

University of Colombo

Faculty of Arts

Master of Arts in Demography-2016

DMA 601: Advanced Demographic Analysis

Answer four (04) questions only.

Time: Four (04) Hours

Calculators can be used

- 1) (a) Explain the applications of Lexis diagram in demographic analysis. (05 marks)
- (b) The following table provides data on the number of female survivors and their deaths, separations or divorces in a marriage cohort married in 2011 and were followed-up until the end of 2015. Place these data on a Lexis diagram. (05 marks)

Number of female survivors and their deaths, separations or divorces

Marriage duration (years)	No. of females survivors	Attrition due to deaths of a marriage partner or separation or divorce
0	9000	200
1	8800	100
2	8700	50
3	8650	25
4	8625	-

- (c) Assuming that 75 percent of attrition of the above marriage cohort at each duration had occurred due to death of a marriage partner, compute corresponding probabilities, q_x of attrition, by separation and divorce, corrected for the influenced of mortality. (15 marks)

- 2) (a) Briefly discuss the assumptions on which the concepts of a stationary and stable population are based.

(05 marks)

- b) Explain the importance of theoretical population models in demographic analysis.

(07 marks)

- c) Using the stable population model provided, estimate the following parameters for a "West" female stable population with $e_0^0 = 68.5$ and $r = 0.028$

i) the proportion aged 60 and above

ii) the death rate

iii) the gross reproduction rate assuming a mean age at maternity in 28 years.

(13 marks)

- 3) (a) Explain briefly the main characteristics of stationary and stable population models.

(05 marks)

- (b) A female stable population has the following characteristics:

Life Table Parameters	Intrinsic Rate of Growth
$l_0 = 100,000$	
${}_{\infty}L_{60} = 624,500$	$r = 0.023$
$e_0^0 = 68.5$	$b = 0.0210$
${}_{15}L_0 = 80,000$	

Based on the above data, estimate:

- What proportion of the stationary population is aged 60 and over? of the stable population?
- What proportion of the stationary population is under age 15 ? of the stable population?
- Compute the index of ageing and younger dependency ratio in stationary population

(12 marks)

- c) Data on the probability of employee wastage calculated based on the proportion of annual labour turn over in a factory (X) is given below. Calculate the average length of service of an employee and the annual intake required to maintain the staff of 4,000 persons.

Year	Factory X
0	0.651
1	0.520
2	0.410
3	0.400
4	0.399
5	0.351
6	0.331
7	0.241
8	0.087
9	1.000

(08 marks)

- 4) a) Explain the differences between the estimates of internal migration derived from place of birth method and Survival ratio method.

(05 marks)

- b) Assume that according to the 2005 census, 4,000 persons were residing in an hypothetical region X but were born in another region of a country, while 2000 persons who were born in region X were enumerated as residents of another region. A census taken 10 years later shows that there are 6,000 persons residing in region X who were not born in X, while 4000 natives of X reside outside the region X. The probability of dying during the 10 year period for all out-migrants from the region X q_0 is 0.20, while the probability of all in-migrants q_1 is 0.4.

- i) Calculate net migration of the region X without taking into account mortality among migrants.

(05 marks)

- ii) Calculate net migration of region X by introducing deaths (during the period) among migrants who were already in region or who had already left the region X at the beginning of period.

(05 marks)

- iii) Suppose that migrants who entered or left region X during 2005-2015 period were also subject to the risk of dying. In the absence of any information on the timing of their arrival or departure from region X, assuming that they entered or left region X at mid period. Refine your net migration value for region X using the following formula:

$$\text{Formula: } m = \frac{1}{1-0.5q_I} (I_{t+n} - p_I I_t) + \frac{1}{1-0.5q_O} (p_O O_t - O_{t+n})$$

(05 marks)

- iv) Comment on your results.

(05 marks)

- 5) a) Explain how population estimates differ from population projections.

(05 marks)

- b) Explain three growth models which can be used to estimate population of a country.

(05 marks)

- c) Data and the assumptions for the country X are given below. Project the female population for the year 2020 using the cohort component method of population projection.

