Jaroslav Stránský; Jaroslav Bulina

The development of population in the Czechoslovak Republic

Aktuárské vědy, Vol. 1 (1930), No. 1, 21–33

Persistent URL: http://dml.cz/dmlcz/144503

der Funktionen zu verfolgen besteht, dass die Kurvenkreutzungsnomogramme den besten Weg dazu bieten.

Bei der Konstruktion der Rechentafel soll immer die Rücksicht darauf genommen werden, dass man die Resultate schnell, durch einfache Manipulation und ohne irgendwelche weitere rechnerische Operationen erlangen soll. Es soll auch immer eine Interpolation bei den sämtlichen Veränderlichen leicht vollgezogen werden können. Die numerischen Rechentafeln entsprechen nicht immer allen diesen Forderungen und benötigen am meisten noch Ergänzung durch rechnerische Operationen, welche erst mittels Maschinenrechnen beschleunigt werden können, sonst aber doch die ganze Operation verlängern und komplizieren.

Es ist schon bei der Anwendung von graphischen Rechentafeln in den anderen Wissenschaftszweigen — auch in der Finanzmathematik — geprüft und bewiesen worden, dass sich diese Rechentafeln grösstenteils eng dem soeben erwähnten Ziel annähern. Es besteht nun die Aufgabe auch für die Versicherungsmathematik diejenigen Type von Nomogrammen zu finden, welche den Zwecken und der Gestalltung der Praxis entsprechen. Es wäre ein Missverständnis, wenn man denken sollte, dass dieses Bestreben unter der Devise stehen soll, die numerischen Tafeln überhaupt zu beseitigen. Dieses Bestreben bestand nicht bei der Einführung des Maschinenrechnens und soll auch hier nicht bestehen, wo es sich eigentlich nur um eine Erweiterung der Hilfsmittel zur gröstmöglichen Mechanisierung der Rechenvorgänge der Praxis handelt.

Dieser Artikel soll im Anschlusse an andere Arbeiten die Anregung zur Vertiefung des Studiums und zur Ausbreitung des Verwendungsgebietes dienen. Es ist die Sache der Praktiker der einzelnen Versicherungszweige die Möglichkeit und Form der Anwendung von graphischen Rechentafeln und von ihnen stammenden Rechenhilfsmitteln zu prüfen.

The development of population in the Czechoslovak Republic.

Dr. Jar. Stránský. — Jar. Bulina.

Solving the problems of social insurance, particularly when we take into consideration the generations which will enter the insurance in the future, it is necessary to know not only the state of the present population, but also to make a supposition about its development in the future. It is natural that the development of population in the past is of great importance for the choice of this supposition; to be able to draw conclusions on the future we first have to know the past.

L. Euler was the first one who tried to express the growth of the population by a mathematical formula supposing that the population of a country has tendency to increase according to a geometrical series. But this supposition being right the population would increase indefinitely; thus it is necessary to find a factor to retard such a neverending growth. T. R. Malthus was believed to have found this factor in his famous law stating that the population has the tendency to grow according to a geometrical series, but its development is limited by the fact that the means of living are increasing only conform to an arithmetical series.

The retardation of the growth of population was at the first time mathematically expressed by P. F. Verhulst and it is G. U. Yule's merit to have done accessible the forgotten works of Verhulst by his treatise published in the Journal of the Royal Statistical Society for 1925. If we denote population by y and time by t, thus supposing the growth is infinite according to a geometrical series the following differential equation results:

$$\frac{1}{y}\frac{dy}{dt} = \text{const.}$$

If we suppose that the limitation of growth is expressed by a function $\Phi(y)$ we get a new differential equation instead of the preceding one:

$$\frac{1}{y}\frac{dy}{dt} = m - \Phi(y).$$

The simplest assumption that can be made as to the form of $\Phi(y)$ is to suppose that it is a linear function of y and then we get the following equation

$$\frac{1}{y}\frac{dy}{dt} = m - ny;$$

forming it thus

$$\frac{1}{y}\frac{dy}{dt} = \frac{1}{\alpha}\left(1 - \frac{y}{L}\right), \tag{1}$$

we have as a solution of this differential equation

$$y = L\frac{1}{1 + e^{\frac{\beta - t}{\alpha}}}. \tag{2}$$

The curve belonging to such an equation was called by Verhulst logistic curve (figure A)

Supposing the growth of population being according to a geometrical series without limits the number of population would increase indefinitely, but if it increases according to a logistic curve it approaches assymptotically to the maximum value L (for $t = \infty$).

Yule constructed the logistic curve for the population of England and Wales, France and the United States of America and in all these

three cases he got a good harmony between the values of the curve and the data of the censuses.

