

BACKGROUND

Large organizations typically tie employee salaries to a market-informed internally defined structure. A series of bands is often used, with midpoint salaries on a fixed-increment geometric progression. The benefits of salary band structures include simplification and stabilization of complex, fluctuating market reference data, and the creation of clear boundaries between salaries by job level. Liabilities include divergence from market norms due to discretization, with roughly half of the jobs positioned below market, leading to hiring and retention challenges.

Standard approaches to salary structure design also fit parameters by the collection of jobs and market references, without consideration of population by job, unnecessarily exacerbating these challenges. Populations by job title and level¹ may be highly variable (see Fig. 1).

The premise of this case study is that superior band structures may be designed by considering job-level populations and varying midpoint increments.

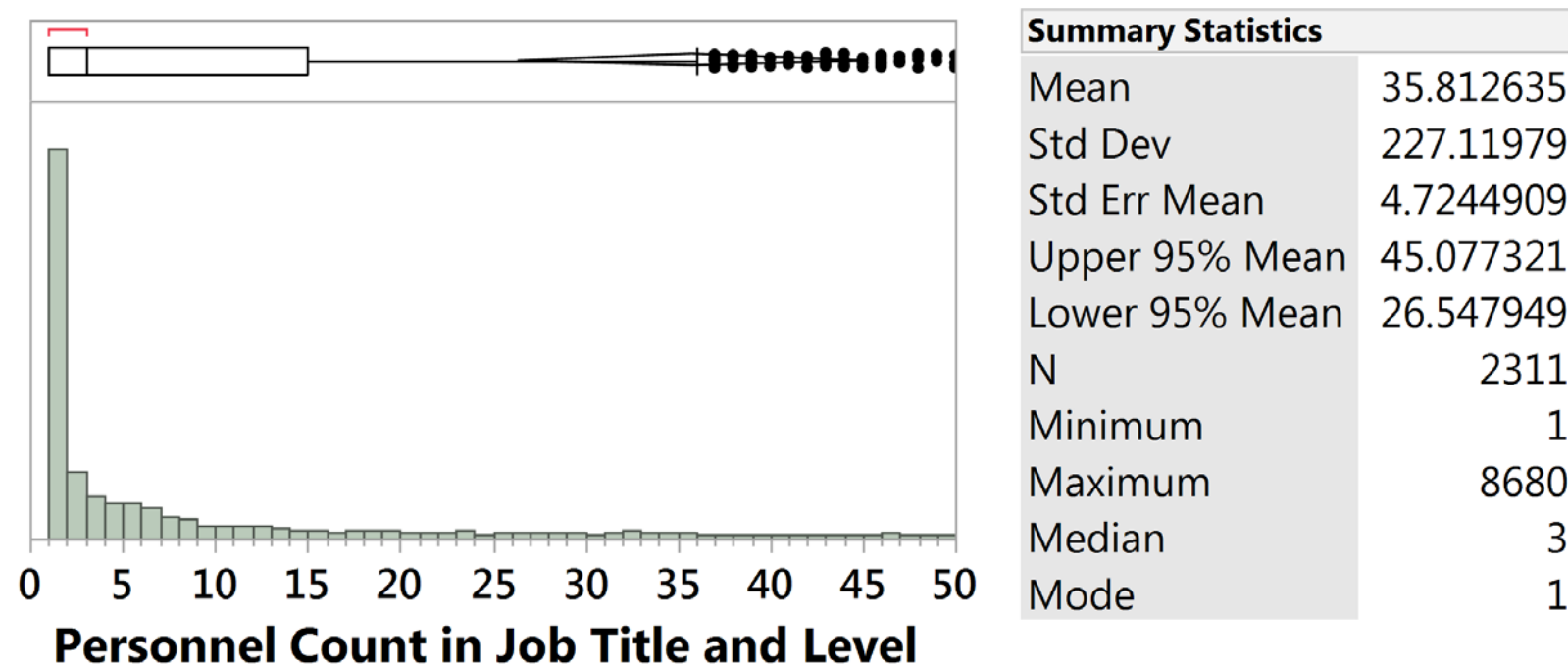


Figure 1: Florida state government personnel counts by job and level.

APPROACH

The mathematics of the standard fixed-increment geometric progression used in Human Resources practice are shown below².

