Evgenii Evgenievich SLUTSKY (or SLUTSKII)
b. 7 April 1880 (o.s.) - d. 10 March 1948

Summary. Slutsky contributed to the understanding of stochastic convergence. He made important contributions to econometrics; in time series analysis the Slutsky effect is named after him.

Slutsky was born in a village in the Yaroslavl gubernia (to the north of Moscow) in Russia. His father at the time was a supervisor in the Novinsk Teacher's College, but lost his job in 1886 for ethical reasons. After three further years the family returned to the father's native Ukraine where he was appointed director of the Zhitomir Teacher's College. Evgenii entered the classical gymnasium in this town, dreamed of becoming a physicist, and regarded mathematics only as a tool to this end. He also displayed considerable literary and artisitic learnings, and completed the gymnasium with a gold medal in 1899, when his father again came into conflict with his superiors and retired. Some of this uncompromising nature was to become evident also in the young Evgenii.

He entered the Physico-Mathematical Faculty at Kyiv (Kiev) University in 1899, from which, caught up in the revolutionary fervour of students in the Russian empire of the time, he was expelled in 1902 and forbidden to enter any Russian tertiary institution. The years 1902-1905 were spent at the Polytechnic Institute in Munich, ostensibly studying mechanical engineering (for which he showed no aptitude) while subsidised and encouraged by his grandmother, but actually pursuing an interest in economics. The changes in political climate of 1905 made it possible for him to begin political economy at Kyiv University in 1905. He ultimately completed his university studies in 1911, for a mathematically-based study entitled "The Theory of Limiting Utility" which became a now-famous though long-overlooked paper on the theory of consumer behaviour (Slutsky, 1915).

His interest in statistics and in the theory of probability as a theoretical basis for it, was stimulated by an elementary book of 1911 personally presented by its author, the physiologist A.V. Leontovich, which exposited techniques of Gauss (q.v.) and Karl Pearson (q.v.). Slutsky consequently produced a book whose full title, in English translation, is *The Theory of Correlations and Elements of Curves of Distribution.* In the Preface he refers to the new statistical school of Galton (q.v.) and Pearson, and gives as his motivation a contribution to the inevitable spread of its ideas. Publication

of this book in 1912 helped Slutsky gain a position at the Kyiv Commercial Institute in the Spring of 1915 where he worked, rising to the rank of professor, until 1926 when he left for Moscow. (From 1912 to 1918 he worked at a school of which his wife's father, N.N. Volodkevich, was director.)

In Slutsky's last 5 or so years in Kyiv, the interests of M.P. Kravchuk (q.v.), some 12 years younger and also working in this city, began to turn to statistics in a direction strongly influenced by the English Biometric School, and it is plausible to think there may have been some contact between the two, although their national orientations may well have been different. In overall interests and early career Slutsky's development, however, parallels closely that of his eminent countryman, A.A. Chuprov (q.v.), only some 6 years older. It is therefore not surprising that the two established close academic contact that continued until the émigré Chuprov's untimely death.

In Moscow Slutsky decided to pursue theoretical problems of statistics (though these were influenced by interests in economics and in geophysics); he worked at the Koniunkturnyi (Conjunctural) Institute (an institute for the study of business cycles) and the Central Statistical Office until about 1931. In 1928 in a short communication in *C.R. Acad. Sci. Paris* **180**, 370, he ascribed the Strong Law of Large Numbers to Borel (q.v.) when it had been hitherto believed to be due to Francesco Paolo Cantelli (1875-1966). The matter was noticed by the Italians and came to a head during the 8th International Congress of Mathematicians, held in Bologna, Italy, 3-10 September, 1928. The dispute's evolution is described in detail in two letters from Slutsky to his wife during the Congress (see Seneta, 1992). They show Slutsky uncompromising, and perhaps a little less than gracious in victory.

From 1931 to 1934 he worked at the Central Institute of Meteorology, from 1934 at Moscow State University, and from 1938, after a wartime period in Tashkent, until his death in the security of the Steklov Mathematical Institute of the USSR Academy of Sciences. The subject of Statistics was severely repressed, one of many repressions, under Stalin from the early 1930's (e.g. Seneta, 1985), and Slutsky's moves would have been forced by the necessity of avoiding the line of fire and keeping a job. One sees a roughly similar effect at a similar time in the careers of S.N. Bernstein (q.v.) and M.P. Kravchuk (q.v.).

Slutsky's (1925) paper had a fundamental influence in elucidating the notion of convergence in probability (although to some extent in this he had been anticipated by Cantelli) and establishing a form of what is now known as Slutsky's Theorem. (A version of this theorem states that if a sequence

of random variables $\{X_n\}$ converges in probability to a random variable X, and f is a continuous function, then $\{f(X_n)\}$ converges in probability to $f(X)$.) The paper, naturally, contains a form of the Weak Law of Large Numbers from which these notions derive. Here the influence of Chuprov and the Japanese mathematician M. Watanabe is manifest. No doubt the paper contains the seeds of Slutsky's discontent with Cantelli. Slutsky also treated random sequences, stimulated by manifestation of periodicity in economic time-series data. In the most famous of these papers the Slutsky effect- that repeated filtering of even a purely random series introduces spurious periodicity- is elucidated. More generally he studied the attributes of random functions and may be regarded as one of the founders of the theory of stationary random processes, thus encompassing a very broad range of applicability for his mathematical talents.

In his final years he supervised the tabulation of the incomplete gamma and beta functions at the Steklov Institute, and died in the course of this task, while reading Galsworthy's *The Forsyte Saga* for recreation.

References

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