The logistic curve contains three constants and to construct it we must have the results of the three censuses. Let us suppose that these three censuses were carried through in equidistant intervals and

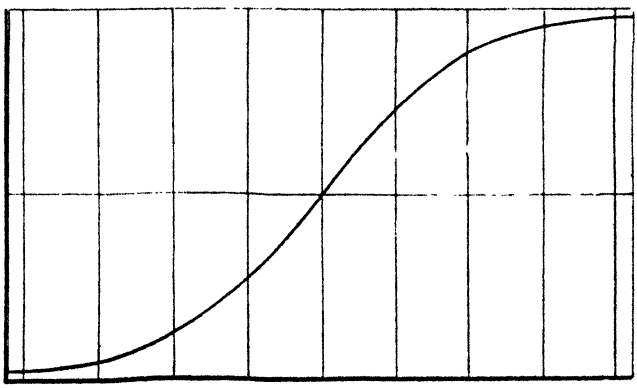


Fig. A.

let us denote them y_0, y_1, y_2; then we have following equations for the determination of the constants L, α, β of the logistic:

$$e^{\frac{1}{\alpha}} = \frac{d_1}{d_2}, \tag{3}$$

$$\frac{1}{L} = \frac{1}{y_0} - \frac{d_1^2}{d_1 - d_2}, \tag{4}$$

$$e^{\frac{\beta}{\alpha}} = L \frac{d_1^2}{d_1 - d_2}, \tag{5}$$

where $d_1 = \frac{1}{y_0} - \frac{1}{y_1}$, and $d_2 = \frac{1}{y_1} - \frac{1}{y_2}$.

Let us attempt now to draw the logistic curve for the population of the Czechoslovak Republic; for this purpose we use the data published by the Statistical State Office about the census of 1921. If we state increase of the population in intervals of ten years, we can observe great irregularities; for instance in 1880—1890 the population of Bohemia increased by about 280.000 men, in the following decennium by about 470.000 and in the next one by 450.000. These irregularities can be distinctly observed in constructing the logistic curve. It follows by the equation (4) that the value of $d_1 - d_2$ must be positive if L is to be the real limiting number of men. But if $d_1 - d_2$ is negative the curve (2) will get a quite different course (figure B). Thus it is

evident that it cannot be used as expression for the growth of population. Therefore the three values necessary for the determination of the logistic must fulfil the condition

$$\frac{1}{y_0} - \frac{1}{y_1} > \frac{1}{y_1} - \frac{1}{y_2}. \tag{6}$$

But when we take the data from the mentioned publication, say for the whole republic or for its single countries, we state that the condition (6) is in no one of these cases fulfilled.

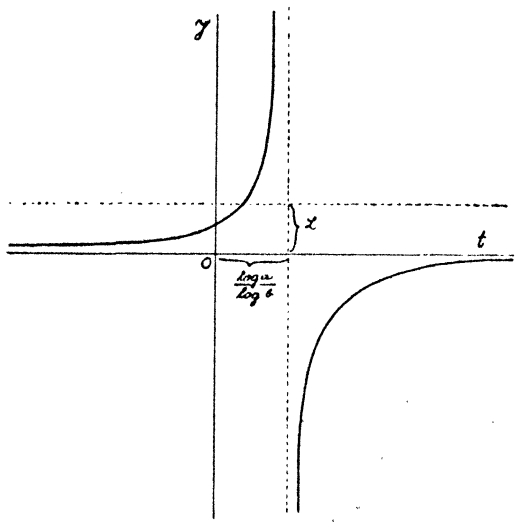


Fig. B.

It is possible to object that we have only the data of five censuses what seems not to be sufficient for the construction of a curve expressing the exact growth of population; but when we take the results of the censuses in Bohemia, Moravia and Silesia since the year 1818 it is evident that it is impossible to construct a logistic curve fitting in these data. A calculation gives the same result. If we take the data of censuses of 1817, 1837 and 1857 and try to construct the corresponding logistic curve we get as maximum number of population about 8,160.000, which number was reached already before 1880. In the same way we get from the censuses of 1829, 1843 and 1857 only 7,730.000 as a limit population.

For these reasons it is evident that the logistic is inapplicable to the development of population in Czechoslovakia. It follows by Dr. W. Friedli's treatise: Bevoelkerungsstatistische Grundlagen zur Alters- und Hinterlassenenversicherung in der Schweiz of 1928 that the Swiss population too cannot be expressed by a logistic curve.

When we wish to draw conclusions on the probable future development of the population from the data already known we must set certain hypotheses about the factors which it depends on. The choice of these hypotheses is a very difficult problem as we must do an extrapolation of certain occurences of the future.

