coefficients	**Standard errors**
CONSTANT	0.3890	0.1190
D	–0.2270	0.1680
EDU	0.0820	0.0080
D*EDU	–0.0056	0.0131

(*a*) LOG (W) का EDU के साथ संबंध दर्शाने वाले समाश्रयण समीकरणों को पुरुषों तथा महिलाओं के लिए अलग-अलग लिखिए।

(*b*) इस संदर्भ में एक अतिरिक्त वर्ष की शिक्षा के कारण मज़दूरी में प्रतिशत वृद्धि (शिक्षा से, लाभ प्राप्ति का मापन है) उपर्युक्त खंड (a) के परिणाम को प्रयोग करके पुरुषों तथा महिलाओं के लिए शिक्षा से लाभ ज्ञात कीजिए।

(*c*) 'पुरुषों तथा महिलाओं में शिक्षा से लाभ प्राप्ति में कोई अंतर है या नहीं ?' 5 प्रतिशत सांख्यिकीय सार्थकता के स्तर पर बताइए।

(*ii*) मूल-बिंदु से निकलते हुए निम्नलिखित समाश्रयण प्रतिमान पर विचार कीजिए :

$$Y_i = B_2X_i + u_i$$

(*a*) मानकीय समीकरण (Normal equation) को लिखिए तथा B_2 के OLS आकलक b_2 का व्युत्पन्न करने में इसका प्रयोग कीजिए।

(*b*) दर्शाइए कि B_2 के लिए b_2 एक रैखिक तथा अनभिनत आकलक है।

(*c*) समझाइए कि इस समाश्रयण प्रतिमान में आकलित अवशेषों का योगफल Σe_i शून्य के बराबर होना आवश्यक क्यों नहीं है ?

5. (*i*) Find the slope and elasticity of Y with respect to X for the following functional forms :

(*a*) $\ln Y = B_1 - B_2(1/X)$

(*b*) $Y = B_1 + B_2 \ln X$.

(*ii*) In the presence of first order autocorrelation, what is the method of estimation that will produce BLUE estimators ? Outline the steps involved in implementing this method.

(*iii*) Based on 147 quarterly observations, an aggregate consumption function is estimated wherein aggregate consumption expenditure C_t, is regressed on disposable income YD_t, and one period lagged dependent variable.

The estimated least squares equation is as follows (standard errors in parentheses) :

$$\hat{C}_t = 1.88 + 0.086YD_t + 0.911C_{t-1}$$

(4.49) (.028) (.0304)

$DW = 1.569 \quad R^2 = 0.999$

Which test should be used to test the presence of AR (1) error process in this model ? Describe the test and perform this test at 5% level of significance. 4.5.6

(*i*) निम्नलिखित फलन रूपों के लिए ढाल तथा Y की X के प्रति लोच ज्ञात कीजिए :

(*a*) $\ln Y = B_1 - B_2(1/X)$

(*b*) $Y = B_1 + B_2 \ln X$.

(*ii*) प्रथम कोटि के स्वसहसंबंध की उपस्थिति में किस आकलन विधि से BLUE आकलक प्राप्त किये जा सकते हैं ? इस विधि को लागू करने का क्रमबद्ध रूप में प्रयुक्त चरणों का विवरण दीजिए।

P.T.O.

(*iii*) 147 त्रैमासिक प्रेक्षणों के आधार पर एक समग्र उपभोग फलन को आकलित किया गया है जिसमें समग्र उपभोग व्यय C_t को प्रयोज्य आय YD_t तथा एक समयावधि विलंबित निर्भर चर (Dependent variable) पर समाश्रयित किया गया है।

ELS आकलित समीकरण तथा मानक त्रुटियाँ (कोष्ठक में) निम्नलिखित हैं :

$$\hat{C}_t = 1.88 + 0.086YD_t + 0.911C_{t-1}$$

(4.49) (.028) (.0304)

DW = 1.569 R^2 = 0.999

इस प्रतिमान में AR (1) त्रुटि-प्रणाली की उपस्थिति की जाँच हेतु कौनसे परीक्षण का उपयोग किया जाना चाहिए ? परीक्षण का वर्णन कीजिए व इसे 5 प्रतिशत सार्थकता स्तर पर कीजिए।

6. (*i*) Let Y be output, X_2 be unskilled labour and X_3 be skilled labour in the following relationship :

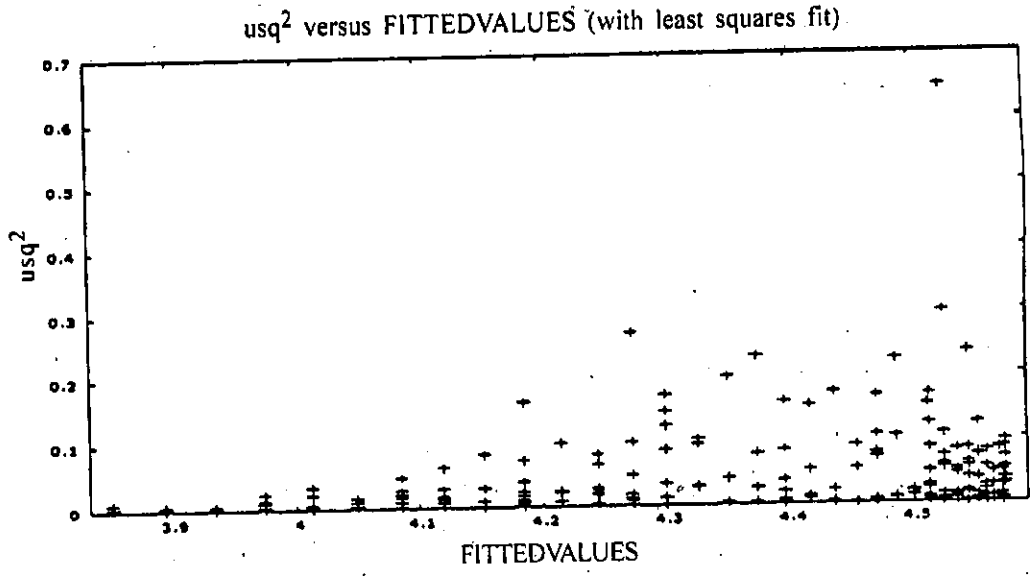
$$Y_i = B_1 + B_2X_{2i} + B_3X_{3i} + B_4(X_{2i} + X_{3i}) + B_5X_{2i}^2 + B_6X_{3i}^2 + u_i$$

What parameters are estimable by ordinary least squares ? Explain.

(*ii*) Suppose heteroscedasticity is present in a regression model and ordinary least squares procedure is applied to estimate the parameters of the model ? What are the consequences for the properties of the estimators and the hypothesis testing procedures ?

(*iii*) A regression of salaries of 222 professors from seven universities in the U.S. on their years of experience since they completed their Ph.D. was performed.

(*a*) The graph of squared residuals against the fitted values of the dependent variable, salary is shown below. What does the graph show ? Is there evidence of heteroscedasticity in the model ?



(*b*) The test statistic for White's test for this regression was reported as 19.7. State the null and alternate hypothesis and the test statistic for carrying out this test. Is the null hypothesis rejected at 5% level of significance ? 4,5,6

(*i*) निम्नलिखित संबंध में Y उत्पादन/निर्गत है, X_2 अकुशल श्रम है तथा X_3 कुशल श्रम है :

$$Y_i = B_1 + B_2X_{2i} + B_3X_{3i} + B_4(X_{2i} + X_{3i}) + B_5X_{2i}^2 + B_6X_{3i}^2 + u_i$$

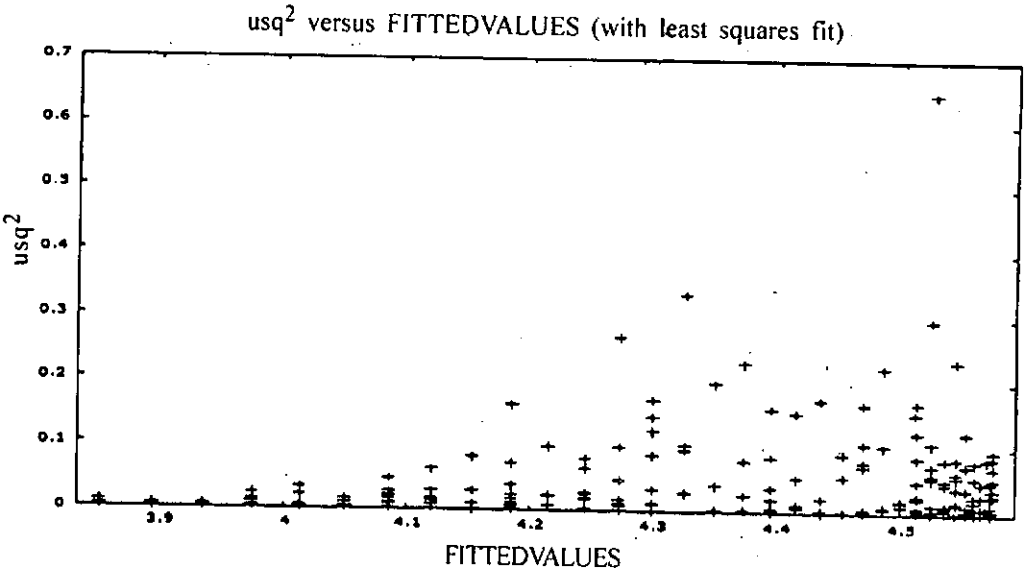
इस प्रतिमान में OLS पद्धति द्वारा कौन-कौनसे प्राचलों को आकलित किया जा सकता है ? समझाइये।

P.T.O.

(*ii*) मान लीजिए कि किसी समाश्रयण प्रतिमान में प्रसरण विविधता (Heteroscedasticity) उपस्थित है तथा इस प्रतिमान के सभी प्राचलों को OLS प्रणाली द्वारा आकलित किया गया है। इस प्रसरण विविधता से आकलकों के वैशिष्ट्यों व प्राक्कल्पना-परीक्षण पद्धतियों के लिए क्या परिणाम होंगे ? समझाइये।

(*iii*) यू. एस. के 7 विश्वविद्यालयों के 222 अध्यापकों/प्रोफेसरों के वेतन तथा उनके पी.एच.डी. प्राप्ति के बाद के अनुभव (वर्षों में) के आँकड़ों के आधार पर एक समाश्रयण किया गया था।

(*a*) निम्नलिखित रेखाचित्र में अवशेषों के वर्गफल तथा निर्भर चर के आकलित मान दर्शाए गए हैं। यह रेखाचित्र क्या दर्शाता है ? क्या इस रेखाचित्र के अनुसार प्रतिमान में प्रसरण विविधता की उपस्थिति साक्ष्य है ?