Five year age Groups	Female population, 2015	Five year female survival ratio	Age specific fertility rate (per woman) -2015
0-4	521,311	0.99405	-
5-9	488,026	0.99769	-
10-14	473,704	0.99611	-
15-19	360,703	0.99219	0.060
20-24	304,791	0.99242	0.280
25-29	284,746	0.99225	0.210
30-34	330,663	0.99041	0.110
35-39	340,186	0.98554	0.060
40-44	286,353	0.97666	0.020
45-49	277,869	0.96166	0.002
50-54	232,834	0.93699	-
55-59	175,137	0.89918	-
60-64	125,524	0.84472	-
65-69	81,771	0.77359	-
70+	171,955	0.55683	-

Assumptions:

- i) All age specific fertility rates (ASFRs) recorded in 2015 will decline by 1.4 % by the year 2020.
- ii) Sex Ratio at birth is 102.
- iii) The female survival ratio from birth to age group 0-4 is 0.988753.
- iv) There is no international migration during the period 2015-2020.

(15 marks)

6) a) Explain briefly the importance of Bongaarts model in fertility analysis of a country.

(08 marks)

b) The following tables provide data drawn from the 2011 census of a population in a country and the standard marital fertility schedule of the Hutterite population. Using the number of births during calendar year and data provided in tables, compute the following measures of fertility.

Age group	Number of women	Number of married women	Number of unmarried women
15-19	350,619	33,515	317,104
20-24	294,707	176,841	117,866
25-29	274,662	235,981	38,681
30-34	320,579	289,342	31,237
35-39	330,102	297,680	32,422
40-44	276,269	243,465	32,804
45-49	267,785	227,211	40,574

Standard marital fertility schedule of Hutterite (1921-1930)

Age group	Legitimate fertility rate
15-19	0.300
20-24	0.550
25-29	0.502
30-34	0.447
35-39	0.406
40-44	0.222
45-49	0.061

Legitimate births = 68,374

Illegitimate births = 8,623

- Comparative index of general fertility (I_f)
- Comparative index of legitimate fertility (I_g)
- Comparative index of illegitimate fertility (I_h)
- Comparative index of proportions married (I_m)
- Comment on your results

(17 marks)

TABLE II. "WEST" MODEL STABLE POPULATIONS ARRANGED BY LEVEL OF MORTALITY (continued)

LEVEL 19
Females ($^0e_0 = 65.00$ years)