As naturally such an extrapolation is not absolutely reliable, it is necessary to take all the results with great caution. The hypotheses we ought to set in our calculations concern first the death- and birth-rate of the future. We supposed that the deathrate is directed by the mortality-table „Oesterreichische Sterbetafel" from 1913, though the

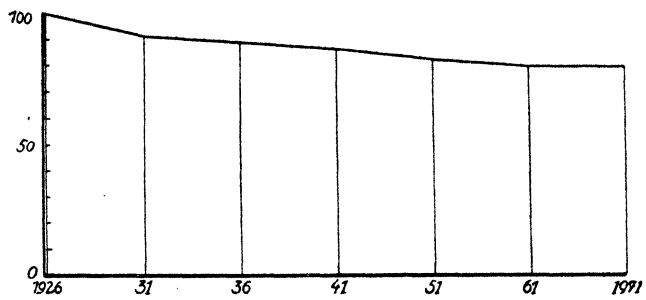


Fig. C.

deathrate has certainly decreased since then. When we take as basis the age-composition of the population according to the census of the 15th of february 1921 we obtain using the mentioned mortality table the development of the population living on the quoted day.

Further on we have to look for an other supposition about the increase of the birthrate in order to get also the development of population which will be born after this day.

Already before the war there was observed a constant decrease of the number of births in all European countries; as a first alternative we supposed that the birthrate (i. e. the number of children born alive falling to one married woman in the age from 15 to 45 years) will go on sinking in the future, but of course only to a certain minimum limit.

We chose the function according to which the birth-rate will sink as follows

$$100\, p_t = p_0 \frac{100 + 4.8913\, t}{1 + 0.065217\, t}.$$

In this formula $t = 0$ corresponds to the year 1926 and for $t = \infty$ we get $100\, p_\infty = 75\, p_0$; the development of the function is evident from the figure *C*.

As the Statistical State Office has not yet published tables containing relations between the birthrate and the age of women, we had

to use for our calculations the publication of the German Statistical Office: Die Bewegung der Bevölkerung in den Jahren 1922 und 1923 where the problem of the future development of the German population is solved.

The number of births was determined by the following formula:

$$P_t = p_t \, M \sum_1^6 Z_n{}^t \, \Phi_n.$$

In this formula $Z_1{}^t$ denotes the number of women aged 15—19, $Z_2{}^t$ aged 20—24, . . . $Z_6{}^t$ aged 40—44, so that $\sum_1^6 Z_n{}^t$ is the sum of women capable to bear. M is the average number of legitimate children which fall to one married woman in the age of 15—45 according to the state in 1926, i. e.

$$M = \frac{\sum_1^6 \frac{k_n}{Z_n}}{6}$$

where k_1 is the number of legitimate children born alive by women aged 15—19 and analogically $k_2, \ldots k_6$ of the other groups of ages. Φ_n is defined by the formula:

$$\Phi_n = \frac{\frac{k_n}{Z_n}}{M}.$$

As it was not possible to determine these numbers by our material, we used the Saxon data of the years 1912—1913 (tab. 1.) which were

Table 1.

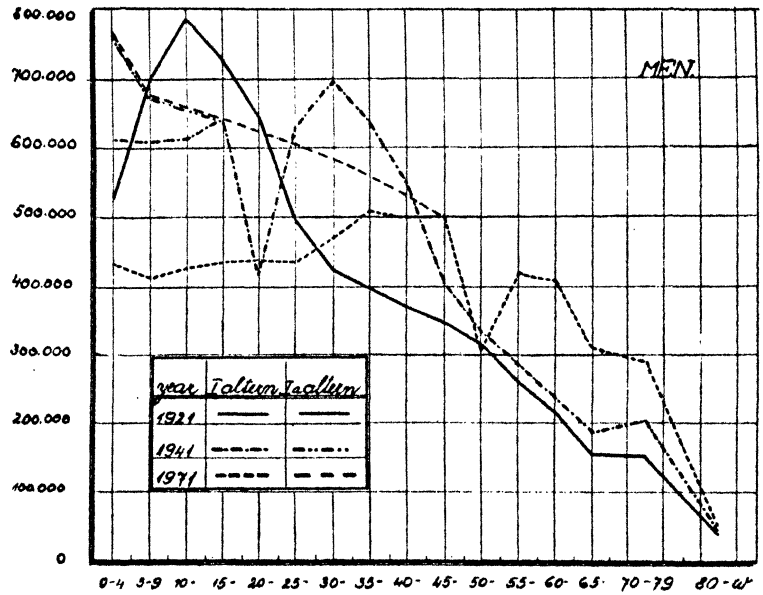
Age	Φ_n
15—19	0.07
20—24	1.23
25—29	1.92
30—34	1.37
35—39	1.03
40—44	0.40

