RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, MAY 2014

SECOND YEAR

ECONOMICS (Honours)

Date : 23/05/2014

Time : 11 am – 3 pm

Paper : IV

Full Marks : 100

[Use a Separate Answer Book for each group]

Group – A

1. Answer **any three** questions : [3×4]

   a) A monopolist faces a demand curve $y_i = Ap^{-r_i}$ in i-th market (i = 1,2). He faces a constant marginal cost C. Does this monpolist have an incentive to price discriminate? Explain with reasons. [4]

   b) Explain the marginal cost price regulation for a natural monopoly, with proper diagrams and intuition. [4]

   c) 'Movie tickets are more expensive in the evenings'. Explain with reference to the proper type of price discrimination. [4]

   d) Define isoprofit curve and reaction curve in the Cournot model. [2+2]

   e) In a duopoly market firms produce close substitutes under the following demand and cost conditions

   $$D_1(p_1, p_2) = 10 - p_1 + 0{\cdot}5\,\frac{p_2}{p_1} \quad ; \quad C_1 = 0$$

   $$D_2(p_1, p_2) = 20 - 2p_2 + \frac{p_1}{p_2} \quad ; \quad C_2 = 0$$

   Construct the price game and find out the equilibrium. [2+2]

   f) Establish the relationship between monopoly power and price elasticity of demand. [4]

2. Answer **any one** question : [1×8]

   a) i) State TRUE, FALSE or UNCERTAIN with proper explanation :

   A firm is a monopolist in the market for good X. The government has perfect information about the marginal and average cost curves of this firm and also has perfect information about the demand curve for good X. It is claimed that the economy will reach an efficient outcome if the government sets a price ceiling that makes price equal to the marginal cost, evaluated at the quantity where the marginal cost intersects the demand curve. [4]

   ii) What is a 'two-part' tariff? Suppose a monopolist faces demand curve Q = 100 – P, and cost function c(q) = q^2. Design a two-part tariff that maximises the monpolist's profits. What is the dead-weight loss generated by the monopoly? [4]

   b) Suppose there are only two firms producing boneless hilsa. Each is considering whether to advertise or not. The profit estimates are summarized in the following payoff matrix :

	Firm B advertises	Firm B doesn't advertise
Firm A advertises	Profit A = 10 Profit B = 10	Profit A = 15 Profit B = 5
Firm A doesn't advertise	Profit A = 5 Profit B = 15	Profit A = 12 Profit B = 12

   i) What is Firm A's best strategy for each of Firm B's possible actions? [2]

   ii) What is Firm B's best strategy for each of Firm A's possible actions? [2]

   iii) If each firm chooses its best strategy, what will be the outcome? [2]

   iv) Is it a Pareto optimal outcome? [2]

3. Answer **any two** questions : [2×15]

a) Suppose you are given the following information :

Each month an airlines sells 1500 business class tickets at Rs. 200 per ticket, and 6,000 economy class tickets at Rs. 80 per ticket. The airlines treats business class tickets and economy class as two separate markets. The airlines knows the demand curves for the two markets and maximises profits. It is also known that demand curve of the each of the two markets is linear and marginal cost associated with each-ticket is Rs. 50.

i) Use the above informations to construct the demand curves for economy class and business class tickets. [5]

ii) What would be the equilibrium quantities and prices if the airlines could not get involved in price discrimination? [5]

iii) Suppose that a monopolist can produce in discrete non-negative integer units. Its cost function C(q) is as follows :

$$C(q) = 1 + q^2 \quad \text{if} \quad q \geq 0$$
$$= 0 \quad \text{if} \quad q = 0$$

The monopolist faces a demand function $D(P) = \frac{9}{P}$. How much should the monopolist optimally produce & sell? [5]

b) i) Explain the following concepts : percieved demand curve, proportional demand curve and market demand curve in a monopolistically competitive market. [4]

ii) Suppose all consumers in an economy behave as if there is one consumer with utility function : $u_1(x_1) + u_2(x_2) + y$, where x_1 and x_2 are the amounts of good 1 & 2, respectively and 'y' is the money spent on all other goods. Suppose good 1 is supplied by a firm that acts competitively and good 2 is supplied by a firm that acts like a monopoly. The cost function for good 'i' is denoted by $c_i(x_i)$ and there is a specific tax of t_i on the output of industry 'i'. Assume $c_i'' > 0, p_i'' < 0, p_i' < 0$.