	Annual rate of increase												
	-.010	-.005	.000	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050
<i>Age interval</i>	<i>Proportion in age interval</i>												
Under 1 .....	.0100	.0122	.0148	.0176	.0207	.0241	.0278	.0316	.0356	.0398	.0441	.0485	.0530
1-4 .....	.0401	.0484	.0578	.0680	.0791	.0909	.1033	.1161	.1293	.1426	.1561	.1695	.1829
5-9 .....	.0518	.0613	.0714	.0823	.0935	.1051	.1167	.1283	.1397	.1507	.1612	.1712	.1806
10-14 .....	.0542	.0624	.0710	.0797	.0884	.0969	.1050	.1126	.1195	.1257	.1312	.1359	.1398
15-19 .....	.0566	.0636	.0705	.0772	.0835	.0893	.0944	.0987	.1022	.1048	.1067	.1078	.1081
20-24 .....	.0589	.0646	.0698	.0746	.0787	.0820	.0846	.0862	.0871	.0872	.0865	.0852	.0834
25-29 .....	.0612	.0654	.0690	.0719	.0740	.0752	.0756	.0752	.0741	.0723	.0700	.0672	.0642
30-34 .....	.0634	.0661	.0680	.0691	.0694	.0688	.0674	.0654	.0628	.0598	.0565	.0529	.0493
35-39 .....	.0655	.0666	.0669	.0663	.0649	.0627	.0600	.0568	.0532	.0494	.0455	.0416	.0377
40-44 .....	.0675	.0669	.0655	.0633	.0604	.0570	.0532	.0491	.0448	.0406	.0365	.0325	.0288
45-49 .....	.0691	.0668	.0638	.0601	.0560	.0515	.0468	.0422	.0376	.0332	.0291	.0253	.0218
50-54 .....	.0699	.0660	.0615	.0565	.0513	.0460	.0408	.0358	.0312	.0268	.0229	.0194	.0164
55-59 .....	.0697	.0641	.0583	.0522	.0463	.0405	.0350	.0300	.0254	.0214	.0178	.0147	.0121
60-64 .....	.0676	.0607	.0538	.0470	.0406	.0327	.0292	.0244	.0202	.0165	.0134	.0108	.0087
65-69 .....	.0627	.0549	.0474	.0404	.0340	.0283	.0233	.0190	.0153	.0122	.0097	.0076	.0060
70-74 .....	.0537	.0459	.0387	.0322	.0264	.0215	.0172	.0137	.0108	.0084	.0065	.0050	.0038
75-79 .....	.0406	.0338	.0278	.0225	.0181	.0143	.0112	.0087	.0066	.0051	.0038	.0029	.0021
80+ .....	.0376	.0303	.0241	.0189	.0146	.0112	.0085	.0064	.0047	.0035	.0025	.0018	.0013
<i>Age</i>	<i>Proportion under given age</i>												
1 .....	.0100	.0122	.0148	.0176	.0207	.0241	.0278	.0316	.0356	.0398	.0441	.0485	.0530