(*b*) इस प्रतिमान में White's परीक्षण के प्रतिदर्शज का मान 19.7 था। इस परीक्षण की निराकरणीय प्राक्कल्पना, वैकल्पिक प्राक्कल्पना तथा परीक्षण प्रतिदर्शज का मान को व्यक्त कीजिए। क्या हम 5 प्रतिशत सांख्यिकीय सार्थकता के स्तर पर निराकरणीय प्राक्कल्पना को अस्वीकार कर सकते हैं ?

7. (*i*) The following function is known as the transcendental production function (TPF), a generalization of the well known Cobb-Douglas production function :

$$Y = B_1 L^{B_2} K^{B_3} e^{(B_4 L + B_5 K)}$$

(*a*) Perform a suitable logarithmic transformation so that this function is estimable using ordinary least squares.

(*b*) For the logarithmic TPF to reduce to the Cobb-Douglas production function expressed in logarithmic form, what must be the restrictions on the values of B_4 and B_5 ? Outline the steps for testing the validity of the restrictions on B_4 and B_5 in choosing between the TPF and Cobb-Douglas models in logarithmic form. 2.4

(*ii*) What are the practical consequences of multicollinearity ? In this context, do you recommend that we should drop all the insignificant variables from the regression model ? 5

(*iii*) If a qualitative explanatory variable has *m* categories, and a researcher formulates a regression model with an intercept and *m* dummies, what problem is likely to be encountered ? Explain the problem and its consequences. 4

(*i*) निम्नलिखित फलन अंतिक्रमणीक (transcendental) उत्पादन फलन (TPF) के नाम से जाना जाता है जो प्रसिद्ध कॉब-डगलस (Cobb-Douglas) उत्पादन फलन का विस्तृत रूप है :

$$Y = B_1 L^{B_2} K^{B_3} e^{(B_4 L + B_5 K)}$$

(*a*) उपर्युक्त फलन का लघुगणकीय (logarithmic) रूपांतरण (transformation) कीजिए ताकि यह OLS पद्धति से आकलित किया जा सके।

(*b*) B_4 तथा B_5 के मान को किस प्रकार प्रतिबंधित किया जा सकता है ताकि लघुगणकीय TPF को कॉब-डगलस उत्पादन फलन के लघुगणकीय रूप में रूपांतरित किया जा सके ? TPF तथा कॉब-डगलस प्रतिमानों के लघुगणकीय रूपों के बीच चयन के संदर्भ में B_4 व B_5 पर प्रतिबंधों की वैधता के परीक्षण हेतु प्रयुक्त पद्धति का क्रमबद्ध रूप में विवरण कीजिए।

(*ii*) बहुरेखता के व्यावहारिक परिणाम क्या हैं ? बताइये। इस संदर्भ में क्या एक समाश्रयण प्रतिमान में शामिल सभी असार्थक चरों को समाश्रयण प्रतिमान से हटाने की अनुशंसा करेंगे ? कारण बताइये।

(*iii*) यदि एक गुणात्मक चर m संवर्गीय हो, तथा एक शोधार्थी अंत:खंड एवं m डमी चर सहित एक समाश्रयण प्रतिमान प्रस्तुत करता है तो यह शोधार्थी किस समस्या का सामना कर सकता है ? इस समस्या की व्याख्या तथा इसके परिणामों का उल्लेख कीजिए।

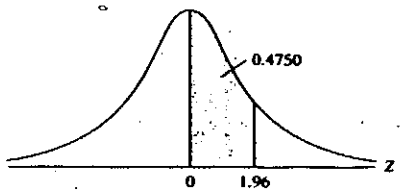
(1)

TABLE ...: AREAS UNDER THE STANDARDIZED NORMAL DISTRIBUTION

Example

$\Pr(0 \le Z \le 1.96) = 0.4750$

$\Pr(Z \ge 1.96) = 0.5 - 0.4750 = 0.025$



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4454	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Note: This table gives the area in the right-hand tail of the distribution (i.e., $Z \ge 0$). But since the normal distribution is symmetrical about $Z = 0$, the area in the left-hand tail is the same as the area in the corresponding right-hand tail. For example, $P[-1.96 \le Z \le 0) = 0.4750$. Therefore, $P[-1.96 \le Z \le 1.96) = 2(0.4750) = 0.95$.

416

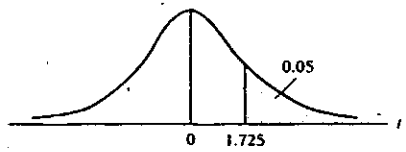
TABLE PERCENTAGE POINTS OF THE *t* DISTRIBUTION

Example

$\Pr(t > 2.086) = 0.025$

$\Pr(t > 1.725) = 0.05$ for df = 20

$\Pr(|t| > 1.725) = 0.10$



df \ Pr	0.25 0.50	0.10 0.20	0.05 0.10	0.025 0.05	0.01 0.02	0.005 0.010	0.001 0.002
1	1.000	3.078	6.314	12.706	31.821	63.657	318.31
2	0.816	1.886	2.920	4.303	6.965	9.925	22.327
3	0.765	1.638	2.353	3.182	4.541	5.841	10.214
4	0.741	1.533	2.132	2.776	3.747	4.604	7.173
5	0.727	1.476	2.015	2.571	3.365	4.032	5.893
6	0.718	1.440	1.943	2.447	3.143	3.707	5.208
7	0.711	1.415	1.895	2.365	2.998	3.499	4.785
8	0.706	1.397	1.860	2.306	2.896	3.355	4.501
9	0.703	1.383	1.833	2.262	2.821	3.250	4.297
10	0.700	1.372	1.812	2.228	2.764	3.169	4.144
11	0.697	1.363	1.796	2.201	2.718	3.106	4.025
12	0.695	1.356	1.782	2.179	2.681	3.055	3.930
13	0.694	1.350	1.771	2.160	2.650	3.012	3.852
14	0.692	1.345	1.761	2.145	2.624	2.977	3.787
15	0.691	1.341	1.753	2.131	2.602	2.947	3.733
16	0.690	1.337	1.746	2.120	2.583	2.921	3.686
17	0.689	1.333	1.740	2.110	2.567	2.898	3.646
18	0.688	1.330	1.734	2.101	2.552	2.878	3.610
19	0.688	1.328	1.729	2.093	2.539	2.861	3.579
20	0.687	1.325	1.725	2.086	2.528	2.845	3.552
21	0.686	1.323	1.721	2.080	2.518	2.831	3.527
22	0.686	1.321	1.717	2.074	2.508	2.819	3.505
23	0.685	1.319	1.714	2.069	2.500	2.807	3.485
24	0.685	1.318	1.711	2.064	2.492	2.797	3.467
25	0.684	1.316	1.708	2.060	2.485	2.787	3.450
26	0.684	1.315	1.706	2.056	2.479	2.779	3.435
27	0.684	1.314	1.703	2.052	2.473	2.771	3.421
28	0.683	1.313	1.701	2.048	2.467	2.763	3.408
29	0.683	1.311	1.699	2.045	2.462	2.756	3.396
30	0.683	1.310	1.697	2.042	2.457	2.750	3.385
40	0.681	1.303	1.684	2.021	2.423	2.704	3.307
60	0.679	1.296	1.671	2.000	2.390	2.660	3.232
120	0.677	1.289	1.658	1.980	2.358	2.617	3.160
∞	0.674	1.282	1.645	1.960	2.326	2.576	3.090

Note: The smaller probability shown at the head of each column is the area in one tail; the larger probability is the area in both tails.

(2)