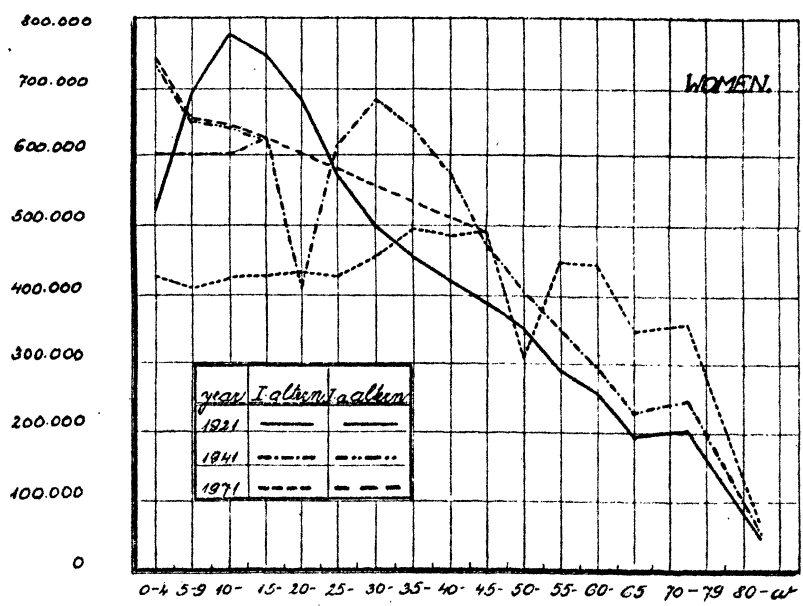
multiplied by a factor l determined in the following way:

$$\frac{{}^S k_n}{{}^S Z_n} = {}^S M \, . \, {}^S \Phi_n \quad l \, . \sum_1^6 \frac{{}^S k_n}{{}^S Z_n} \, . \; {}^{CR} Z_n = \sum_1^6 {}^{CR} k_n = 350.952 =$$

= number of legitimate children born alive in 1926, where from it follows for $l = 1{,}2146$, and therefore

$${}^{CR} M = l \, . \, {}^S M = 1.2146 \times 0.0715 = 0.0868.$$


800.000
700.000
600.000
500.000
400.000
300.000
200.000
100.000
0
MEN.
year
Total
Total
1921
1941
1971
0-4 5-9 10- 15- 20- 25- 30- 35- 40- 45- 50- 55- 60- 65- 70-79 80-


800.000
700.000
600.000
500.000
400.000
300.000
200.000
100.000
0
WOMEN.
year
1921
1941
1971
0-4 5-9 10- 15- 20- 25- 30- 35- 40- 45- 50- 55- 60- 65 70-79 80-

These data determine the number of legitimate births and were multiplied by a factor 1, 12 (tab. 2) and we obtained the number of all lifebirths.

Table 2.

Year	Legitimate children born alive	Illegitimate children born alive	in %
1923	341.449	37.811	11,07
1924	326.042	37.114	11,38
1925	318.833	37.168	11,66
1926	313.498	37.454	11,95

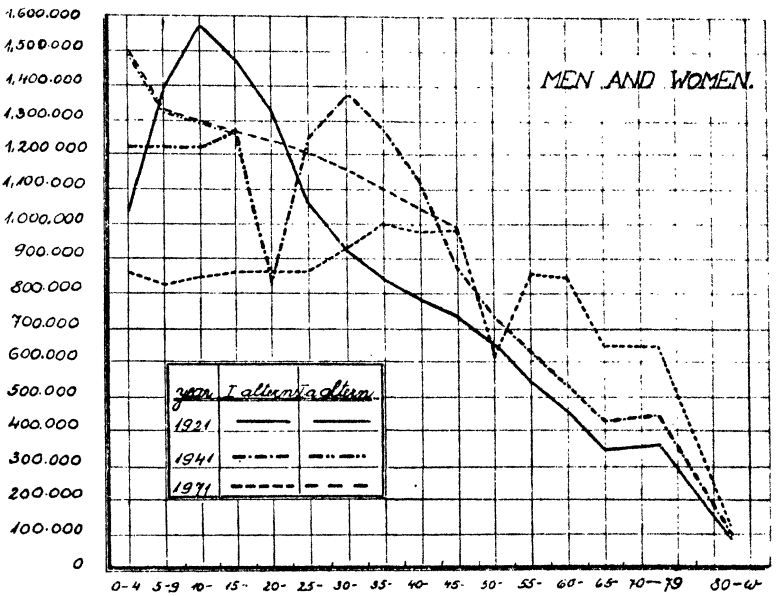
Results of these calculations are involved in the following tables and figures. Table No I. contains the age-composition of the population (in groups of 5 years); in the first line we can find the number of men, in the second one that of women and in the third one that of both together in thousands for the years 1921, 1931, 1941, 1951, 1961 and 1971. Table No II. shows the percentual age-composition of the population in the mentioned years, and table No III. the development of single age-groups putting in each group the population-number of 1921 equal to 100; table No IV. contains the development of the average-age from 1921 to 1971. Table No I. is illustrated by figures of which the first one concerns men, the second one women and the third one both sexes together.