5 .....	.0501	.0606	.0725	.0856	.0998	.1150	.1310	.1477	.1649	.1824	.2002	.2180	.2358
10 .....	.1019	.1219	.1440	.1679	.1934	.2201	.2478	.2760	.3046	.3331	.3614	.3892	.4165
15 .....	.1561	.1843	.2150	.2476	.2818	.3170	.3528	.3886	.4241	.4589	.4926	.5251	.5563
20 .....	.2126	.2479	.2855	.3249	.3653	.4063	.4471	.4873	.5262	.5637	.5993	.6329	.6644
25 .....	.2715	.3125	.3554	.3995	.4440	.4883	.5317	.5735	.6133	.6509	.6858	.7182	.7478
30 .....	.3327	.3779	.4244	.4714	.5180	.5635	.6073	.6487	.6874	.7231	.7558	.7854	.8120
35 .....	.3961	.4440	.4924	.5405	.5874	.6323	.6747	.7141	.7502	.7830	.8123	.8384	.8613
40 .....	.4616	.5106	.5593	.6068	.6522	.6950	.7347	.7709	.8034	.8323	.8578	.8799	.8990
45 .....	.5291	.5775	.6248	.6701	.7127	.7521	.7879	.8199	.8482	.8729	.8942	.9124	.9278
50 .....	.5981	.6443	.6886	.7302	.7687	.8035	.8347	.8621	.8858	.9061	.9233	.9377	.9497
55 .....	.6681	.7103	.7501	.7867	.8200	.8496	.8755	.8979	.9170	.9330	.9462	.9572	.9660
60 .....	.7378	.7745	.8083	.8390	.8662	.8901	.9105	.9279	.9424	.9543	.9640	.9719	.9781
65 .....	.8054	.8352	.8621	.8860	.9068	.9247	.9398	.9523	.9626	.9709	.9775	.9827	.9868
	<i>Parameter of stable populations</i>												
Birth rate .....	.0104	.0127	.0154	.0184	.0217	.0253	.0292	.0333	.0377	.0422	.0469	.0517	.0566
Death rate .....	.0204	.0177	.0154	.0134	.0117	.0103	.0092	.0083	.0077	.0072	.0069	.0067	.0066
GRR (27)	0.85	0.97	1.12	1.28	1.46	1.66	1.89	2.16	2.45	2.79	3.17	3.59	4.07
GRR (29)	0.84	0.97	1.12	1.30	1.49	1.72	1.98	2.28	2.61	3.00	3.43	3.93	4.49
GRR (31)	0.83	0.97	1.13	1.32	1.53	1.78	2.07	2.41	2.79	3.23	3.74	4.32	4.99
GRR (33)	0.82	0.96	1.14	1.34	1.57	1.85	2.17	2.55	2.99	3.50	4.09	4.78	5.58
Average age	42.2	39.6	38.0	34.4	32.0	29.7	27.5	25.4	23.5	21.8	20.3	18.8	17.5
Births/population 15-44 .....	.028	.032	.038	.044	.050	.058	.067	.077	.089	.102	.117	.113	.152

TABLE II. "WEST" MODEL STABLE POPULATIONS ARRANGED BY LEVEL OF MORTALITY (continued)

LEVEL 21
Males ($e_0 = 66.02$ years)