I = Fixed Increment **D₁ = Lowest Midpoint**
i = Variable Increment **D_N = Highest Midpoint**
N = Band Count **D_n = Midpoint of Band**
n = Specific Band **D_J = Market Reference**

$$Loss = \left[\log \left(\frac{D_n}{D_J} \right) \right]^2$$

$$D_n = D_1 \times (1 + I)^{Round \left(\left[\frac{\log(D_J/D_1)}{\log(1+I)} \right] \right)}$$

Smaller increments between levels for lower-paid jobs should improve fit, given observed tendencies in compensation spread³ (see Fig. 2). The mathematics for a steadily increasing increment were developed to address this opportunity:

$$\prod_{n=1}^{N-1} (1+I) = \prod_{n=1}^{N-1} (1+i) \quad i(n) = \epsilon \cdot I \cdot 10^{\alpha(n-1)} \quad \alpha = \frac{\log(1/\epsilon)}{N-1}$$

$$D_J = D_1 \cdot 10^{\epsilon \cdot 10^{\frac{n-1}{N-1} \log(1/\epsilon)} \cdot \log(1+I) \cdot (n-1)}$$

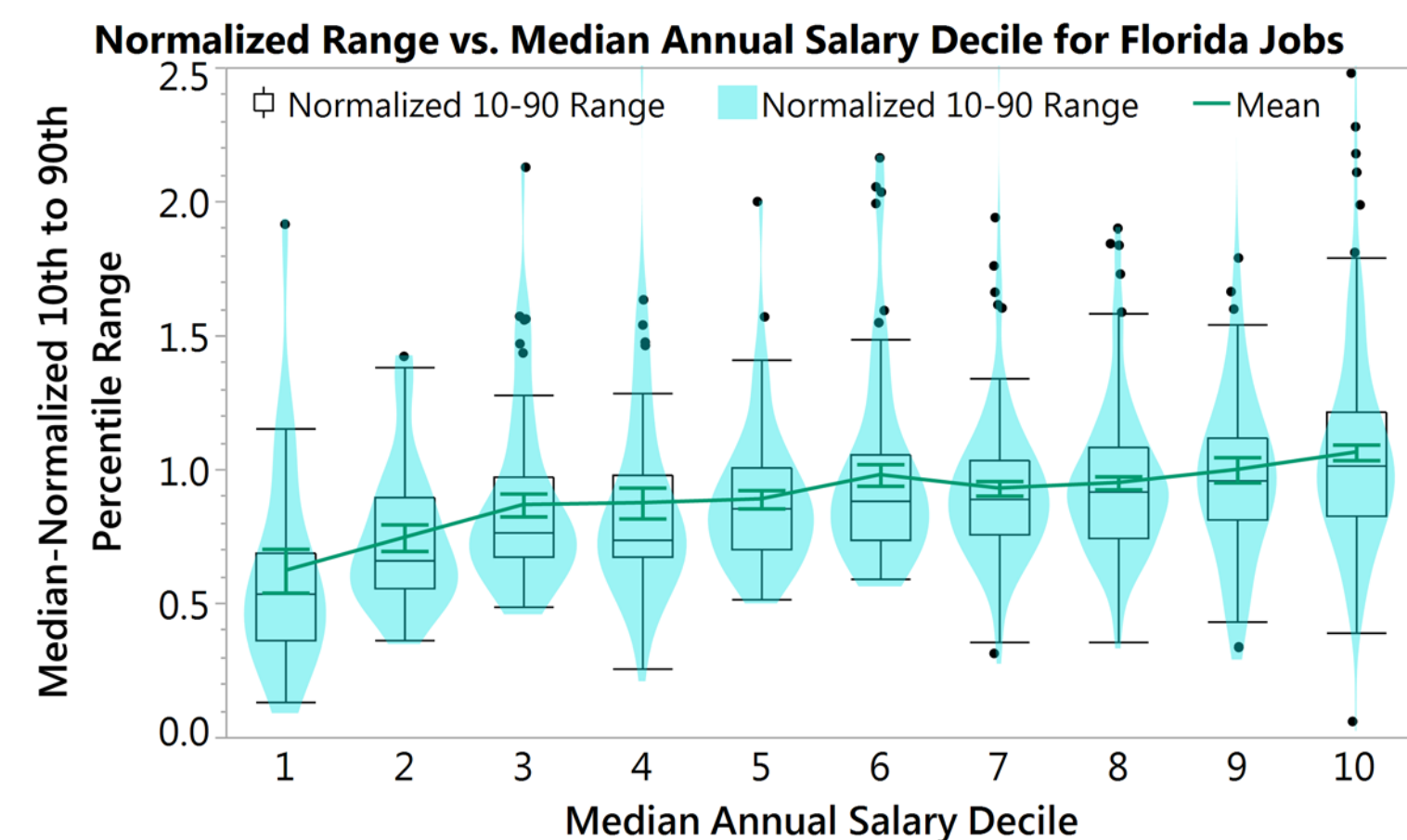


Figure 2: Summary of Bureau of Labor Standards survey salary ranges for the State of Florida.

RESULTS

The standard fixed-increment approach is equivalent to $\epsilon = 1$ in the increasing increment model. The value of ϵ for minimum aggregate loss varies with band count but the fixed increment model is clearly suboptimal (Figs. 3-4).

