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An Accurate Statistical Estimation of the Lifelength of ƒ100- Banknotes: a Circulation Trial with Two Qualities of Currency Paper

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Summary

For over two years the issue and subsequent withdrawal of approximately 1.2 million Dutch ƒ l00-banknotes has been recorded with the aid of the Bank's banknote sorting system. The banknotes were printed on two varieties of paper differing in quality, i.e. with and without flax. The results are analysed using statistical techniques common to industrial quality control and reliability engineering. Technically and economically, it appears advantageous to switch from conventional paper with flax to paper without flax. The consumption of ƒ 100 banknotes will consequently be reduced by approximately 23 per cent, provided the fit/unfit criterion used until now will be maintained. The mean time to failure of ƒ 100-banknotes printed on paper with flax is assessed at 150 weeks and on paper without flax at 196 weeks.

Furthermore, the rate at which banknotes are returned to the Bank appears to be independent of age or deterioration, contrary to common notion.* The cumulative fraction of banknotes withdrawn may be approximated by a two-parameter gamma distribution, the scale parameter being a measure of the circulation rate and the shape parameter a measure of the paper quality.

* Gresham 's Law.