A) Derive an expression for $\frac{dx_i}{dt_i}$ for i = 1,2. Explain the relevant signs of the expression. [5]

B) Given a change in outputs (dx_1, dx_2), derive an expression for the change in welfare. [3]

C) Suppose that we consider taxing one of the two industries and using the proceeds to subsidize others. Should we tax the competitive industry or monopoly? [3]

c) i) ''In a modern business environment a firm is characterised by the divorce of ownership and management, and therefore managers try to maximise their own utility" —discuss. [3]

ii) Assuming that maximisation of sales revenue subject to a profit constraint maximises manager's utility function, use an appropriate model to show how the equilibrium of a firm is determined. [12]

d) i) Consider two firms with same cost structures, operating in an oligopolistic environment taking output decisions and moving simultaneously. Using linear demand and cost curves compute the equilibrium price and quantities. [6]

ii) If now they move sequentially with seller 1 moving first and seller 2 moving second, how will the equilibrium values of price and quantity change? Explain you answer in economic terms. [9]

Group – B

4. Answer **any four** questions : [4×5]

a) i) Suppose that $y_i = \mu + e_i$, where i = 1,2,...,n & e_i's are independent errors with mean zero & variance σ^2. Show that $\bar{y}$ is the least square estimate of μ. [3]

ii) Suppose that the son of a man of height x (in inches) attains a height that is normally distributed with mean x+1 and variance 4. What is the best prediction of the height at full growth of the son of a man who is 6 feet tall? [2]

b) Suppose that grades on a midterm and final have a correlation coefficient of 0·5 and both exams have an average score of 75 and a standard deviation of 10.

i) If a student's score on the midterm is 95, what would you predict his score on the final to be? [3]

ii) If a student scored 85 on the final, what would you guess about his score on the midterm? [2]

c) In the context of the inference on the slope coefficient for the simple linear regression, derive the relation $r^2 = \frac{t^2}{t^2 + n - 2}$, where r is the correlation coefficient and n being the number of observations. [5]

d) Given the data on y and x, explain what functional form you will use and how you will estimate the parameters if—

i) y is a proportion and lies between 0 and 1. [3]

ii) x > 0 and x assumes very large values relative to y. [2]

e) For detecting heteroscedasticity, discuss the Gold-feld Quandt test. [5]

f) Consider the following regression-through origin model :

$Y_i = \beta x_i + u_i$ for i = 1,2

You're told that $u_1 \sim N(0, \sigma^2)$ and $u_2 \sim N(0, 2\sigma^2)$ and they are statistically independent. If $x_1 = +1$ & $x_2 = -1$, obtain the weighted least squares (WLS) estimate of β and its variance. Is this variance better than the variance of the OLS estimator had you incorrectly assumed that both $u_1 \,\&\, u_2 \sim N(0, \sigma^2)$? [3+2]

g) In studying the movement in the production workers' share in the value added (i.e labour's share), the following models were considered, based on annual data for 1949 – 1964.

Model A : $Y_t = 0{\cdot}4529 - 0{\cdot}0041t; R^2 = 0{\cdot}5284, d = 0{\cdot}8252$

Model B : $Y_t = 0{\cdot}4786 - 0{\cdot}0127t + 0{\cdot}0005t^2; R^2 = 0{\cdot}6629, d = 1{\cdot}82$

where Y_t = Labour's share and t = time

Find out whether there is serial correlation in both model A & B. [5]

5. Answer **<u>any two</u>** questions : [2×15]

a) Consider the following regression model : $\frac{1}{Y_i} = \beta_1 + \beta_2 \left(\frac{1}{X_i}\right) + u_i$ Here neither Y nor X assumes zero value.

i) Is this a linear regression model? [2]

ii) How would you estimate this model? [7]

iii) What is the behaviour of Y as X tends to infinity? [3]

iv) Can you give an example where such a model may be appropriate? [3]

b) A production function is specified as : $y_i = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + u_i$,where u_i are iid $N(0, \sigma^2)$ where y = output, x_1 = Labour input and x_2 = Capital input; i = 1,2,...23

The independent variables are non-stochastic. The following data are obtained on the above model :

$\bar{x}_1 = 10$, $\bar{x}_2 = 5$, $\bar{y} = 12$, $\sum_i x_{1i}^2 = 2312$, $\sum_i x_{2i}^2 = 587$, $\sum_i y_i^2 = 3322$, $\sum_i x_{1i}x_{2i} = 1158$, $\sum x_{1i}y_i = 2770$ & $\sum x_{2i}y_i = 1388$

i) Compute $\hat{\alpha}$, $\hat{\beta}_1$ & $\hat{\beta}_2$ and their standard errors. Present the regression equation. [7]

ii) Find the 95% confidence intervals for $\alpha, \beta_1 \& \beta_2$ and test the hypothesis $\beta_1 = 1$. [5]

iii) Find 95% confidence interval for σ^2. [3]