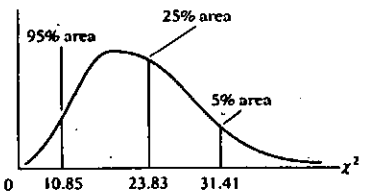
TABLE : UPPER PERCENTAGE POINTS OF THE χ^2 DISTRIBUTION

Example

$\Pr(\chi^2 > 10.85) = 0.95$

$\Pr(\chi^2 > 23.83) = 0.25$ for df = 20

$\Pr(\chi^2 > 31.41) = 0.05$



Degrees of freedom \ Pr	.995	.990	.975	.950	.900	.750	.500	.250	.100	.050	.025	.010	.005
1	392704×10^{-10}	157088×10^{-9}	982069×10^{-9}	393214×10^{-8}	.0157908	.1015308	.454937	1.32330	2.70554	3.84146	5.02389	6.63490	7.87944
2	.0100251	.0201007	.0506356	.102587	.210720	.575364	1.38629	2.77259	4.60517	5.99147	7.37776	9.21034	10.5966
3	.0717212	.114832	.215795	.351846	.584375	1.212534	2.36597	4.10835	6.25139	7.81473	9.34840	11.3449	12.8381
4	.206990	.297110	.484419	.710721	1.063623	1.92255	3.35670	5.38527	7.77944	9.48773	11.1433	13.2767	14.8602
5	.411740	.554300	.831211	1.145476	1.61031	2.67460	4.35146	6.62568	9.23635	11.0705	12.8325	15.0863	16.7496
6	.675727	.872085	1.237347	1.63539	2.20413	3.45460	5.34812	7.84080	10.6446	12.5916	14.4494	16.8119	18.5476
7	.989265	1.239043	1.68987	2.16735	2.83311	4.25485	6.34581	9.03715	12.0170	14.0671	16.0128	18.4753	20.2777
8	1.344419	1.646482	2.17973	2.73264	3.48954	5.07064	7.34412	10.2188	13.3616	15.5073	17.5346	20.0902	21.9550
9	1.734926	2.087912	2.70039	3.32511	4.16816	5.89883	8.34283	11.3887	14.6837	16.9190	19.0228	21.6660	23.5893
10	2.15585	2.55821	3.24697	3.94030	4.86518	6.73720	9.34182	12.5489	15.9871	18.3070	20.4831	23.2093	25.1882
11	2.60321	3.05347	3.81575	4.57481	5.57779	7.58412	10.3410	13.7007	17.2750	19.6751	21.9200	24.7250	26.7569
12	3.07382	3.57056	4.40379	5.22603	6.30380	8.43842	11.3403	14.8454	18.5494	21.0261	23.3367	26.2170	28.2995
13	3.56503	4.10691	5.00874	5.89186	7.04150	9.29906	12.3398	15.9839	19.8119	22.3621	24.7356	27.6883	29.8194
14	4.07468	4.66043	5.62872	6.57063	7.78953	10.1653	13.3393	17.1170	21.0642	23.6848	26.1190	29.1413	31.3193
15	4.60094	5.22935	6.26214	7.26094	8.54675	11.0365	14.3389	18.2451	22.3072	24.9958	27.4884	30.5779	32.8013
16	5.14224	5.81221	6.90766	7.96164	9.31223	11.9122	15.3385	19.3688	23.5418	26.2962	28.8454	31.9999	34.2672
17	5.69724	6.40776	7.56418	8.67176	10.0852	12.7919	16.3381	20.4887	24.7690	27.5871	30.1910	33.4087	35.7185
18	6.26481	7.01491	8.23075	9.39046	10.8649	13.6753	17.3379	21.6049	25.9894	28.8693	31.5264	34.8053	37.1564
19	6.84398	7.63273	8.90655	10.1170	11.6509	14.5620	18.3376	22.7178	27.2036	30.1435	32.8523	36.1908	38.5822
20	7.43386	8.26040	9.59083	10.8508	12.4426	15.4518	19.3374	23.8277	28.4120	31.4104	34.1696	37.5662	39.9968
21	8.03366	8.89720	10.28293	11.5913	13.2396	16.3444	20.3372	24.9348	29.6151	32.6705	35.4789	38.9321	41.4010
22	8.64272	9.54249	10.9823	12.3380	14.0415	17.2396	21.3370	26.0393	30.8133	33.9244	36.7807	40.2894	42.7956
23	9.26042	10.19567	11.6885	13.0905	14.8479	18.1373	22.3369	27.1413	32.0069	35.1725	38.0757	41.6384	44.1813
24	9.88623	10.8564	12.4011	13.8484	15.6587	19.0372	23.3367	28.2412	33.1963	36.4151	39.3641	42.9798	45.5585
25	10.5197	11.5240	13.1197	14.6114	16.4734	19.9393	24.3366	29.3389	34.3816	37.6525	40.6465	44.3141	46.9278
26	11.1603	12.1981	13.8439	15.3791	17.2919	20.8434	25.3364	30.4345	35.5631	38.8852	41.9232	45.6417	48.2899
27	11.8076	12.8786	14.5733	16.1513	18.1138	21.7494	26.3363	31.5284	36.7412	40.1133	43.1944	46.9630	49.6449
28	12.4613	13.5648	15.3079	16.9279	18.9392	22.6572	27.3363	32.6205	37.9159	41.3372	44.4607	48.2782	50.9933
29	13.1211	14.2565	16.0471	17.7083	19.7677	23.5666	28.3362	33.7109	39.0875	42.5569	45.7222	49.5879	52.3356
30	13.7867	14.9535	16.7908	18.4926	20.5992	24.4776	29.3360	34.7998	40.2560	43.7729	46.9792	50.8922	53.6720
40	20.7065	22.1643	24.4331	26.5093	29.0505	33.6603	39.3354	45.6160	51.8050	55.7585	59.3417	63.6907	66.7659
50	27.9907	29.7067	32.3574	34.7642	37.6886	42.9421	49.3349	56.3336	63.1671	67.5048	71.4202	76.1539	79.4900
60	35.5346	37.4848	40.4817	43.1879	46.4589	52.2938	59.3347	66.9814	74.3970	79.0819	83.2976	88.3794	91.9517
70	43.2752	45.4418	48.7576	51.7393	55.3290	61.6983	69.3344	77.5766	85.5271	90.5312	95.0231	100.425	104.215
80	51.1720	53.5400	57.1532	60.3915	64.2778	71.1445	79.3343	88.1303	96.5782	101.879	106.629	112.329	116.321
90	59.1963	61.7541	65.6466	69.1260	73.2912	80.6247	89.3342	98.6499	107.565	113.145	118.136	124.116	128.299
100*	67.3276	70.0648	74.2219	77.9295	82.3581	90.1332	99.3341	109.141	118.498	124.342	129.561	135.807	140.169

*For df greater than 100 the expression $\sqrt{2\chi^2} - \sqrt{(2k-1)} = Z$ follows the standardized normal distribution, where k represents the degrees of freedom.

(3)

TABLE UPPER PERCENTAGE POINTS OF THE F DISTRIBUTION

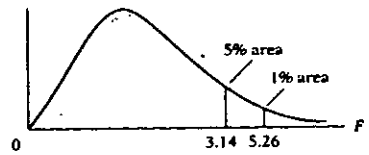
Example

$\Pr(F > 1.59) = 0.25$

$\Pr(F > 2.42) = 0.10$ for df $N_1 = 10$

$\Pr(F > 3.14) = 0.05$ and $N_2 = 9$

$\Pr(F > 5.26) = 0.01$



df for denominator N_2	Pr	df for numerator N_1: 1	2	3	4	5	6	7	8	9	10	11	12	15	20	24	30	40	50	60	100	120	200	500	∞	Pr	df for denominator N_2
1	.25	5.83	7.50	8.20	8.58	8.82	8.98	9.10	9.19	9.26	9.32	9.36	9.41	9.49	9.58	9.63	9.67	9.71	9.74	9.76	9.78	9.80	9.82	9.84	9.85	.25	1
	.10	39.9	49.5	53.6	55.8	57.2	58.2	58.9	59.4	59.9	60.2	60.5	60.7	61.2	61.7	62.0	62.3	62.5	62.7	62.8	63.0	63.1	63.2	63.3	63.3	.10	
	.05	161	200	216	225	230	234	237	239	241	242	243	244	246	248	249	250	251	252	252	253	253	254	254	254	.05	
2	.25	2.57	3.00	3.15	3.23	3.28	3.31	3.34	3.35	3.37	3.38	3.39	3.39	3.41	3.43	3.43	3.44	3.45	3.45	3.46	3.47	3.47	3.48	3.48	3.48	.25	2
	.10	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39	9.40	9.41	9.42	9.44	9.45	9.46	9.47	9.47	9.47	9.48	9.48	9.49	9.49	9.49	.10	
	.05	18.5	19.0	19.2	19.2	19.3	19.3	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	.05	
	.01	98.5	99.0	99.2	99.2	99.3	99.3	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.4	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	99.5	.01	
3	.25	2.02	2.28	2.36	2.39	2.41	2.42	2.43	2.44	2.44	2.44	2.45	2.45	2.46	2.46	2.46	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	.25	3
	.10	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24	5.23	5.22	5.22	5.20	5.18	5.18	5.17	5.16	5.15	5.15	5.14	5.14	5.14	5.14	5.13	.10	
	.05	10.1	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.76	8.74	8.70	8.66	8.64	8.62	8.59	8.58	8.57	8.55	8.55	8.54	8.53	8.53	.05	
	.01	34.1	30.8	29.5	28.7	28.2	27.9	27.7	27.5	27.3	27.2	27.1	27.1	26.9	26.7	26.6	26.5	26.4	26.4	26.3	26.2	26.2	26.2	26.1	26.1	.01	
4	.25	1.81	2.00	2.05	2.06	2.07	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	2.08	.25	4
	.10	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94	3.92	3.91	3.90	3.87	3.84	3.83	3.82	3.80	3.80	3.79	3.78	3.78	3.77	3.76	3.76	.10	
	.05	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.94	5.91	5.86	5.80	5.77	5.75	5.72	5.70	5.69	5.66	5.66	5.65	5.64	5.63	.05	
	.01	21.2	18.0	16.7	16.0	15.5	15.2	15.0	14.8	14.7	14.5	14.4	14.4	14.2	14.0	13.9	13.8	13.7	13.7	13.7	13.6	13.6	13.5	13.5	13.5	01	
5	.25	1.69	1.85	1.88	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.88	1.88	1.88	1.88	1.88	1.87	1.87	1.87	1.87	1.87	1.87	.25	5
	.10	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32	3.30	3.28	3.27	3.24	3.21	3.19	3.17	3.16	3.15	3.14	3.13	3.12	3.12	3.11	3.10	.10	
	.05	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.71	4.68	4.62	4.56	4.53	4.50	4.46	4.44	4.43	4.41	4.40	4.39	4.37	4.36	.05	
	.01	16.3	13.3	12.1	11.4	11.0	10.7	10.5	10.3	10.2	10.1	9.96	9.89	9.72	9.55	9.47	9.38	9.29	9.24	9.20	9.13	9.11	9.08	9.04	9.02	.01	
6	.25	1.62	1.76	1.78	1.79	1.79	1.78	1.78	1.78	1.77	1.77	1.77	1.77	1.76	1.76	1.75	1.75	1.75	1.75	1.74	1.74	1.74	1.74	1.74	1.74	.25	6
	.10	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96	2.94	2.92	2.90	2.87	2.84	2.82	2.80	2.78	2.77	2.76	2.75	2.74	2.73	2.73	2.72	.10	
	.05	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.03	4.00	3.94	3.87	3.84	3.81	3.77	3.75	3.74	3.71	3.70	3.69	3.68	3.67	.05	
	.01	13.7	10.9	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.79	7.72	7.56	7.40	7.31	7.23	7.14	7.09	7.06	6.99	6.97	6.93	6.90	6.88	.01	
7	.25	1.57	1.70	1.72	1.72	1.71	1.71	1.70	1.70	1.69	1.69	1.69	1.68	1.68	1.67	1.67	1.66	1.66	1.66	1.65	1.65	1.65	1.65	1.65	1.65	.25	7
	.10	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72	2.70	2.68	2.67	2.63	2.59	2.58	2.56	2.54	2.52	2.51	2.50	2.49	2.48	2.48	2.47	.10	
	.05	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.60	3.57	3.51	3.44	3.41	3.38	3.34	3.32	3.30	3.27	3.27	3.25	3.24	3.23	.05	
	.01	12.2	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.54	6.47	6.31	6.16	6.07	5.99	5.91	5.86	5.82	5.75	5.74	5.70	5.67	5.65	01	
8	.25	1.54	1.66	1.67	1.66	1.66	1.65	1.64	1.64	1.63	1.63	1.63	1.62	1.62	1.61	1.60	1.60	1.59	1.59	1.59	1.58	1.58	1.58	1.58	1.58	.25	8
	.10	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56	2.54	2.52	2.50	2.46	2.42	2.40	2.38	2.36	2.35	2.34	2.32	2.32	2.31	2.30	2.29	.10	
	.05	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.31	3.28	3.22	3.15	3.12	3.08	3.04	2.02	3.01	2.97	2.97	2.95	2.94	2.93	.05	
	.01	11.3	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.73	5.67	5.52	5.36	5.28	5.20	5.12	5.07	5.03	4.96	4.95	4.91	4.88	4.86	.01	
9	.25	1.51	1.62	1.63	1.63	1.62	1.61	1.60	1.60	1.59	1.59	1.58	1.58	1.57	1.56	1.56	1.55	1.55	1.54	1.54	1.53	1.53	1.53	1.53	1.53	.25	9
	.10	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44	2.42	2.40	2.38	2.34	2.30	2.28	2.25	2.23	2.22	2.21	2.19	2.18	2.17	2.17	2.16	.10	
	.05	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.10	3.07	3.01	2.94	2.90	2.86	2.83	2.80	2.79	2.76	2.75	2.73	2.72	2.71	.05	
	.01	10.6	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.18	5.11	4.96	4.81	4.73	4.65	4.57	4.52	4.48	4.42	4.40	4.36	4.33	4.31	.01	