By these figures the influence of the world war can be recognised very well, as well in the decrease of births during the war (the minima of the line corresponding to the year of 1941 for the group of 20—25 and of the line corresponding to 1971 for the group of 50—55) as in the increase of births after the war (the maxima following close after the mentioned minima). It appears also from the figures how the influence of the war grows to diminuate in the future, for the minimum and the maximum of the line for 1971 are not nearly so great as the extreme values of the lines for 1921 and 1941. The figures are, on the whole, the same as those which Dr. Janko constructed putting down different suppositions in his: Pravděpodobný vývoj trhu práce v ČSR. (Sociální Revue ročník VIII.) in which of course he only treats with the population aged from 15 to 70 years. It follows by table I that on suppositions made about the constant deathrate and sinking birthrate the total of population in the Czechoslovak Republic would decrease already from the year 1941. As such un unfavourable development of the population is not probable, we can say that the mentioned hypotheses lead to an extremely bad result. On the other hand, to get the extreme opposite case we suppose two possibilities:

1. The deathrate remains constant, but the future number of births will remain constantly the same as it was in the year 1926.

2. The decrease of the deathrate of born children is recompensed by the decrease of births.

Both hypotheses lead to the same results, which are contained in the tables Ia to IVa analogically to the first alternative; it is evident that these hypotheses finally show results which approach the probable reality more than the first one.



If we construct a logistic curve on the basis of the results of 1921, 1941 and 1961 we get

$$y = \frac{16{,}400.000}{1 + 0.2078 \times 2.162^{-t}}$$

which expresses very well the development of the population according to table Ia as shows the table 3.

Table 3.

Year	Values by the logistic curve	Values of the table Ia.
1921	13.601	13.601
1926	14.026	14.031
1931	14.396	14.392
1936	14.716	14.701
1941	14.991	14.991
1946	15.225	15.237
1951	15.424	15.386
1956	15.591	15.608
1961	15.732	15.732
1966	15.850	15.806
1971	15.948	15.833

Development of age-composition of population in the Czechoslovak Republic.

Table I. Absolute numbres.

Age \ Year	1921	1931	1941	1951	1961	1971
	525,8	718,3	615,8	537,4	502,8	431,3
0—4	511,0	700,1	600,3	523,9	490,1	423,3
	1.036,8	1.418,4	1.216,1	1.061,3	992,9	854,6
	698,1	672,8	611,5	486,5	453,1	413,1
5—9	692,5	656,5	600,6	477,8	445,0	405,7
	1.390,6	1.329,3	1.212,1	964,3	898,1	818,8
	784,2	439,4	615,0	527,3	460,2	430,5
10—14	776,6	429,9	602,8	516,9	451,1	422,0
	1.560,8	869,3	1.217,8	1.044,2	911,3	852,5
	733,4	671,6	645,9	587,0	467,0	435,0
15—19	745,9	662,0	624,7	573,0	455,9	424,6
	1.479,3	1.333,6	1.270,6	1.160,0	922,9	859,6
	645,0	747,6	419,3	586,3	502,7	438,6
20—24	681,0	735,7	407,8	571,2	489,7	427,4
	1.326,0	1.483,3	827,1	1.157,5	992,4	866,0
	493,6	687,0	629,2	605,3	550,2	437,7
25—29	568,3	695,7	617,4	584,5	534,6	425,3
	1.061,9	1.382,7	1 246,6	1.189,8	1.084,8	863,0
	422,2	601,0	696,6	390,7	546,2	468,3
30—34	494,1	629,9	680,5	377,4	528,4	453,0
	916,3	1.230,9	1.377,1	768,1	1.074,6	921,3
	393,5	457,0	635,1	582,5	560,1	509,2
35—39	453,2	522,3	639,5	567,5	537,1	491,4
	846,7	979,3	1.274,6	1.150,0	1.097,2	1.000,6
	367,3	384,3	547,1	634,2	356,0	497,2
40—44	414,0	450,5	574,3	620,4	344,3	481,7
	781,3	834,8	1.121,4	1.254,6	700,3	978,9
	347,9	349,8	406,2	565,5	517,9	497,6
45—49	384,3	409,1	471,5	577,2	512,2	484,7
	732,2	758,9	877,7	1.142,7	1.030,1	982,3
	315,3	315,8	330,4	470,4	545,3	306,6
50—54	344,8	367,7	400,2	510,2	551,1	306,0
	660,1	683,5	730,6	980,6	1.096,4	612,6
	260,6	284,0	285,5	331,6	461,6	422,7
55—59	286,4	329,3	350,5	403,9	494,5	438,9
	547,0	613,3	636,0	735,5	956,1	861,6
	219,9	238,0	238,4	249,4	355,1	411,6
60—64	257,5	373,7	292,0	317,7	405,1	437,6
	477,4	611,7	530,4	567,1	760,2	849,2
	158,5	174,4	190,0	191,1	221,9	308,9
65—69	189,4	200,2	230,1	245,0	282,3	345,6
	347,9	374,6	420,1	436,1	504,2	654,5
	158,0	187,4	204,0	210,7	217,3	288,6
70—79	203,5	231,0	245,1	268,6	289,9	356,6
	361,5	418,4	449,1	479,3	507,2	645,2
	30,8	35,7	42,3	46,2	47,3	49,0
80—ω	44,6	46,5	52,6	56.0	60,6	65,6
	75,4	82,2	94,9	102,2	107,9	114,6
	6.554,1	6.964,1	7.112,3	7.002,1	6.764,7	6.345,9
Sum	7.047,1	7.440,1	7.389,9	7.191,2	6.871,9	6.389,4
	13.601,2	14,404.2	14.502,2	14.193,3	13,636.6	12.735,3