c) The following are data on—

y = quit rate per 100 employees in manufacturing, x = unemployment rate

The data for the US cover the period 1960-72

Year	**y**	**x**	**Year**	**y**	**x**
1960	1·3	6·2	1967	2·3	3·6
1961	1·2	7·8	1968	2·5	3·3
1962	1·4	5·8	1969	2·7	3·3
1963	1·4	5·7	1970	2·1	5·6
1964	1·5	5·0	1971	1·8	6·8
1965	1·9	4·0	1972	2·2	5·6
1966	2·6	3·2			

i) Calculate a regression of y on x $y = \alpha + \beta x + u$. [7]

ii) Test the hypothesis $H_0 : \beta = 0$ against the alternative $H_1 : \beta \neq 0$ at the 5% significance level. [5]

iii) What is likely to be wrong with the assumptions of the classical normal linear model in this case? Discuss. [3]

d) i) You are given the following age and price data for 10 randomly selected Toyota Tazzes between 1 & 6 years old. Here, age is in years and price is in thousands of Rands.

Age	6	6	6	2	2	5	4	5	1	4
Price	205	195	210	340	299	230	270	243	340	240

Obtain the intercept and slope estimate in the equation

$$\text{Price} = \hat{\beta}_0 + \hat{\beta}_1 \text{ age}$$

Comment on the direction of the relationship.

How much lower is price predicted to be if age is increased by two years. [4]

Verify that the residuals approximately sum to zero. [3]

How much of the Variation in price for these 10 cars is explained by age? Explain [3]

ii) Consider the savings function

$\text{Sav} = \beta_0 + \beta_1 \text{inc} + u$; $u = \sqrt{\text{inc}}.e$ where e is a random variable with E(e) = 0 and $\text{Var}(e) = \sigma_e^2$.

Here, 'Sav' denotes saving and 'inc' denotes income.

Assuming that e is independent of inc.

- Show that $E(u / \text{inc}) = 0$. [1]
- Show that $V(u / \text{inc}) = \sigma_e^2 \text{inc}$. This means variance of 'sav' increases with 'inc'. [2]
- Provide a discussion that supports the assumption that the variance of savings increases with family income. [2]

TABLE IV t-DISTRIBUTION*

Values of $t_{\alpha,\nu}$

ν \ α	0·05	0·025	0·01	0·005
1	6·314	12·706	31·821	63·657
2	2·920	4·303	6·965	9·925
3	2·353	3·182	4·541	5·841
4	2·132	2·776	3·747	4·604
5	2·015	2·571	3·365	4·032
6	1·943	2·447	3·143	3·707
7	1·895	2·365	2·998	3·499
8	1·860	2·306	2·896	3·355
9	1·833	2·262	2·821	3·250
10	1·812	2·228	2·764	3·169
11	1·796	2·201	2·718	3·106
12	1·782	2·179	2·681	3·055
13	1·771	2·160	2·650	3·012
14	1·761	2·145	2·624	2·977
15	1·753	2·131	2·602	2·947
16	1·746	2·120	2·583	2·921
17	1·740	2·110	2·567	2·898
18	1·734	2·101	2·552	2·878
19	1·729	2·093	2·539	2·861
20	1·725	2·086	2·528	2·845
21	1·721	2·080	2·518	2·831
22	1·717	2·074	2·508	2·819
23	1·714	2·069	2·500	2·807
24	1·711	2·064	2·492	2·797
25	1·708	2·060	2·485	2·787
26	1·706	2·056	2·479	2·779
27	1·703	2·052	2·473	2·771
28	1·701	2·048	2·467	2·763
29	1·699	2·045	2·462	2·756
30	1·697	2·042	2·457	2·750
40	1·684	2·021	2·423	2·704
60	1·671	2·000	2·390	2·660
120	1·658	1·980	2·358	2·617
∞	1·645	1·960	2·326	2·576

*Abridged from Table 12 of *Biometrika Tables for Statisticians*, vol. I, with the kind permission of the Biometrika Trustees.