(Continued)

TABLE UPPER PERCENTAGE POINTS OF THE F DISTRIBUTION (*Continued*)

(4)

df for denominator N_2	Pr	df for numerator N_1: 1	2	3	4	5	6	7	8	9	10	11	12	df for numerator N_1: 15	20	24	30	40	50	60	100	120	200	500	∞	Pr	df for denominator N_2
10	.25	1.49	1.60	1.60	1.59	1.59	1.58	1.57	1.56	1.56	1.55	1.55	1.54	1.53	1.52	1.52	1.51	1.51	1.50	1.50	1.49	1.49	1.49	1.48	1.48	.25	10
	.10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35	2.32	2.30	2.28	2.24	2.20	2.18	2.16	2.13	2.12	2.11	2.09	2.08	2.07	2.06	2.06	.10	
	.05	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.94	2.91	2.85	2.77	2.74	2.70	2.66	2.64	2.62	2.59	2.58	2.56	2.55	2.54	.05	
	.01	10.0	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.77	4.71	4.56	4.41	4.33	4.25	4.17	4.12	4.08	4.01	4.00	3.96	3.93	3.91	.01	
11	.25	1.47	1.58	1.58	1.57	1.56	1.55	1.54	1.53	1.53	1.52	1.52	1.51	1.50	1.49	1.49	1.48	1.47	1.47	1.47	1.46	1.46	1.46	1.45	1.45	.25	11
	.10	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27	2.25	2.23	2.21	2.17	2.12	2.10	2.08	2.05	2.04	2.03	2.00	2.00	1.99	1.98	1.97	.10	
	.05	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.82	2.79	2.72	2.65	2.61	2.57	2.53	2.51	2.49	2.46	2.45	2.43	2.42	2.40	.05	
	.01	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.46	4.40	4.25	4.10	4.02	3.94	3.86	3.81	3.78	3.71	3.69	3.66	3.62	3.60	.01	
12	.25	1.46	1.56	1.56	1.55	1.54	1.53	1.52	1.51	1.51	1.50	1.50	1.49	1.48	1.47	1.46	1.45	1.45	1.44	1.44	1.43	1.43	1.43	1.42	1.42	.25	12
	.10	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21	2.19	2.17	2.15	2.10	2.06	2.04	2.01	1.99	1.97	1.96	1.94	1.93	1.92	1.91	1.90	.10	
	.05	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.72	2.69	2.62	2.54	2.51	2.47	2.43	2.40	2.38	2.35	2.34	2.32	2.31	2.30	.05	
	.01	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.22	4.16	4.01	3.86	3.78	3.70	3.62	3.57	3.54	3.47	3.45	3.41	3.38	3.36	.01	
13	.25	1.45	1.55	1.55	1.53	1.52	1.51	1.50	1.49	1.49	1.48	1.47	1.47	1.46	1.45	1.44	1.43	1.42	1.42	1.42	1.41	1.41	1.40	1.40	1.40	.25	13
	.10	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16	2.14	2.12	2.10	2.05	2.01	1.98	1.96	1.93	1.92	1.90	1.88	1.88	1.86	1.85	1.85	.10	
	.05	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.63	2.60	2.53	2.46	2.42	2.38	2.34	2.31	2.30	2.26	2.25	2.23	2.22	2.21	.05	
	.01	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	4.02	3.96	3.82	3.66	3.59	3.51	3.43	3.38	3.34	3.27	3.25	3.22	3.19	3.17	.01	
14	.25	1.44	1.53	1.53	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.46	1.45	1.44	1.43	1.42	1.41	1.41	1.40	1.40	1.39	1.39	1.39	1.38	1.38	.25	14
	.10	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12	2.10	2.08	2.05	2.01	1.96	1.94	1.91	1.89	1.87	1.86	1.83	1.83	1.82	1.80	1.80	.10	
	.05	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.57	2.53	2.46	2.39	2.35	2.31	2.27	2.24	2.22	2.19	2.18	2.16	2.14	2.13	.05	
	.01	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.86	3.80	3.66	3.51	3.43	3.35	3.27	3.22	3.18	3.11	3.09	3.06	3.03	3.00	.01	
15	.25	1.43	1.52	1.52	1.51	1.49	1.48	1.47	1.46	1.46	1.45	1.44	1.44	1.43	1.41	1.41	1.40	1.39	1.39	1.38	1.38	1.37	1.37	1.36	1.36	.25	15
	.10	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09	2.06	2.04	2.02	1.97	1.92	1.90	1.87	1.85	1.83	1.82	1.79	1.79	1.77	1.76	1.76	10	
	.05	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.51	2.48	2.40	2.33	2.29	2.25	2.20	2.18	2.16	2.12	2.11	2.10	2.08	2.07	05	
	.01	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.73	3.67	3.52	3.37	3.29	3.21	3.13	3.08	3.05	2.98	2.96	2.92	2.89	2.87	.01	
16	.25	1.42	1.51	1.51	1.50	1.48	1.47	1.46	1.45	1.44	1.44	1.44	1.43	1.41	1.40	1.39	1.38	1.37	1.37	1.36	1.36	1.35	1.35	1.34	1.34	.25	16
	.10	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06	2.03	2.01	1.99	1.94	1.89	1.87	1.84	1.81	1.79	1.78	1.76	1.75	1.74	1.73	1.72	.10	
	.05	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.46	2.42	2.35	2.28	2.24	2.19	2.15	2.12	2.11	2.07	2.06	2.04	2.02	2.01	.05	
	.01	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.62	3.55	3.41	3.26	3.18	3.10	3.02	2.97	2.93	2.86	2.84	2.81	2.78	2.75	.01	
17	.25	1.42	1.51	1.50	1.49	1.47	1.46	1.45	1.44	1.43	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.35	1.34	1.34	1.34	1.33	1.33	.25	17
	.10	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03	2.00	1.98	1.96	1.91	1.86	1.84	1.81	1.78	1.76	1.75	1.73	1.72	1.71	1.69	1.69	.10	
	.05	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.41	2.38	2.31	2.23	2.19	2.15	2.10	2.08	2.06	2.02	2.01	1.99	1.97	1.96	.05	
	.01	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.52	3.46	3.31	3.16	3.08	3.00	2.92	2.87	2.83	2.76	2.75	2.71	2.68	2.65	.01	
18	.25	1.41	1.50	1.49	1.48	1.46	1.45	1.44	1.43	1.42	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.34	1.33	1.33	1.32	1.32	1.32	25	18
	.10	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	2.00	1.98	1.96	1.93	1.89	1.84	1.81	1.78	1.75	1.74	1.72	1.70	1.69	1.68	1.67	1.66	10	
	.05	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.37	2.34	2.27	2.19	2.15	2.11	2.06	2.04	2.02	1.98	1.97	1.95	1.93	1.92	.05	
	.01	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.43	3.37	3.23	3.08	3.00	2.92	2.84	2.78	2.75	2.68	2.66	2.62	2.59	2.57	.01	
19	.25	1.41	1.49	1.49	1.47	1.46	1.44	1.43	1.42	1.41	1.41	1.40	1.40	1.38	1.37	1.36	1.35	1.34	1.33	1.33	1.32	1.32	1.31	1.31	1.30	.25	19
	.10	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98	1.96	1.94	1.91	1.86	1.81	1.79	1.76	1.73	1.71	1.70	1.67	1.67	1.65	1.64	1.63	10	
	.05	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.34	2.31	2.23	2.16	2.11	2.07	2.03	2.00	1.98	1.94	1.93	1.91	1.89	1.88	05	
	.01	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.36	3.30	3.15	3.00	2.92	2.84	2.76	2.71	2.67	2.60	2.58	2.55	2.51	2.49	.01	
20	.25	1.40	1.49	1.48	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.39	1.37	1.36	1.35	1.34	1.33	1.33	1.32	1.31	1.31	1.30	1.30	1.29	.25	20
	.10	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96	1.94	1.92	1.89	1.84	1.79	1.77	1.74	1.71	1.69	1.68	1.65	1.64	1.63	1.62	1.61	10	
	.05	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.31	2.28	2.20	2.12	2.08	2.04	1.99	1.97	1.95	1.91	1.90	1.88	1.86	1.84	05	
	.01	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.29	3.23	3.09	2.94	2.86	2.78	2.69	2.64	2.61	2.54	2.52	2.48	2.44	2.42	.01	

(*Continued*)

