



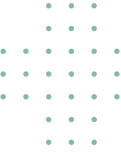
COMPANY MERGER OPTIMIZATION

By: Mackenzie Lees and Matea Gjka





Problem Statement



- Issues during merger: integrating human capital and maximizing financial assets
 - Risks: shareholder value erosion, weakened brand
- Goal: Develop optimization model to balance financial and human capital objectives

Datasets



Employees

Company, salary, revenue,
department, score review,
age, level in company, years
in company, race, gender,
and severance estimate



Demand

Maximum and minimum
number of people for each
department and level



Financials

Asset value, debt value,
and shareholder equity

Methodology



Model 1 (4 cases)

$$\text{maximize } \sum_{i=1}^n r_i x_i - \sum_{i=1}^n c_i x_i - \sum_{i=1}^n s_i (1 - x_i)$$

$$\text{s.t. } \sum_{x_i \in D_{jk}} x_i \geq dmin_{jk}$$

$$\sum_{x_i \in D_{jk}} x_i \leq dmax_{jk}$$

$$x_i \gamma_i \geq a - M(1 - x_i)$$

$$\sum_{i=1}^n x_i \leq Emax$$

$$x_i \in \{0, 1\}$$

$$\sum_{i \in Female} x_i \geq 0.4 \sum_{i=1}^n x_i$$

$$\sum_{i \in AfricanAmerican} x_i \geq 0.15 \sum_{i=1}^n x_i$$

$$\sum_{i \in Hispanic} x_i \geq 0.15 \sum_{i=1}^n x_i$$

$$\sum_{i \in Other} x_i \geq 0.05 \sum_{i=1}^n x_i$$

$$\sum_{i \notin Caucasian} x_i \geq 0.6 \sum_{i=1}^n x_i$$

Model 2 (3 cases)

$$\text{maximize } \sum_{i=1}^n v_i x_i$$

$$\sum_{i=1}^n v_i x_i \geq \sum_{i=1}^n l_i$$

$$\sum_{i=1}^n l_i \geq \sum_{i=1}^n s_i$$

$$l_i \leq M x_i \forall i = 1 \dots n$$

$$s_i \leq M_s x_i \forall i = 1 \dots n$$

$$x_i \in \{0, 1\} \forall i = 1 \dots n$$

$$l_i, s_i \geq 0 \forall i = 1 \dots n$$

Key Findings

Model 1



Diversity

Specific diversity constraints decrease profits



Salary, revenue, severance

Key drivers of employee retention



Score

Augment or remove score has no impact on objective



Total profits

Highest Profits from relaxed diversity constraint

Model 2



Trade Off

Increasing equity issued leads to higher objective; cost of diluting stock value

Impact

Model 1

- Meet departmental labor needs
- Balanced, inclusive workforce while maintaining key performance metrics
 - Minimize cost of severance payments due to layoffs

Model 2

- Maximize value of acquired assets
- Preserve healthy solvency and liquidity ratios
- Avoid over-issuance of company stock, maintaining per-share-value



THANKS!

Do you have any questions?