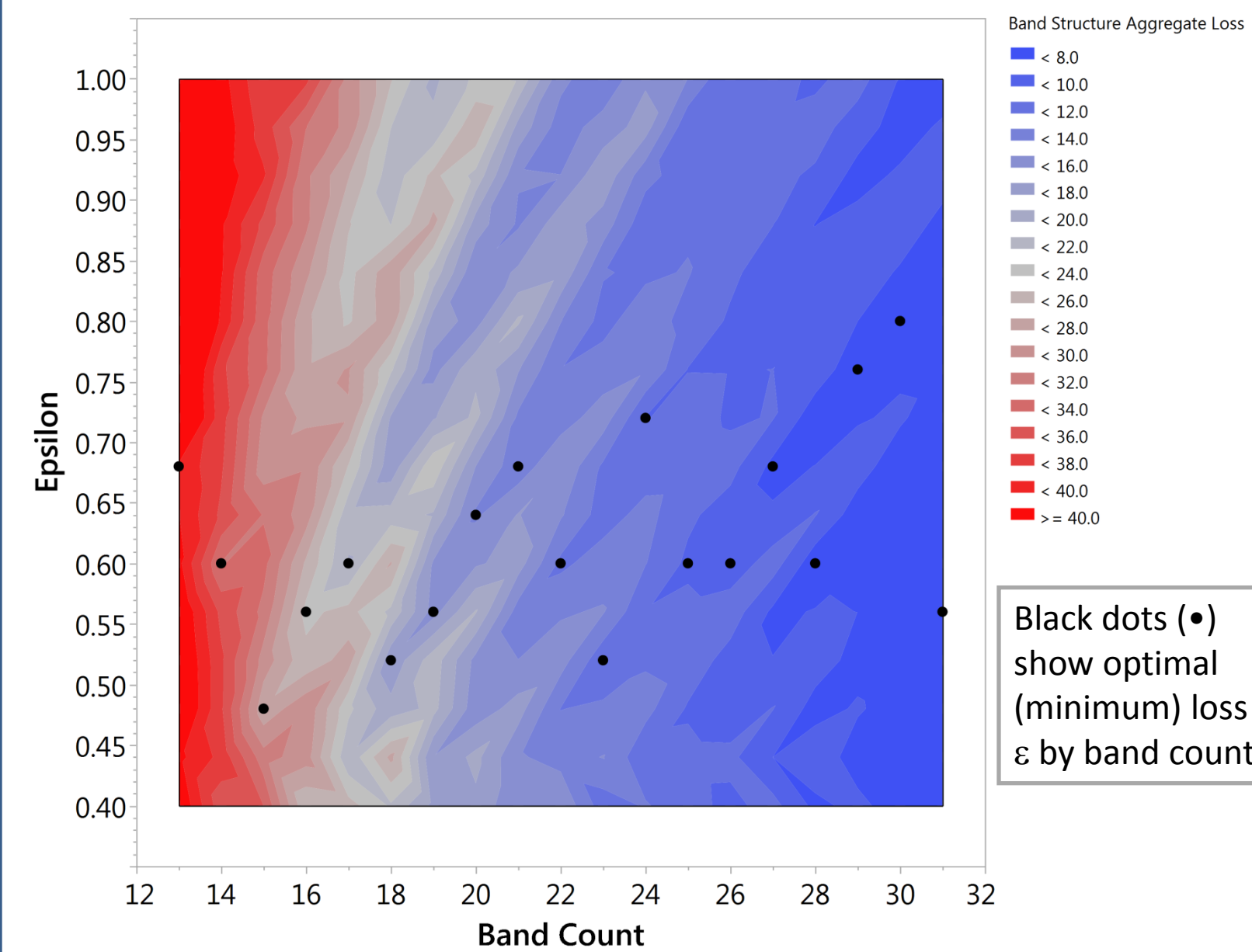


Figure 3: Aggregate loss vs. ϵ and band count.