TABLE UPPER PERCENTAGE POINTS OF THE F DISTRIBUTION (*Continued*)

df for denominator N_2		df for numerator N_1																								df for denominator N_2
	Pr	1	2	3	4	5	6	7	8	9	10	11	12	15	20	24	30	40	50	60	100	120	200	500	∞	Pr	
	.25	1.40	1.48	1.47	1.45	1.44	1.42	1.41	1.40	1.39	1.39	1.38	1.37	1.36	1.34	1.33	1.32	1.31	1.31	1.30	1.30	1.30	1.29	1.29	1.28	.25	
	.10	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93	1.90	1.88	1.86	1.81	1.76	1.73	1.70	1.67	1.65	1.64	1.61	1.60	1.59	1.58	1.57	.10	
22	.05	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.26	2.23	2.15	2.07	2.03	1.98	1.94	1.91	1.89	1.85	1.84	1.82	1.80	1.78	.05	22
	.01	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.18	3.12	2.98	2.83	2.75	2.67	2.58	2.53	2.50	2.42	2.40	2.36	2.33	2.31	.01	
	.25	1.39	1.47	1.46	1.44	1.43	1.41	1.40	1.39	1.38	1.38	1.37	1.36	1.35	1.33	1.32	1.31	1.30	1.29	1.29	1.28	1.28	1.27	1.27	1.26	.25	
	.10	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91	1.88	1.85	1.83	1.78	1.73	1.70	1.67	1.64	1.62	1.61	1.58	1.57	1.56	1.54	1.53	.10	
24	.05	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.21	2.18	2.11	2.03	1.98	1.94	1.89	1.86	1.84	1.80	1.79	1.77	1.75	1.73	.05	24
	.01	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.09	3.03	2.89	2.74	2.66	2.58	2.49	2.44	2.40	2.33	2.31	2.27	2.24	2.21	.01	
	.25	1.38	1.46	1.45	1.44	1.42	1.41	1.39	1.38	1.37	1.37	1.36	1.35	1.34	1.32	1.31	1.30	1.29	1.28	1.28	1.26	1.26	1.26	1.25	1.25	.25	
	.10	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92	1.88	1.86	1.84	1.81	1.76	1.71	1.68	1.65	1.61	1.59	1.58	1.55	1.54	1.53	1.51	1.50	.10	
26	.05	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.18	2.15	2.07	1.99	1.95	1.90	1.85	1.82	1.80	1.76	1.75	1.73	1.71	1.69	.05	26
	.01	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18	3.09	3.02	2.96	2.81	2.66	2.58	2.50	2.42	2.36	2.33	2.25	2.23	2.19	2.16	2.13	.01	
	.25	1.38	1.46	1.45	1.43	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.31	1.30	1.29	1.28	1.27	1.27	1.26	1.25	1.25	1.24	1.24	.25	
	.10	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.90	1.87	1.84	1.81	1.79	1.74	1.69	1.66	1.63	1.59	1.57	1.56	1.53	1.52	1.50	1.49	1.48	.10	
28	.05	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.15	2.12	2.04	1.96	1.91	1.87	1.82	1.79	1.77	1.73	1.71	1.69	1.67	1.65	.05	28
	.01	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12	3.03	2.96	2.90	2.75	2.60	2.52	2.44	2.35	2.30	2.26	2.19	2.17	2.13	2.09	2.06	.01	
	.25	1.38	1.45	1.44	1.42	1.41	1.39	1.38	1.37	1.38	1.35	1.35	1.34	1.32	1.30	1.29	1.28	1.27	1.26	1.26	1.25	1.24	1.24	1.23	1.23	.25	
	.10	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85	1.82	1.79	1.77	1.72	1.67	1.64	1.61	1.57	1.55	1.54	1.51	1.50	1.48	1.47	1.46	10	
30	.05	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.13	2.09	2.01	1.93	1.89	1.84	1.79	1.76	1.74	1.70	1.68	1.66	1.64	1.62	.05	30
	.01	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.91	2.84	2.70	2.55	2.47	2.39	2.30	2.25	2.21	2.13	2.11	2.07	2.03	2.01	.01	
	.25	1.36	1.44	1.42	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.28	1.26	1.25	1.24	1.23	1.22	1.21	1.21	1.20	1.19	1.19	.25	
	.10	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79	1.76	1.73	1.71	1.66	1.61	1.57	1.54	1.51	1.48	1.47	1.43	1.42	1.41	1.39	1.38	.10	
40	.05	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.04	2.00	1.92	1.84	1.79	1.74	1.69	1.66	1.64	1.59	1.58	1.55	1.53	1.51	.05	40
	.01	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.73	2.66	2.52	2.37	2.29	2.20	2.11	2.06	2.02	1.94	1.92	1.87	1.83	1.80	.01	
	.25	1.35	1.42	1.41	1.38	1.37	1.35	1.33	1.32	1.31	1.30	1.29	1.29	1.27	1.25	1.24	1.22	1.21	1.20	1.19	1.17	1.17	1.16	1.15	1.15	.25	
	.10	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74	1.71	1.68	1.66	1.60	1.54	1.51	1.48	1.44	1.41	1.40	1.36	1.35	1.33	1.31	1.29	10	
60	.05	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.95	1.92	1.84	1.75	1.70	1.65	1.59	1.56	1.53	1.48	1.47	1.44	1.41	1.39	.05	60
	.01	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.56	2.50	2.35	2.20	2.12	2.03	1.94	1.88	1.84	1.75	1.73	1.68	1.63	1.60	.01	
	.25	1.34	1.40	1.39	1.37	1.35	1.33	1.31	1.30	1.29	1.28	1.27	1.26	1.24	1.22	1.21	1.19	1.18	1.17	1.16	1.14	1.13	1.12	1.11	1.10	25	
	.10	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68	1.65	1.62	1.60	1.55	1.48	1.45	1.41	1.37	1.34	1.32	1.27	1.26	1.24	1.21	1.19	.10	
120	.05	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	1.91	1.87	1.83	1.75	1.66	1.61	1.55	1.50	1.46	1.43	1.37	1.35	1.32	1.28	1.25	.05	120
	.01	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.40	2.34	2.19	2.03	1.95	1.88	1.76	1.70	1.66	1.56	1.53	1.48	1.42	1.38	.01	
	.25	1.33	1.39	1.38	1.36	1.34	1.32	1.31	1.29	1.28	1.27	1.26	1.25	1.23	1.21	1.20	1.18	1.16	1.14	1.12	1.11	1.10	1.09	1.08	1.06	.25	
	.10	2.73	2.33	2.11	1.97	1.88	1.80	1.75	1.70	1.66	1.63	1.60	1.57	1.52	1.46	1.42	1.38	1.34	1.31	1.28	1.24	1.22	1.20	1.17	1.14	.10	
200	.05	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88	1.84	1.80	1.72	1.62	1.57	1.52	1.46	1.41	1.39	1.32	1.29	1.26	1.22	1.19	.05	200
	.01	6.76	4.71	3.88	3.41	3.11	2.89	2.73	2.60	2.50	2.41	2.34	2.27	2.13	1.97	1.89	1.79	1.69	1.63	1.58	1.48	1.44	1.39	1.33	1.28	01	
	.25	1.32	1.39	1.37	1.35	1.33	1.31	1.29	1.28	1.27	1.25	1.24	1.24	1.22	1.19	1.18	1.16	1.14	1.13	1.12	1.09	1.08	1.07	1.04	1.00	25	
	.10	2.71	2.30	2.08	1.94	1.85	1.77	1.72	1.67	1.63	1.60	1.57	1.55	1.49	1.42	1.38	1.34	1.30	1.26	1.24	1.18	1.17	1.13	1.08	1.00	10	
∞	.05	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.79	1.75	1.67	1.57	1.52	1.46	1.39	1.35	1.32	1.24	1.22	1.17	1.11	1.00	.05	∞
	.01	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.25	2.18	2.04	1.88	1.79	1.70	1.59	1.52	1.47	1.36	1.32	1.25	1.15	1.00	.01	