The first line concerns men, the second one women and the third one both sexes together.

Development of age-composition of population in the Czechoslovak Republic.

Table II. Relative numbres. Table III.

Age \ Year	1921	1931	1941	1951	1961	1971	1921	1931	1941	1951	1961	1971
	8,0	10,3	8,7	7,7	7,4	6,9	100	137	117	102	96	82
0—4	7,2	9,5	8,1	7,3	7,1	6,6	100	137	117	103	96	83
	7,6	9,9	8,4	7,5	7,3	6,7	100	137	117	102	96	82
	10,7	9,7	8,6	6,9	6,7	6,5	100	96	88	70	65	59
5—9	9,8	9,0	8,1	6,7	6,5	6,4	100	95	87	69	64	59
	10,2	9,3	8,4	6,8	6,6	6,4	100	96	87	69	65	59
	12,0	6,3	8,6	7,5	6,8	6,8	100	56	78	67	59	55
10—14	11,0	5,9	8,2	7,2	6,6	6,6	100	55	77	67	58	54
	11,5	6,1	8,4	7,4	6,7	6,7	100	56	78	67	58	54
	11,2	9,7	9,1	8,4	6,9	6,9	100	92	88	80	64	59
15—19	10,6	9,0	8,5	8,0	6,6	6,6	100	89	84	77	61	57
	10,9	9,3	8,8	8,2	6,8	6,7	100	90	86	78	62	58
	9,8	10,7	5,9	8,4	7,4	6,9	100	116	65	91	78	68
20—24	9,7	10,0	5,5	7,9	7,1	6,7	100	108	60	84	72	63
	9,7	10,4	5,7	8,2	7,3	6,8	100	112	62	87	75	65
	7,5	9,9	8,8	8,6	8,1	6,9	100	139	127	123	111	89
25—29	8,1	9,5	8,4	8,1	7,8	6,7	100	122	109	103	94	75
	7,8	9,7	8,6	8,4	7,9	6,8	100	130	117	112	102	81
	6,4	8,6	9,8	5,6	8,1	7,4	100	142	165	93	129	111
30—34	7,0	8,6	9,2	5,3	7,7	7,1	100	127	138	76	107	92
	6,7	8,6	9,5	5,4	7,9	7,2	100	134	150	84	117	101
	6,0	6,6	8,9	8,3	8,3	8,0	100	116	162	148	142	129
35—39	6,4	7,1	8,7	7,9	7,8	7,7	100	115	141	125	119	108
	6,2	6,8	8,8	8,1	8,0	7,9	100	116	151	136	130	118
	5,6	5,5	7,7	9,1	5,3	7,8	100	105	149	173	97	135
40—44	5,9	6,1	7,8	8,6	5,0	7,5	100	109	139	150	83	116
	5,7	5,8	7,7	8,8	5,1	7,7	100	107	144	161	90	125
	5,3	5,0	5,7	8,1	7,7	7,8	100	101	117	163	149	143
45—49	5,4	5,6	6,4	8,0	7,5	7,6	100	106	123	150	133	126
	5,4	5,3	6,0	8,0	7,6	7,7	100	104	120	156	141	134
	4,8	4,5	4,6	6,7	8,1	4,8	100	100	105	149	173	97
50—54	4,9	5,0	5,4	7,1	8,0	4,8	100	107	116	148	160	89
	4,9	4,8	5,0	6,9	8,0	4,8	100	104	111	149	166	93
	4,0	4,1	4,0	4,7	6,8	6,7	100	109	110	127	177	162
55—59	4,1	4,5	4,7	5,6	7,2	6,9	100	115	122	141	173	153
	4,0	4,3	4,4	5,2	7,0	6,8	100	112	116	134	175	158
	3,4	3,4	3,4	3,6	5,2	6,5	100	108	108	113	162	187
60—64	3,7	3,7	3,9	4,4	5,9	6,8	100	106	113	123	157	170
	3,5	3,6	3,7	4,0	5,6	6,7	100	107	111	119	159	178
	2,4	2,5	2,7	2,7	3,3	4,9	100	110	120	121	140	195
65—69	2,7	2,7	3,1	3,4	4,1	5,4	100	106	121	129	149	182
	2,6	2,6	2,9	3,0	3,7	5,1	100	108	121	125	145	188
	2,4	2,7	2,9	3,0	3,2	4,5	100	119	129	133	138	183
70—79	2,9	3,2	3,3	3,7	4,2	5,6	100	114	120	132	142	175
	2,7	2,9	3,1	3,4	3,7	5,1	100	116	124	133	140	178
	0,5	0,5	0,6	0,7	0,7	0,8	100	116	137	150	154	159
80—ω	0,6	0,6	0,7	0,8	0,9	1,0	100	104	118	126	136	147
	0,6	0,6	0,6	0,7	0,8	0,9	100	109	126	136	143	152
	100	100	100	100	100	100						
Sum	100	100	100	100	100	100						
	100	100	100	100	100	100						