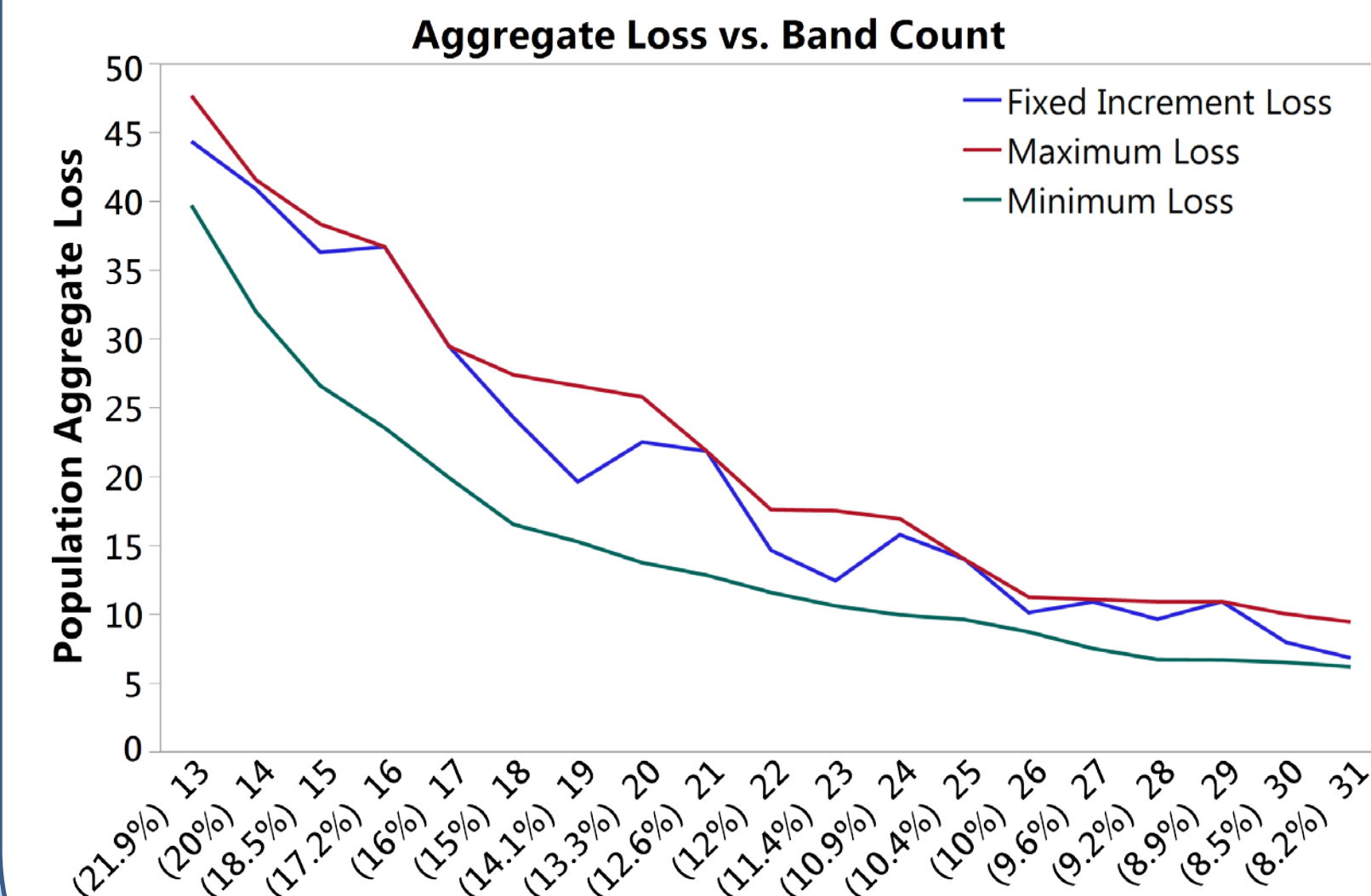


Figure 4: Aggregate loss performance.

COMMENTS

Aggregate statistical loss is a measure of model fitting error to a data set. In the context of analysis for operational management it should represent lost value. Suboptimal salary structure design impacts all personnel, thus frequency by job and level should be considered.

In this case study a geometrically symmetric point loss function was used to demonstrate the benefit of accommodating employee population distribution. An asymmetric loss function considering the various salary structure related factors influencing employee intention to leave⁴, productivity effects, and the costs associated with turnover would be expected to yield different outcomes. The development of more representative functions will require substantial research. Such research is justified given that personnel costs are the dominant operating expense of most firms⁵.

REFERENCES AND NOTES

1. State of Florida, Florida State Employee Salary Data. <http://salaries.myflorida.com/> accessed January 30th, 2017.
2. Purushotham, Daniel P. and Wilson, Stephanie Y., Building Pay Structures. WorldatWork: 2009; 48 pages.
3. Bureau of Labor Standards, Florida Salary Data by Occupation for May 2015. www.bls.gov/oes accessed January 30th, 2017.
4. Allen, David G., et al., Structural validity and generalisability of a referent cognitions model of turnover intentions. Applied Psychology 2009, 58, (4), 709-728.
5. Tully, Shawn, Fortune 500: The year of living profitably. Fortune May 7, 2012, 2012.

Salary data for 112,201 Florida State Government employees were used in this study, filtered to remove hourly employees and those with salaries outside Florida's broadband limits, yielding 82,763 employees with salaries ranging from \$18600 to \$200,000 annually. These data were assumed to be market-neutral, meaning that the average salary for each job and level was used as the market reference. The author hereby express his appreciation to the State of Florida for permission to use personnel and compensation structure data in this analysis, and to the Bureau of Labor Standards for the use of salary survey data local to Florida. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND NO. 2017-XXXXP