TABLE

DURBIN–WATSON d STATISTIC: SIGNIFICANCE POINTS OF d_L AND d_U AT 0.05 LEVEL OF SIGNIFICANCE

	$k = 1$		$k = 2$		$k = 3$		$k = 4$		$k = 5$		$k = 6$		$k = 7$		$k = 8$		$k = 9$		$k = 10$	
n	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U
6	0.610	1.400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7	0.700	1.356	0.467	1.896	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8	0.763	1.332	0.559	1.777	0.368	2.287	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	0.824	1.320	0.629	1.699	0.455	2.128	0.296	2.588	—	—	—	—	—	—	—	—	—	—	—	—
10	0.879	1.320	0.697	1.641	0.525	2.016	0.376	2.414	0.243	2.822	—	—	—	—	—	—	—	—	—	—
11	0.927	1.324	0.758	1.604	0.595	1.928	0.444	2.283	0.316	2.645	0.203	3.006	—	—	—	—	—	—	—	—
12	0.971	1.331	0.812	1.579	0.658	1.864	0.512	2.177	0.379	2.506	0.268	2.832	0.171	3.149	—	—	—	—	—	—
13	1.010	1.340	0.861	1.562	0.715	1.816	0.574	2.094	0.445	2.390	0.328	2.692	0.230	2.985	0.147	3.266	—	—	—	—
14	1.045	1.350	0.905	1.551	0.767	1.779	0.632	2.030	0.505	2.296	0.389	2.572	0.286	2.848	0.200	3.111	0.127	3.360	—	—
15	1.077	1.361	0.946	1.543	0.814	1.750	0.685	1.977	0.560	2.220	0.447	2.472	0.343	2.727	0.251	2.979	0.175	3.216	0.111	3.438
16	1.106	1.371	0.982	1.539	0.857	1.728	0.734	1.935	0.615	2.157	0.502	2.388	0.398	2.624	0.304	2.860	0.222	3.090	0.155	3.304
17	1.133	1.381	1.015	1.536	0.897	1.710	0.778	1.900	0.664	2.104	0.554	2.318	0.451	2.537	0.356	2.757	0.272	2.975	0.198	3.184
18	1.158	1.391	1.046	1.535	0.933	1.696	0.820	1.872	0.710	2.060	0.603	2.257	0.502	2.461	0.407	2.667	0.321	2.873	0.244	3.073
19	1.180	1.401	1.074	1.536	0.967	1.685	0.859	1.848	0.752	2.033	0.649	2.206	0.549	2.396	0.456	2.589	0.369	2.783	0.290	2.974
20	1.201	1.411	1.100	1.537	0.998	1.676	0.894	1.828	0.792	1.991	0.692	2.162	0.595	2.339	0.502	2.521	0.416	2.704	0.336	2.885
21	1.221	1.420	1.125	1.538	1.026	1.669	0.927	1.812	0.829	1.964	0.732	2.124	0.637	2.290	0.547	2.460	0.461	2.633	0.380	2.806
22	1.239	1.429	1.147	1.541	1.053	1.664	0.958	1.797	0.863	1.940	0.769	2.090	0.677	2.246	0.588	2.407	0.504	2.571	0.424	2.734
23	1.257	1.437	1.168	1.543	1.078	1.660	0.986	1.786	0.896	1.920	0.804	2.061	0.715	2.208	0.628	2.360	0.545	2.514	0.465	2.670
24	1.273	1.446	1.188	1.546	1.101	1.656	1.013	1.775	0.925	1.902	0.837	2.036	0.751	2.174	0.666	2.318	0.584	2.464	0.506	2.613
25	1.288	1.454	1.206	1.550	1.123	1.654	1.038	1.767	0.863	1.886	0.868	2.012	0.784	2.144	0.702	2.280	0.621	2.419	0.544	2.560
26	1.302	1.461	1.224	1.553	1.145	1.652	1.062	1.759	0.979	1.873	0.897	1.988	0.816	2.117	0.736	2.248	0.657	2.379	0.581	2.513
27	1.316	1.469	1.240	1.556	1.162	1.651	1.084	1.753	1.004	1.861	0.925	1.974	0.845	2.093	0.767	2.216	0.691	2.342	0.616	2.470
28	1.328	1.476	1.256	1.560	1.181	1.650	1.104	1.747	1.028	1.850	0.951	1.960	0.874	2.071	0.798	2.188	0.723	2.308	0.650	2.431
29	1.341	1.483	1.270	1.563	1.198	1.650	1.124	1.743	1.050	1.841	0.975	1.944	0.900	2.052	0.829	2.164	0.753	2.279	0.682	2.396
30	1.352	1.489	1.284	1.567	1.214	1.650	1.143	1.739	1.071	1.833	0.998	1.931	0.926	2.034	0.854	2.141	0.782	2.251	0.713	2.363
31	1.363	1.496	1.297	1.570	1.229	1.650	1.160	1.736	1.090	1.825	1.020	1.920	0.950	2.018	0.879	2.120	0.810	2.226	0.741	2.333
32	1.373	1.502	1.309	1.574	1.244	1.650	1.177	1.732	1.109	1.819	1.041	1.909	0.972	2.004	0.904	2.102	0.836	2.203	0.768	2.306
33	1.383	1.508	1.321	1.577	1.258	1.651	1.193	1.730	1.127	1.813	1.061	1.900	0.994	1.991	0.927	2.086	0.861	2.181	0.796	2.281
34	1.393	1.514	1.333	1.580	1.271	1.652	1.208	1.728	1.144	1.808	1.080	1.891	1.015	1.979	0.950	2.069	0.885	2.162	0.821	2.257
35	1.402	1.519	1.343	1.584	1.283	1.653	1.222	1.726	1.160	1.803	1.097	1.884	1.034	1.967	0.971	2.054	0.908	2.144	0.846	2.236
36	1.411	1.525	1.354	1.587	1.295	1.654	1.236	1.724	1.176	1.799	1.114	1.877	1.053	1.957	0.991	2.041	0.930	2.127	0.868	2.216
37	1.419	1.530	1.364	1.590	1.307	1.656	1.249	1.723	1.190	1.796	1.131	1.870	1.071	1.948	1.011	2.029	0.951	2.112	0.891	2.196
38	1.427	1.535	1.373	1.594	1.318	1.656	1.261	1.722	1.204	1.792	1.146	1.864	1.088	1.939	1.029	2.017	0.970	2.098	0.912	2.180
39	1.436	1.540	1.382	1.597	1.328	1.658	1.273	1.722	1.218	1.789	1.161	1.858	1.104	1.932	1.047	2.007	0.990	2.086	0.932	2.164
40	1.442	1.544	1.391	1.600	1.338	1.660	1.286	1.721	1.230	1.786	1.175	1.854	1.120	1.924	1.064	1.997	1.008	2.072	0.952	2.148
45	1.475	1.566	1.430	1.615	1.383	1.666	1.336	1.720	1.287	1.778	1.238	1.838	1.189	1.899	1.139	1.960	1.089	2.022	1.038	2.088
50	1.503	1.585	1.462	1.628	1.421	1.674	1.378	1.721	1.335	1.771	1.291	1.823	1.246	1.875	1.201	1.930	1.156	1.989	1.110	2.044
55	1.528	1.601	1.490	1.641	1.452	1.681	1.414	1.724	1.374	1.768	1.334	1.814	1.294	1.861	1.253	1.909	1.212	1.958	1.170	2.010
60	1.549	1.616	1.514	1.652	1.480	1.689	1.444	1.727	1.408	1.767	1.372	1.808	1.336	1.850	1.298	1.894	1.260	1.938	1.222	1.984
65	1.567	1.629	1.536	1.662	1.503	1.696	1.471	1.731	1.438	1.767	1.404	1.805	1.370	1.843	1.336	1.882	1.301	1.923	1.266	1.964
70	1.583	1.641	1.554	1.672	1.525	1.703	1.494	1.735	1.464	1.768	1.433	1.802	1.401	1.837	1.368	1.873	1.337	1.910	1.305	1.948
75	1.598	1.652	1.571	1.680	1.543	1.709	1.515	1.739	1.487	1.770	1.458	1.801	1.428	1.834	1.399	1.867	1.369	1.901	1.339	1.936
80	1.611	1.662	1.586	1.688	1.560	1.715	1.534	1.743	1.507	1.772	1.480	1.801	1.453	1.831	1.425	1.861	1.397	1.893	1.368	1.925
85	1.624	1.671	1.600	1.696	1.575	1.721	1.550	1.747	1.525	1.774	1.500	1.801	1.474	1.829	1.448	1.857	1.422	1.886	1.396	1.916
90	1.635	1.679	1.612	1.703	1.589	1.726	1.566	1.751	1.542	1.776	1.518	1.801	1.494	1.827	1.469	1.854	1.446	1.881	1.420	1.909
95	1.645	1.687	1.623	1.709	1.602	1.732	1.579	1.755	1.557	1.776	1.535	1.802	1.513	1.827	1.490	1.852	1.466	1.877	1.442	1.903
100	1.654	1.694	1.634	1.715	1.613	1.736	1.592	1.758	1.571	1.780	1.550	1.803	1.528	1.826	1.504	1.850	1.484	1.874	1.462	1.898
150	1.720	1.746	1.706	1.760	1.693	1.774	1.679	1.788	1.665	1.802	1.651	1.817	1.637	1.832	1.622	1.847	1.608	1.862	1.594	1.877
200	1.758	1.778	1.748	1.789	1.738	1.799	1.728	1.810	1.718	1.820	1.707	1.831	1.697	1.841	1.686	1.852	1.675	1.863	1.665	1.874

	$k = 11$		$k = 12$		$k = 13$		$k = 14$		$k = 15$		$k = 16$		$k = 17$		$k = 18$		$k = 19$		$k = 20$	
n	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U
16	0.098	3.503	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17	0.138	3.378	0.087	3.557	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18	0.177	3.265	0.123	3.441	0.078	3.603	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19	0.220	3.159	0.160	3.335	0.111	3.496	0.070	3.642	—	—	—	—	—	—	—	—	—	—	—	—
20	0.263	3.063	0.200	3.234	0.145	3.395	0.100	3.542	0.063	3.676	—	—	—	—	—	—	—	—	—	—
21	0.307	2.976	0.240	3.141	0.182	3.300	0.132	3.448	0.091	3.583	0.058	3.708	—	—	—	—	—	—	—	—
22	0.349	2.897	0.281	3.057	0.220	3.211	0.169	3.358	0.120	3.496	0.083	3.619	0.052	3.731	—	—	—	—	—	—
23	0.391	2.826	0.322	2.978	0.258	3.128	0.202	3.272	0.153	3.409	0.110	3.535	0.076	3.650	0.048	3.753	—	—	—	—
24	0.431	2.761	0.362	2.906	0.297	3.053	0.236	3.193	0.186	3.327	0.141	3.454	0.101	3.572	0.070	3.678	0.044	3.773	—	—
25	0.470	2.702	0.400	2.844	0.336	2.983	0.275	3.119	0.221	3.251	0.178	3.378	0.130	3.494	0.094	3.604	0.065	3.708	0.041	3.790
26	0.508	2.649	0.438	2.784	0.373	2.919	0.313	3.051	0.256	3.179	0.206	3.303	0.160	3.420	0.120	3.531	0.087	3.632	0.060	3.724
27	0.544	2.600	0.475	2.730	0.409	2.859	0.348	2.987	0.291	3.112	0.238	3.233	0.191	3.348	0.148	3.460	0.113	3.563	0.081	3.656
28	0.578	2.555	0.510	2.680	0.445	2.806	0.383	2.986	0.325	3.060	0.271	3.188	0.222	3.353	0.178	3.398	0.139	3.496	0.104	3.582
29	0.612	2.515	0.544	2.634	0.479	2.755	0.418	2.874	0.359	2.988	0.306	3.107	0.254	3.219	0.208	3.327	0.166	3.431	0.129	3.528
30	0.643	2.477	0.577	2.592	0.512	2.709	0.451	2.823	0.390	2.937	0.337	3.050	0.286	3.160	0.238	3.266	0.196	3.368	0.158	3.465
31	0.674	2.443	0.608	2.553	0.545	2.668	0.484	2.778	0.425	2.887	0.370	2.998	0.317	3.102	0.269	3.208	0.224	3.309	0.183	3.406
32	0.703	2.411	0.638	2.517	0.576	2.629	0.515	2.758	0.457	2.840	0.401	2.946	0.349	3.050	0.299	3.153	0.253	3.252	0.211	3.346
33	0.731	2.382	0.668	2.484	0.606	2.588	0.546	2.692	0.486	2.796	0.432	2.899	0.379	3.000	0.329	3.100	0.283	3.196	0.239	3.293
34	0.758	2.356	0.696	2.454	0.634	2.554	0.576	2.654	0.516	2.754	0.462	2.854	0.409	2.954	0.360	3.051	0.312	3.147	0.267	3.240
35	0.783	2.330	0.722	2.425	0.662	2.521	0.604	2.619	0.547	2.718	0.492	2.813	0.438	2.910	0.388	3.006	0.340	3.098	0.296	3.189
36	0.808	2.308	0.748	2.398	0.689	2.492	0.631	2.588	0.575	2.680	0.520	2.774	0.467	2.868	0.417	2.961	0.369	3.053	0.323	3.142
37	0.831	2.286	0.772	2.374	0.714	2.464	0.657	2.556	0.602	2.648	0.548	2.738	0.496	2.829	0.446	2.920	0.397	3.009	0.351	3.097
38	0.854	2.265	0.796	2.351	0.738	2.438	0.683	2.525	0.628	2.614	0.576	2.703	0.522	2.792	0.472	2.880	0.424	2.966	0.379	3.054
39	0.875	2.246	0.819	2.329	0.763	2.413	0.707	2.499	0.653	2.586	0.600	2.671	0.549	2.757	0.499	2.843	0.451	2.929	0.404	3.013
40	0.896	2.229	0.840	2.309	0.786	2.391	0.731	2.473	0.679	2.557	0.626	2.641	0.575	2.724	0.525	2.808	0.477	2.892	0.430	2.974
45	0.988	2.156	0.938	2.225	0.887	2.296	0.836	2.367	0.788	2.439	0.740	2.512	0.692	2.586	0.644	2.658	0.596	2.733	0.563	2.807
50	1.084	2.103	1.019	2.163	0.973	2.228	0.927	2.287	0.882	2.350	0.836	2.414	0.788	2.478	0.747	2.544	0.703	2.610	0.660	2.675
55	1.129	2.062	1.087	2.116	1.048	2.170	1.003	2.226	0.961	2.281	0.919	2.339	0.877	2.396	0.836	2.454	0.795	2.512	0.754	2.571
60	1.184	2.031	1.145	2.079	1.108	2.127	1.068	2.177	1.029	2.227	0.990	2.278	0.951	2.330	0.913	2.382	0.874	2.434	0.836	2.487
65	1.231	2.008	1.195	2.049	1.160	2.093	1.124	2.139	1.088	2.183	1.052	2.229	1.016	2.276	0.980	2.323	0.944	2.371	0.908	2.419
70	1.272	1.988	1.239	2.026	1.206	2.066	1.172	2.106	1.139	2.146	1.105	2.188	1.072	2.230	1.038	2.275	1.006	2.318	0.971	2.362
75	1.308	1.970	1.277	2.006	1.247	2.043	1.215	2.080	1.184	2.118	1.153	2.156	1.121	2.196	1.090	2.236	1.058	2.275	1.027	2.315
80	1.340	1.957	1.311	1.991	1.283	2.024	1.253	2.058	1.224	2.093	1.196	2.129	1.168	2.165	1.134	2.201	1.108	2.236	1.078	2.275
85	1.369	1.948	1.342	1.977	1.316	2.008	1.287	2.040	1.260	2.073	1.232	2.106	1.205	2.139	1.177	2.173	1.149	2.208	1.121	2.241
90	1.395	1.937	1.369	1.966	1.344	1.995	1.318	2.026	1.292	2.056	1.266	2.086	1.240	2.116	1.213	2.148	1.187	2.179	1.160	2.211
95	1.418	1.929	1.394	1.958	1.370	1.984	1.345	2.012	1.321	2.040	1.296	2.068	1.271	2.097	1.245	2.125	1.222	2.156	1.197	2.186
100	1.439	1.923	1.416	1.948	1.393	1.974	1.371	2.000	1.347	2.026	1.324	2.053	1.301	2.080	1.277	2.108	1.253	2.136	1.230	2.164
150	1.579	1.892	1.564	1.908	1.550	1.924	1.536	1.940	1.518	1.956	1.504	1.972	1.490	1.988	1.474	2.006	1.460	2.023	1.443	2.040
200	1.654	1.885	1.642	1.896	1.632	1.908	1.621	1.918	1.610	1.931	1.598	1.942	1.586	1.954	1.575	1.967	1.566	1.979	1.554	1.991