	Annual rate of increase												
	-.010	-.005	.000	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050
Proportion in age interval													
Age interval													
Under 1	.0099	.0121	.0146	.0174	.0205	.0238	.0274	.0311	.0351	.0392	.0434	.0477	.0522
1-4	.0403	.0485	.0578	.0679	.0788	.0905	.1028	.1155	.1285	.1418	.1551	.1685	.1818
5-9	.0523	.0617	.0718	.0825	.0936	.1051	.1167	.1282	.1395	.1505	.1610	.1710	.1804
10-14	.0548	.0630	.0715	.0801	.0887	.0971	.1051	.1126	.1195	.1258	.1312	.1359	.1399
15-19	.0573	.0642	.0711	.0777	.0839	.0896	.0946	.0989	.1023	.1050	.1069	.1080	.1083
20-24	.0597	.0653	.0705	.0752	.0792	.0824	.0849	.0865	.0874	.0874	.0868	.0855	.0837
25-29	.0622	.0663	.0698	.0726	.0746	.0757	.0761	.0756	.0745	.0727	.0704	.0676	.0645
30-34	.0647	.0673	.0691	.0701	.0702	.0695	.0681	.0660	.0634	.0604	.0570	.0534	.0497
35-39	.0671	.0681	.0682	.0675	.0659	.0637	.0609	.0576	.0539	.0500	.0461	.0421	.0383
40-44	.0694	.0686	.0671	.0647	.0617	.0581	.0541	.0499	.0456	.0413	.0371	.0331	.0293
45-49	.0711	.0686	.0653	.0615	.0572	.0525	.0477	.0429	.0383	.0338	.0296	.0257	.0222
50-54	.0718	.0676	.0628	.0576	.0522	.0468	.0415	.0364	.0316	.0273	.0233	.0197	.0166
55-59	.0709	.0651	.0590	.0528	.0467	.0408	.0353	.0302	.0256	.0215	.0179	.0148	.0122
60-64	.0676	.0605	.0535	.0467	.0403	.0343	.0290	.0242	.0200	.0164	.0133	.0107	.0086
65-69	.0611	.0534	.0460	.0392	.0330	.0274	.0225	.0183	.0148	.0118	.0094	.0074	.0058
70-74	.0508	.0432	.0364	.0302	.0248	.0201	.0161	.0128	.0101	.0078	.0061	.0046	.0035
75-79	.0369	.0307	.0251	.0204	.0163	.0129	.0101	.0078	.0060	.0045	.0034	.0026	.0019
80+	.0321	.0258	.0205	.0161	.0124	.0095	.0072	.0054	.0040	.0029	.0021	.0016	.0011
Proportion under given age													
Age													
1	.0099	.0121	.0146	.0174	.0205	.0238	.0274	.0311	.0351	.0392	.0434	.0477	.0522
5	.0502	.0607	.0724	.0853	.0993	.1143	.1301	.1466	.1636	.1809	.1985	.2162	.2340
10	.1025	.1223	.1442	.1678	.1930	.2194	.2468	.2748	.3031	.3314	.3595	.3872	.4143
15	.1573	.1853	.2156	.2479	.2817	.3165	.3519	.3874	.4226	.4571	.4907	.5231	.5542
20	.2146	.2495	.2867	.3256	.3656	.4061	.4465	.4863	.5249	.5621	.5976	.6311	.6625
25	.2743	.3148	.3572	.4007	.4448	.4885	.5314	.5728	.6123	.6496	.6844	.7166	.7462
30	.3364	.3811	.4270	.4733	.5193	.5643	.6075	.6484	.6868	.7223	.7547	.7842	.8108
35	.4011	.4484	.4961	.5434	.5896	.6338	.6756	.7145	.7502	.7826	.8117	.8376	.8605
40	.4682	.5165	.5643	.6109	.6555	.6975	.7365	.7720	.8041	.8327	.8578	.8798	.8988
45	.5376	.5851	.6313	.6756	.7172	.7556	.7906	.8220	.8497	.8740	.8949	.9128	.9280
50	.6087	.6537	.6967	.7371	.7743	.8081	.8383	.8649	.8880	.9077	.9245	.9386	.9503
55	.6805	.7213	.7595	.7947	.8266	.8550	.8798	.9013	.9196	.9350	.9478	.9583	.9669
60	.7514	.7863	.8185	.8475	.8733	.8958	.9151	.9315	.9452	.9565	.9657	.9731	.9791
65	.8190	.8469	.8720	.8942	.9135	.9301	.9441	.9557	.9652	.9729	.9790	.9839	.9877
Parameter of stable populations													
Birth rate	.0102	.0125	.0152	.0181	.0213	.0248	.0286	.0326	.0369	.0413	.0459	.0506	.0554
Death rate	.0202	.0175	.0152	.0131	.0113	.0098	.0086	.0076	.0069	.0063	.0059	.0056	.0054
GRR (27)	0.83	0.95	1.09	1.24	1.42	1.62	1.84	2.10	2.39	2.71	3.08	3.50	3.96
GRR (29)	0.81	0.94	1.09	1.26	1.45	1.67	1.92	2.21	2.54	2.91	3.34	3.82	4.37
GRR (31)	0.80	0.94	1.10	1.28	1.49	1.73	2.01	2.34	2.71	3.14	3.63	4.20	4.84
GRR (33)	0.79	0.93	1.10	1.30	1.53	1.79	2.11	2.47	2.90	3.39	3.97	4.64	5.42
Average age	41.7	39.1	36.6	34.1	31.7	29.5	27.3	25.3	23.5	21.8	20.3	18.9	17.6
Births/population 15-44	.027	.031	.036	.042	.049	.057	.065	.075	.086	.099	.113	.130	.148