TABLE III χ^2-DISTRIBUTION*

Values of $\chi^2_{\alpha,\nu}$

ν \ α	0·995	0·99	0·975	0·95	0·05	0·025	0·01	0·005
1	0·000	0·000	0·001	0·004	3·841	5·024	6·635	7·879
2	0·010	0·020	0·051	0·103	5·991	7·378	9·210	10·597
3	0·072	0·115	0·216	0·352	7·815	9·348	11·345	12·838
4	0·207	0·297	0·484	0·711	9·488	11·143	13·277	14·860
5	0·412	0·554	0·831	1·145	11·070	12·832	15·086	16·750
6	0·676	0·872	1·237	1·635	12·592	14·449	16·812	18·548
7	0·989	1·239	1·690	2·167	14·067	16·013	18·475	20·278
8	1·344	1·646	2·180	2·733	15·507	17·535	20·090	21·955
9	1·735	2·088	2·700	3·325	16·919	19·023	21·666	23·589
10	2·156	2·558	3·247	3·940	18·307	20·483	23·209	25·188
11	2·603	3·053	3·816	4·575	19·675	21·920	24·725	26·757
12	3·074	3·571	4·404	5·226	21·026	23·337	26·217	28·300
13	3·565	4·107	5·009	5·892	22·362	24·736	27·688	29·819
14	4·075	4·660	5·629	6·571	23·685	26·119	29·141	31·319
15	4·601	5·229	6·262	7·261	24·996	27·488	30·578	32·801
16	5·142	5·812	6·908	7·962	26·296	28·845	32·000	34·267
17	5·697	6·408	7·564	8·672	27·587	30·191	33·409	35·718
18	6·265	7·015	8·231	9·390	28·869	31·526	34·805	37·156
19	6·844	7·633	8·907	10·117	30·144	32·852	36·191	38·582
20	7·434	8·260	9·591	10·851	31·410	34·170	37·566	39·997
21	8·034	8·897	10·283	11·591	32·671	35·479	38·932	41·401
22	8·643	9·542	10·982	12·338	33·924	36·781	40·289	42·796
23	9·260	10·196	11·688	13·091	35·172	38·076	41·638	44·181
24	9·886	10·856	12·401	13·848	36·415	39·364	42·980	45·558
25	10·520	11·524	13·120	14·611	37·652	40·646	44·314	46·928
26	11·160	12·198	13·844	15·379	38·885	41·923	45·642	48·290
27	11·808	12·879	14·573	16·151	40·113	43·194	46·963	49·645
28	12·461	13·565	15·308	16·928	41·337	44·461	48·278	50·993
29	13·121	14·256	16·047	17·708	42·557	45·722	49·588	52·336
30	13·787	14·953	16·791	18·493	43·773	46·979	50·892	53·672
40	20·706	22·164	24·433	26·509	55·759	59·342	63·691	66·766
50	27·991	29·707	32·357	34·764	67·505	71·420	76·154	79·490
60	35·535	37·485	40·482	43·188	79·082	83·298	88·379	91·952
70	43·275	45·442	48·758	51·739	90·531	95·023	100·425	104·215
80	51·172	53·540	57·153	60·391	101·879	106·629	112·329	116·321
90	59·196	61·754	65·647	69·126	113·145	118·136	124·116	128·299
100	67·328	70·065	74·222	77·929	124·342	129·561	135·807	140·169

For larger values of ν, the variable $\sqrt{2\chi^2} - \sqrt{2\nu - 1}$ may be used as a standard normal variable.

*Abridged from Table 8 of *Biometrika Tables for Statisticians*, vol. I, with the kind permission of the Biometrika Trustees.

Table D.5A 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	0.658	1.604	0.595	1.928	0.444	2.283	0.316	2.645	0.203	3.005	—	—	—	—	—	—	—	—
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	0.562	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	0.779	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	2.023	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	1.785	0.895	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	2.035	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	0.953	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	1.143	1.652	1.062	1.759	0.979	1.873	0.897	1.992	0.816	2.117	0.735	2.246	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	1.255	1.560	1.181	1.650	1.104	1.747	1.028	1.850	0.951	1.958	0.874	2.071	0.798	2.188	0.723	2.309	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	0.826	2.164	0.753	2.278	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	0.712	2.363
31	1.363	1.496	1.297	1.570	1.229	1.650	1.160	1.735	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	0.769	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	2.085	0.861	2.181	0.795	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	0.845	2.236
36	1.411	1.525	1.354	1.587	1.295	1.654	1.236	1.724	1.175	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	1.655	1.249	1.723	1.190	1.795	1.131	1.870	1.071	1.948	1.011	2.029	0.951	2.112	0.891	2.198
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	1.435	1.540	1.382	1.597	1.328	1.658	1.273	1.722	1.218	1.789	1.161	1.859	1.104	1.932	1.047	2.007	0.990	2.085	0.932	2.164
40	1.442	1.544	1.391	1.600	1.338	1.659	1.285	1.721	1.230	1.786	1.175	1.854	1.120	1.924	1.064	1.997	1.008	2.072	0.952	2.149
45	1.475	1.566	1.430	1.615	1.383	1.666	1.336	1.720	1.287	1.776	1.238	1.835	1.189	1.895	1.139	1.958	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	1.822	1.246	1.875	1.201	1.930	1.156	1.986	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	1.959	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	1.335	1.850	1.298	1.894	1.260	1.939	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	1.369	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	1.935
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	1.369	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	1.445	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	1.778	1.535	1.802	1.512	1.827	1.489	1.852	1.465	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	1.506	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

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