Note: n = number of observations, k = number of explanatory variables excluding the constant term.

TABLE
DURBIN–WATSON d STATISTIC: SIGNIFICANCE POINTS OF d_L AND d_U AT 0.01 LEVEL OF SIGNIFICANCE

	$k = 1$		$k = 2$		$k = 3$		$k = 4$		$k = 5$		$k = 6$		$k = 7$		$k = 8$		$k = 9$		$k = 10$	
n	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U
6	0.390	1.142	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7	0.435	1.036	0.294	1.676	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8	0.497	1.003	0.345	1.489	0.229	2.102	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9	0.554	0.998	0.408	1.389	0.279	1.875	0.183	2.433	—	—	—	—	—	—	—	—	—	—	—	—
10	0.604	1.001	0.466	1.333	0.340	1.733	0.230	2.193	0.150	2.690	—	—	—	—	—	—	—	—	—	—
11	0.653	1.010	0.518	1.297	0.396	1.640	0.286	2.030	0.198	2.453	0.124	2.892	—	—	—	—	—	—	—	—
12	0.697	1.023	0.569	1.274	0.449	1.575	0.339	1.913	0.244	2.280	0.164	2.665	0.106	3.053	—	—	—	—	—	—
13	0.738	1.038	0.616	1.261	0.499	1.526	0.391	1.826	0.294	2.150	0.211	2.490	0.140	2.838	0.090	3.182	—	—	—	—
14	0.776	1.054	0.660	1.254	0.547	1.490	0.441	1.757	0.343	2.049	0.257	2.364	0.183	2.687	0.122	3.001	0.078	3.307	—	—
15	0.811	1.070	0.700	1.252	0.591	1.464	0.488	1.704	0.391	1.967	0.303	2.244	0.229	2.530	0.161	2.817	0.107	3.101	0.068	3.374
16	0.844	1.086	0.737	1.252	0.633	1.446	0.532	1.663	0.437	1.900	0.348	2.153	0.269	2.416	0.200	2.681	0.142	2.944	0.094	3.201
17	0.874	1.102	0.772	1.255	0.672	1.432	0.574	1.630	0.480	1.847	0.396	2.078	0.315	2.319	0.241	2.566	0.179	2.811	0.127	3.053
18	0.902	1.118	0.805	1.259	0.708	1.422	0.613	1.604	0.522	1.800	0.436	2.015	0.348	2.238	0.282	2.467	0.218	2.697	0.160	2.925
19	0.928	1.132	0.835	1.265	0.742	1.415	0.650	1.584	0.561	1.767	0.476	1.963	0.396	2.186	0.322	2.381	0.258	2.597	0.196	2.813
20	0.952	1.147	0.863	1.271	0.773	1.411	0.685	1.567	0.598	1.737	0.515	1.918	0.436	2.110	0.362	2.308	0.294	2.510	0.232	2.714
21	0.975	1.161	0.890	1.277	0.803	1.408	0.718	1.554	0.633	1.712	0.552	1.881	0.474	2.060	0.400	2.244	0.331	2.434	0.268	2.625
22	0.997	1.174	0.914	1.284	0.831	1.407	0.748	1.543	0.667	1.691	0.587	1.848	0.510	2.016	0.437	2.188	0.368	2.367	0.304	2.548
23	1.018	1.187	0.936	1.291	0.858	1.407	0.777	1.534	0.699	1.673	0.620	1.821	0.545	1.977	0.473	2.140	0.404	2.309	0.340	2.478
24	1.037	1.199	0.960	1.298	0.882	1.407	0.806	1.528	0.728	1.668	0.652	1.797	0.578	1.944	0.507	2.097	0.438	2.256	0.375	2.417
25	1.055	1.211	0.981	1.305	0.906	1.409	0.831	1.523	0.756	1.646	0.682	1.776	0.610	1.918	0.540	2.068	0.473	2.209	0.409	2.362
26	1.072	1.222	1.001	1.312	0.928	1.411	0.856	1.518	0.783	1.636	0.711	1.759	0.640	1.880	0.573	2.026	0.506	2.168	0.441	2.313
27	1.089	1.233	1.019	1.319	0.949	1.413	0.878	1.518	0.808	1.628	0.738	1.743	0.668	1.867	0.601	1.997	0.536	2.131	0.473	2.268
28	1.104	1.244	1.037	1.325	0.969	1.415	0.900	1.513	0.832	1.618	0.764	1.739	0.696	1.847	0.630	1.970	0.566	2.098	0.504	2.229
29	1.119	1.254	1.054	1.332	0.988	1.418	0.921	1.512	0.866	1.611	0.786	1.716	0.723	1.830	0.658	1.947	0.596	2.068	0.536	2.193
30	1.133	1.263	1.070	1.339	1.006	1.421	0.941	1.511	0.877	1.606	0.812	1.707	0.748	1.814	0.684	1.928	0.622	2.041	0.562	2.160
31	1.147	1.273	1.085	1.346	1.023	1.425	0.960	1.510	0.897	1.601	0.834	1.698	0.772	1.800	0.710	1.906	0.649	2.017	0.589	2.131
32	1.160	1.282	1.100	1.352	1.040	1.428	0.978	1.510	0.917	1.597	0.856	1.690	0.794	1.786	0.734	1.886	0.674	1.986	0.615	2.104
33	1.172	1.291	1.114	1.358	1.056	1.432	0.996	1.510	0.936	1.594	0.876	1.683	0.816	1.778	0.757	1.874	0.698	1.975	0.641	2.080
34	1.184	1.299	1.128	1.364	1.070	1.436	1.012	1.511	0.954	1.591	0.896	1.677	0.837	1.769	0.779	1.865	0.722	1.967	0.665	2.067
35	1.195	1.307	1.140	1.370	1.085	1.439	1.029	1.511	0.971	1.589	0.914	1.671	0.857	1.757	0.800	1.847	0.744	1.940	0.689	2.037
36	1.206	1.315	1.153	1.376	1.098	1.442	1.043	1.513	0.988	1.589	0.932	1.666	0.877	1.748	0.821	1.836	0.766	1.925	0.711	2.018
37	1.217	1.323	1.163	1.382	1.112	1.446	1.058	1.514	1.004	1.590	0.950	1.663	0.896	1.742	0.841	1.825	0.787	1.911	0.733	2.001
38	1.227	1.330	1.176	1.388	1.124	1.449	1.072	1.516	1.019	1.590	0.968	1.659	0.913	1.736	0.860	1.815	0.807	1.899	0.754	1.985
39	1.237	1.337	1.187	1.393	1.137	1.453	1.085	1.517	1.034	1.584	0.982	1.656	0.930	1.729	0.878	1.807	0.826	1.887	0.774	1.970
40	1.246	1.344	1.196	1.398	1.148	1.457	1.096	1.518	1.048	1.584	0.997	1.652	0.948	1.724	0.896	1.799	0.844	1.876	0.748	1.958
45	1.288	1.376	1.245	1.423	1.201	1.474	1.156	1.529	1.111	1.584	1.066	1.643	1.019	1.704	0.974	1.768	0.927	1.834	0.881	1.902
50	1.324	1.403	1.285	1.446	1.245	1.491	1.205	1.536	1.164	1.587	1.123	1.639	1.081	1.692	1.039	1.748	0.997	1.805	0.956	1.864
55	1.356	1.427	1.320	1.466	1.284	1.506	1.247	1.548	1.209	1.592	1.172	1.638	1.134	1.686	1.096	1.734	1.057	1.785	1.018	1.837
60	1.383	1.449	1.350	1.484	1.317	1.520	1.283	1.558	1.249	1.598	1.214	1.639	1.179	1.682	1.144	1.726	1.108	1.771	1.072	1.817
65	1.407	1.468	1.377	1.500	1.346	1.534	1.315	1.568	1.283	1.604	1.251	1.642	1.218	1.680	1.186	1.720	1.153	1.761	1.120	1.802
70	1.429	1.485	1.400	1.515	1.372	1.546	1.343	1.578	1.313	1.611	1.283	1.646	1.253	1.680	1.223	1.716	1.192	1.754	1.162	1.792
75	1.448	1.501	1.422	1.529	1.395	1.557	1.368	1.587	1.340	1.617	1.313	1.649	1.284	1.682	1.256	1.714	1.227	1.748	1.198	1.783
80	1.466	1.515	1.441	1.541	1.416	1.568	1.390	1.596	1.364	1.624	1.338	1.653	1.312	1.683	1.285	1.714	1.259	1.748	1.232	1.777
85	1.482	1.528	1.458	1.552	1.435	1.578	1.411	1.603	1.386	1.630	1.362	1.657	1.337	1.686	1.312	1.714	1.287	1.743	1.262	1.773
90	1.496	1.540	1.474	1.563	1.452	1.587	1.429	1.611	1.406	1.636	1.383	1.661	1.360	1.687	1.336	1.714	1.312	1.741	1.288	1.768
95	1.510	1.552	1.489	1.573	1.468	1.596	1.446	1.618	1.425	1.642	1.403	1.666	1.381	1.690	1.358	1.715	1.336	1.741	1.313	1.767
100	1.522	1.562	1.503	1.583	1.482	1.604	1.462	1.625	1.443	1.647	1.421	1.670	1.400	1.693	1.378	1.717	1.357	1.741	1.336	1.765
150	1.611	1.637	1.598	1.651	1.584	1.665	1.571	1.679	1.557	1.693	1.543	1.708	1.530	1.722	1.515	1.737	1.501	1.752	1.486	1.767
200	1.664	1.684	1.653	1.693	1.643	1.704	1.633	1.716	1.623	1.729	1.613	1.738	1.603	1.748	1.592	1.757	1.582	1.768	1.571	1.778