Development of age-composition of population in the Czechoslovak Republic.

Table Ia. Table IIa. Table IIIa.

Age \ Year	Absolute numbres			Relative numbres					
	1921	1941	1971	1921	1941	1971	1921	1941	1971
	525,8	764,6	764,6	8,0	10,4	9,6	100	145,4	145,4
0—4	511,0	741,2	741,2	7,2	9,7	9,4	100	145,0	145,0
	1.036,8	1.505,8	1.505,8	7,6	10,0	9,5	100	145,2	145,2
	698,1	672,8	672,8	10,7	9,1	8,5	100	96,4	96,4
5—9	692,5	656,5	656,5	9,7	8,6	8,3	100	94,8	94,8
	1.390,6	1.329,3	1.329,3	10,2	8,9	8,4	100	95,6	95,6
	784,2	657,6	657,6	12,0	8,9	8,3	100	83,9	83,9
10—14	776,6	640,5	640,5	11,0	8,4	8,1	100	82,5	82,5
	1.560,8	1.298,1	1.298,1	11,5	8,7	8,2	100	83,2	83,2
	733,4	645,9	645,9	11,2	8,8	8,1	100	88,1	88,1
15—19	745,9	624,7	624,7	10,6	8,2	7,9	100	83,8	83,8
	1.479,3	1.270,6	1.270,6	10,9	8,5	8,0	100	85,9	85,9
	645,0	419,3	626,8	9,8	5,7	7,9	100	65,0	97.2
20—24	681,0	407,8	606,8	9,7	5,4	7,7	100	59,9	89,1
	1.326,0	827,1	1.233,6	9,7	5,5	7,8	100	62,4	93,0
	493,6	629,2	605,3	7,5	8,5	7,6	100	127,5	122,6
25—29	568,3	617,4	584,5	8,1	8,1	7,4	100	108,6	102,9
	1.061,9	1.246,6	1.189,8	7,8	8,3	7,5	100	117,4	112,0
	422,2	696,6	584,3	6,4	9,5	7,4	100	165,0	138,4
30—34	494,1	680,5	561,3	7,0	8,9	7,1	100	137,7	113,6
	916,3	1.377,1	1.145,6	6,7	9,2	7,2	100	150,3	125,0
	393,5	636,1	560,1	6,0	8,6	7,1	100	161,7	142,3
35—39	453,2	639,5	537,1	6,4	8,4	6,8	100	141,1	118,5
	846,7	1.275,6	1.097,2	6,2	8,5	6,9	100	150,7	129,6
	367,3	547,1	531,4	5,6	7,4	6,7	100	149,0	144,7
40—44	414,0	574,3	511,7	5,9	7,5	6,5	100	138,7	123,6
	781,3	1.121,4	1.043,1	5,7	7,5	6,6	100	143,5	133,5
	347,9	406,2	497,6	5,3	5,5	6,3	100	116,8	143,0
45—49	384,3	471,5	484,7	5,4	6,2	6,1	100	122,7	126,1
	732,2	877,7	982,3	5,4	5,9	6,2	100	119,9	134,2
	315,3	330,4	306,6	4,8	4,5	3,9	100	104,8	97,2
50—54	344,8	400,2	306,0	4,9	5,3	3,9	100	116,1	88,7
	660,1	730,6	612,6	4,9	4,9	3,9	100	110,7	92,8
	260,6	285,5	422,7	4,0	3,9	5,3	100	109,6	162,2
55—59	286,4	350,5	438,9	4,1	4,6	5,6	100	122,4	153,2
	547,0	636,0	861,6	4,0	4,2	5,5	100	116,3	157,5
	219,9	238,4	411,6	3,4	3,2	5,2	100	108,4	187,2
60—64	257,5	292,0	437,6	3,7	3,8	5,5	100	113,4	169,9
	477,4	530,4	849,2	3,5	3,5	5,4	100	111,1	177,9
	158,5	190,0	308,9	2,4	2,6	3,9	100	119,8	194,9
65—69	189,4	230,1	345,6	2,7	3,0	4,4	100	121,5	182,5
	347,9	420,1	654,5	2,6	2,8	4,1	100	120,8	188,1
	158,0	204,0	288,6	2,4	2,8	3,6	100	129,1	182,7
70—79	203,5	245,1	356,6	2,9	3,2	4,5	100	120,4	175,2
	361,5	449,1	645,2	2,7	3,0	4,1	100	124,2	178,5
	30,8	42,3	49,0	0,5	0,6	0,6	100	137,3	159,1
80—ω	44,6	52,6	65,6	0,7	0,7	0,8	100	117,9	147,1
	75,4	94,9	114,6	0,6	0,6	0,7	100	125,9	152,0
	6.554,1	7.366,0	7,933,8	100	100	100			
Sum	7.047,1	7,624,4	7.899,3	100	100	100			
	13.601,2	14.993,4	15.833,1	100	100	100			