TABLE II. "WEST" MODEL STABLE POPULATIONS ARRANGED BY LEVEL OF MORTALITY (continued)

LEVEL 21
Females ($q_{e0} = 70.00$ years)

	Annual rate of increase												
	-.010	-.005	.000	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050
<i>Age interval</i>	<i>Proportion in age interval</i>												
Under 1	.0093	.0115	.0139	.0167	.0197	.0230	.0266	.0304	.0343	.0385	.0427	.0471	.0515
1-4	.0378	.0460	.0551	.0652	.0762	.0879	.1002	.1131	.1262	.1397	.1532	.1667	.1801
5-9	.0492	.0585	.0686	.0793	.0906	.1022	.1140	.1257	.1373	.1485	.1592	.1694	.1790
10-14	.0516	.0598	.0684	.0771	.0859	.0946	.1028	.1106	.1178	.1242	.1299	.1349	.1390
15-19	.0540	.0611	.0681	.0750	.0815	.0874	.0927	.0973	.1010	.1039	.1060	.1073	.1078
20-24	.0565	.0623	.0678	.0727	.0771	.0807	.0834	.0854	.0865	.0868	.0863	.0852	.0835
25-29	.0590	.0634	.0673	.0704	.0728	.0743	.0750	.0748	.0739	.0723	.0702	.0676	.0646
30-34	.0615	.0645	.0667	.0681	.0687	.0684	.0673	.0655	.0631	.0602	.0570	.0535	.0499
35-39	.0640	.0654	.0660	.0658	.0647	.0628	.0603	.0572	.0537	.0500	.0462	.0423	.0385
40-44	.0663	.0662	.0651	.0633	.0607	.0574	.0538	.0498	.0456	.0414	.0373	.0333	.0295
45-49	.0684	.0665	.0639	.0605	.0566	.0523	.0477	.0431	.0385	.0341	.0299	.0261	.0226
50-54	.0699	.0663	.0621	.0573	.0523	.0471	.0420	.0369	.0322	.0278	.0238	.0202	.0171
55-59	.0704	.0651	.0595	.0536	.0477	.0419	.0364	.0312	.0266	.0224	.0187	.0155	.0127
60-64	.0692	.0625	.0556	.0489	.0424	.0364	.0308	.0258	.0214	.0176	.0143	.0116	.0093
65-69	.0653	.0575	.0500	.0428	.0362	.0303	.0250	.0204	.0165	.0132	.0105	.0083	.0065
70-74	.0574	.0493	.0417	.0349	.0288	.0235	.0189	.0151	.0119	.0093	.0072	.0055	.0042
75-79	.0446	.0374	.0309	.0252	.0203	.0161	.0127	.0098	.0076	.0058	.0044	.0033	.0024
80+	.0455	.0368	.0294	.0231	.0180	.0138	.0105	.0079	.0058	.0043	.0031	.0023	.0016
<i>Age</i>	<i>Proportion under given age</i>												
1	.0093	.0115	.0139	.0167	.0197	.0230	.0266	.0304	.0343	.0385	.0427	.0471	.0515
5	.0471	.0574	.0690	.0819	.0959	.1109	.1268	.1434	.1606	.1781	.1959	.2138	.2317
10	.0963	.1159	.1376	.1612	.1865	.2132	.2408	.2692	.2978	.3266	.3551	.3832	.4106
15	.1479	.1757	.2059	.2383	.2724	.3077	.3437	.3798	.4156	.4508	.4850	.5180	.5496
20	.2020	.2368	.2741	.3133	.3539	.3951	.4364	.4770	.5166	.5547	.5910	.6253	.6575
25	.2585	.2990	.3418	.3860	.4310	.4758	.5198	.5624	.6031	.6415	.6774	.7105	.7410
30	.3175	.3625	.4091	.4565	.5038	.5501	.5948	.6373	.6770	.7139	.7476	.7781	.8056
35	.3790	.4270	.4758	.5246	.5724	.6185	.6621	.7028	.7401	.7741	.8046	.8317	.8555
40	.4429	.4924	.5419	.5904	.6371	.6813	.7223	.7599	.7939	.8241	.8507	.8739	.8940
45	.5093	.5586	.6070	.6537	.6978	.7378	.7761	.8097	.8395	.8655	.8880	.9073	.9235
50	.5777	.6251	.6709	.7142	.7544	.7910	.8238	.8528	.8780	.8996	.9180	.9333	.9461
55	.6476	.6914	.7330	.7715	.8067	.8381	.8658	.8898	.9102	.9275	.9418	.9536	.9632
60	.7179	.7566	.7924	.8251	.8543	.8800	.9022	.9210	.9368	.9498	.9605	.9691	.9759
65	.7871	.8190	.8481	.8740	.8967	.9163	.9329	.9468	.9582	.9674	.9748	.9806	.9852
	<i>Parameter of stable populations</i>												
Birth rate	.0095	.0117	.0143	.0172	.0204	.0238	.0276	.0316	.0358	.0402	.0448	.0495	.0543
Death rate	.0195	.0167	.0143	.0122	.0104	.0088	.0076	.0066	.0058	.0052	.0048	.0045	.0043
GRR (27)	0.81	0.93	1.06	1.22	1.39	1.58	1.81	2.06	2.34	2.66	3.02	3.43	3.88
GRR (29)	0.80	0.92	1.07	1.23	1.42	1.64	1.88	2.17	2.49	2.85	3.27	3.74	4.28
GRR (31)	0.78	0.92	1.07	1.25	1.45	1.69	1.97	2.28	2.65	3.07	3.55	4.10	4.74
GRR (33)	0.77	0.91	1.07	1.27	1.49	1.75	2.06	2.41	2.83	3.31	3.88	4.53	5.29
Average age	43.4	40.7	38.0	35.4	32.8	30.4	28.2	26.0	24.1	22.3	20.7	19.2	17.9
Births/population 15-44	.026	.031	.036	.041	.048	.055	.064	.073	.084	.097	.111	.127	.145