	$k = 11$		$k = 12$		$k = 13$		$k = 14$		$k = 15$		$k = 16$		$k = 17$		$k = 18$		$k = 19$		$k = 20$	
n	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U	d_L	d_U
16	0.060	3.446	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17	0.084	3.286	0.053	3.506	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
18	0.113	3.146	0.078	3.358	0.047	3.557	—	—	—	—	—	—	—	—	—	—	—	—	—	—
19	0.145	3.023	0.107	3.227	0.087	3.420	0.043	3.601	—	—	—	—	—	—	—	—	—	—	—	—
20	0.178	2.914	0.131	3.106	0.002	3.297	0.081	3.474	0.038	3.639	—	—	—	—	—	—	—	—	—	—
21	0.212	2.817	0.162	3.004	0.119	3.186	0.084	3.364	0.066	3.531	0.036	3.671	—	—	—	—	—	—	—	—
22	0.244	2.729	0.194	2.906	0.148	3.084	0.108	3.252	0.077	3.412	0.050	3.562	0.032	3.700	—	—	—	—	—	—
23	0.281	2.651	0.227	2.832	0.178	2.991	0.136	3.156	0.100	3.311	0.070	3.459	0.048	3.587	0.029	3.726	—	—	—	—
24	0.315	2.580	0.260	2.744	0.209	2.908	0.165	3.066	0.125	3.216	0.096	3.363	0.066	3.501	0.043	3.629	0.027	3.747	—	—
25	0.346	2.517	0.292	2.674	0.240	2.829	0.194	2.982	0.152	3.131	0.116	3.274	0.086	3.410	0.060	3.538	0.039	3.657	0.025	3.766
26	0.381	2.460	0.324	2.610	0.272	2.758	0.224	2.908	0.180	3.060	0.141	3.101	0.107	3.325	0.078	3.452	0.056	3.573	0.038	3.682
27	0.413	2.406	0.356	2.552	0.303	2.694	0.253	2.836	0.208	2.978	0.167	3.113	0.131	3.245	0.100	3.371	0.073	3.490	0.051	3.602
28	0.444	2.363	0.387	2.499	0.333	2.636	0.283	2.772	0.237	2.907	0.194	3.040	0.156	3.169	0.123	3.294	0.093	3.412	0.068	3.524
29	0.474	2.321	0.417	2.451	0.363	2.582	0.313	2.713	0.266	2.843	0.222	2.972	0.182	3.098	0.148	3.220	0.116	3.336	0.087	3.450
30	0.503	2.283	0.447	2.407	0.393	2.535	0.342	2.663	0.294	2.788	0.249	2.909	0.208	3.032	0.171	3.152	0.137	3.267	0.107	3.379
31	0.531	2.248	0.476	2.367	0.422	2.487	0.371	2.608	0.322	2.730	0.277	2.851	0.234	2.970	0.196	3.087	0.160	3.201	0.130	3.311
32	0.556	2.216	0.503	2.330	0.450	2.448	0.398	2.563	0.350	2.680	0.304	2.797	0.261	2.918	0.221	3.036	0.184	3.137	0.151	3.248
33	0.585	2.187	0.530	2.296	0.477	2.408	0.426	2.520	0.377	2.633	0.331	2.746	0.287	2.864	0.246	2.980	0.208	3.076	0.174	3.184
34	0.610	2.160	0.556	2.266	0.503	2.373	0.452	2.481	0.404	2.580	0.357	2.690	0.313	2.808	0.272	2.915	0.233	3.022	0.197	3.128
35	0.634	2.136	0.581	2.237	0.529	2.340	0.478	2.444	0.430	2.560	0.385	2.656	0.339	2.761	0.297	2.865	0.257	2.969	0.221	3.071
36	0.658	2.113	0.605	2.210	0.554	2.310	0.504	2.410	0.456	2.512	0.409	2.614	0.364	2.717	0.322	2.816	0.282	2.918	0.244	3.018
37	0.680	2.092	0.628	2.186	0.578	2.282	0.528	2.378	0.480	2.477	0.434	2.576	0.389	2.675	0.347	2.774	0.308	2.870	0.268	2.969
38	0.702	2.073	0.651	2.164	0.601	2.258	0.552	2.350	0.504	2.446	0.458	2.540	0.414	2.637	0.371	2.733	0.330	2.828	0.291	2.923
39	0.723	2.055	0.675	2.143	0.625	2.232	0.575	2.323	0.528	2.414	0.482	2.507	0.438	2.600	0.396	2.694	0.354	2.787	0.316	2.879
40	0.744	2.039	0.694	2.123	0.645	2.210	0.597	2.297	0.551	2.386	0.505	2.476	0.461	2.566	0.419	2.657	0.377	2.748	0.338	2.838
45	0.835	1.972	0.790	2.044	0.744	2.118	0.700	2.193	0.656	2.269	0.612	2.348	0.570	2.424	0.528	2.503	0.488	2.582	0.448	2.661
50	0.913	1.925	0.871	1.987	0.829	2.051	0.787	2.116	0.746	2.182	0.706	2.250	0.666	2.318	0.626	2.387	0.589	2.456	0.548	2.526
55	0.979	1.891	0.940	1.945	0.902	2.002	0.863	2.059	0.825	2.117	0.786	2.176	0.748	2.237	0.711	2.298	0.674	2.360	0.637	2.421
60	1.037	1.865	1.001	1.914	0.965	1.964	0.929	2.015	0.893	2.067	0.857	2.120	0.822	2.173	0.786	2.227	0.751	2.283	0.716	2.338
65	1.087	1.845	1.053	1.889	1.020	1.934	0.986	1.980	0.952	2.027	0.919	2.075	0.886	2.123	0.852	2.172	0.818	2.221	0.786	2.272
70	1.131	1.831	1.099	1.870	1.068	1.911	1.037	1.953	1.006	1.996	0.974	2.038	0.943	2.082	0.911	2.127	0.880	2.172	0.849	2.217
75	1.170	1.819	1.141	1.856	1.111	1.893	1.082	1.931	1.052	1.970	1.023	2.009	0.993	2.049	0.964	2.090	0.934	2.131	0.905	2.172
80	1.206	1.810	1.177	1.844	1.150	1.878	1.122	1.913	1.094	1.948	1.066	1.984	1.039	2.022	1.011	2.060	0.983	2.097	0.955	2.136
85	1.236	1.803	1.210	1.834	1.184	1.866	1.158	1.898	1.132	1.931	1.105	1.965	1.080	1.998	1.053	2.033	1.027	2.068	1.000	2.104
90	1.264	1.798	1.240	1.827	1.215	1.856	1.191	1.886	1.166	1.917	1.141	1.948	1.116	1.979	1.091	2.012	1.066	2.044	1.041	2.077
95	1.290	1.793	1.267	1.821	1.244	1.848	1.221	1.876	1.197	1.905	1.174	1.934	1.150	1.963	1.126	1.993	1.102	2.023	1.079	2.054
100	1.314	1.790	1.292	1.816	1.270	1.841	1.248	1.868	1.225	1.896	1.202	1.922	1.181	1.949	1.158	1.977	1.136	2.006	1.113	2.034
150	1.473	1.783	1.458	1.799	1.444	1.814	1.429	1.830	1.414	1.847	1.400	1.863	1.386	1.880	1.370	1.897	1.356	1.913	1.340	1.931
200	1.561	1.781	1.550	1.801	1.539	1.813	1.528	1.824	1.518	1.836	1.507	1.847	1.496	1.860	1.484	1.871	1.474	1.883	1.462	1.896

Note: n = number of observations
k = number of explanatory variables excluding the constant term