Table IV.

Development of the average-age.

Year	1921	1931	1941	1951	1961	1971
			Men			
1. alternative	28,2	29,1	30,6	32,6	34,4	35,8
2. alternative	28,2	28,9	29,7	30,7	31,3	31,8
Germany	28,8	30,6	32,4	34,0	35,3	36,2
			Women			
1. alternative	29,5	30,5	32,1	34,1	35,7	36,9
2. alternative	29,5	30,4	31,3	32,1	32,6	32,7
Germany	29,7	32,1	34,0	35,8	37,0	37,5

The mentioned logistic gives us as the maximum number of men the number 16,400.000. When we set a convenient supposition about the density of population instead about the death-and birthrate, as it is done in the mentioned publication of Dr. Friedli, and when we suppose that in Bohemia and Moravia, i. e. in countries not yet saturated with population, density will reach the number of 120 on 1 km^2, in Slovakia 90 on 1 km^2, in Podkarpatská Rus 60 on 1 km^2 (Silesia is already quite saturated) we get for the limit population the number of 16,340.000 which corresponds well to the value represented by the logistic.

Einige Bemerkungen zur Novellierung des tschechoslovakischen Gesetzes betreffend die Versicherung der Arbeitnehmer für den Fall der Krankheit, der Invalidität und des Alters.

Von Dr. *A. Zelenka.*

Das Gesetz über Sozialversicherung der Arbeiter trat bei uns am 1./VII. 1926 in Wirksamkeit. Wie zu erwarten war, wurde es zum Gegenstand der Angriffe einiger Arbeitgebergruppen, welche behaupteten, das die neue für sie entstehende Belastung allzu gross sei. Der Grossteil der Arbeitgeber versöhnte sich mit der neuen Belastung sehr bald. Auch einige Unklarheiten des Gesetzes waren Angriffen ausgesetzt. Ausserdem war die wirtschaftliche und politische Situation bei Wirksamkeitsbeginn des Gesetzes keine günstige. Um den Wünschen dieser Kreise zu entsprechen, gab die Regierung im Oktober 1927 einen Entwurf zur Novellierung des Gesetzes heraus (Druck des Abgeordnetenhauses Nr. 1225). Dieser Entwurf entsprach zwar den Wünschen des angeführten Teiles der Arbeitgeber, konnte aber die Versicherten nicht befriedigen und selbst