TABLE II. "WEST" MODEL STABLE POPULATIONS ARRANGED BY LEVEL OF MORTALITY (continued)

LEVEL 23
Males (${}^0e_0 = 71.19$ years)

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	Annual rate of increase												
	.010	.005	.000	.005	.010	.015	.020	.025	.030	.035	.040	.045	.050
Age interval	Proportion in age interval												
Under 1	.0092	.0114	.0138	.0165	.0195	.0228	.0263	.0301	.0340	.0381	.0423	.0466	.0510
1-4	.0377	.0458	.0549	.0649	.0758	.0874	.0997	.1125	.1256	.1390	.1524	.1660	.1794
5-9	.0492	.0584	.0684	.0791	.0903	.1019	.1136	.1253	.1368	.1480	.1588	.1690	.1786
10-14	.0516	.0598	.0683	.0770	.0858	.0943	.1026	.1104	.1175	.1240	.1297	.1347	.1388
15-19	.0541	.0611	.0681	.0749	.0813	.0873	.0926	.0971	.1009	.1038	.1059	.1072	.1078
20-24	.0566	.0624	.0678	.0727	.0770	.0806	.0834	.0853	.0864	.0868	.0863	.0852	.0836
25-29	.0592	.0636	.0674	.0706	.0729	.0744	.0751	.0749	.0740	.0725	.0703	.0677	.0648
30-34	.0619	.0649	.0671	.0685	.0690	.0687	.0676	.0658	.0634	.0605	.0573	.0538	.0502
35-39	.0647	.0661	.0666	.0663	.0652	.0633	.0607	.0576	.0542	.0504	.0466	.0427	.0388
40-44	.0673	.0671	.0660	.0641	.0614	.0581	.0544	.0504	.0462	.0419	.0378	.0337	.0299
45-49	.0697	.0677	.0650	.0615	.0575	.0531	.0485	.0438	.0391	.0347	.0304	.0265	.0230
50-54	.0713	.0676	.0632	.0584	.0532	.0480	.0427	.0376	.0328	.0283	.0243	.0206	.0174
55-59	.0716	.0662	.0604	.0544	.0484	.0425	.0369	.0317	.0270	.0227	.0190	.0157	.0129
60-64	.0698	.0629	.0560	.0492	.0427	.0366	.0310	.0259	.0215	.0177	.0144	.0116	.0093
65-69	.0649	.0571	.0496	.0425	.0359	.0300	.0248	.0203	.0164	.0131	.0104	.0082	.0064
70-74	.0560	.0480	.0406	.0340	.0280	.0228	.0184	.0147	.0116	.0090	.0070	.0054	.0041
75-79	.0427	.0357	.0295	.0240	.0193	.0154	.0121	.0094	.0072	.0055	.0042	.0031	.0023
80+	.0423	.0342	.0273	.0215	.0167	.0128	.0097	.0073	.0054	.0040	.0029	.0021	.0015
Age	Proportion under given age												
1	.0092	.0114	.0138	.0165	.0195	.0228	.0263	.0301	.0340	.0381	.0423	.0466	.0510
5	.0470	.0571	.0686	.0814	.0953	.1102	.1260	.1425	.1596	.1770	.1947	.2126	.2304
10	.0961	.1155	.1371	.1605	.1856	.2121	.2396	.2678	.2964	.3251	.3535	.3816	.4090
15	.1478	.1753	.2053	.2375	.2714	.3065	.3422	.3782	.4139	.4491	.4832	.5162	.5479
20	.2019	.2364	.2734	.3124	.3527	.3937	.4348	.4753	.5148	.5529	.5892	.6235	.6557
25	.2585	.2988	.3412	.3851	.4298	.4744	.5182	.5607	.6013	.6396	.6755	.7087	.7393
30	.3177	.3624	.4087	.4557	.5027	.5488	.5933	.6356	.6753	.7121	.7458	.7764	.8040
35	.3796	.4273	.4757	.5242	.5716	.6174	.6608	.7013	.7386	.7726	.8031	.8302	.8542
40	.4443	.4933	.5424	.5905	.6368	.6807	.7215	.7590	.7928	.8230	.8496	.8729	.8930
45	.5116	.5604	.6084	.6545	.6982	.7388	.7760	.8094	.8390	.8650	.8874	.9066	.9230
50	.5813	.6282	.6733	.7160	.7557	.7919	.8244	.8531	.8781	.8996	.9178	.9332	.9459
55	.6526	.6958	.7366	.7744	.8090	.8399	.8671	.8907	.9109	.9279	.9421	.9538	.9633
60	.7242	.7620	.7970	.8288	.8573	.8824	.9040	.9224	.9379	.9506	.9611	.9695	.9762
65	.7940	.8249	.8530	.8780	.9000	.9189	.9350	.9484	.9594	.9683	.9755	.9811	.9856
	Parameter of stable populations												
Birth rate	.0094	.0116	.0141	.0169	.0200	.0234	.0271	.0310	.0352	.0395	.0440	.0486	.0534
Death rate	.0194	.0166	.0141	.0119	.0100	.0084	.0071	.0060	.0052	.0045	.0040	.0036	.0034
GRR (27)	0.79	0.91	1.04	1.19	1.36	1.55	1.77	2.02	2.30	2.61	2.96	3.36	3.81
GRR (29)	0.78	0.90	1.04	1.21	1.39	1.60	1.85	2.12	2.44	2.80	3.20	3.67	4.20
GRR (31)	0.71	0.90	1.05	1.22	1.42	1.66	1.93	2.24	2.59	3.00	3.48	4.02	4.64
GRR (33)	0.75	0.89	1.05	1.24	1.46	1.71	2.01	2.36	2.77	3.24	3.79	4.43	5.18
Average age	43.1	40.5	37.9	35.3	32.8	30.4	28.2	26.1	24.1	22.4	20.7	19.3	17.9
Births/population 15-44	.026	.030	.035	.040	.047	.054	.062	.072	.083	.095	.109	.125	.142