Contribution of Productivity Extremes in Estimation

(Chapter 11 – Software Project Estimation)

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Topics covered

1. Introduction
2. Identification of Productivity Extremes
3. Investigation of Productivity Extremes
4. Lessons Learned for Estimation Purposes

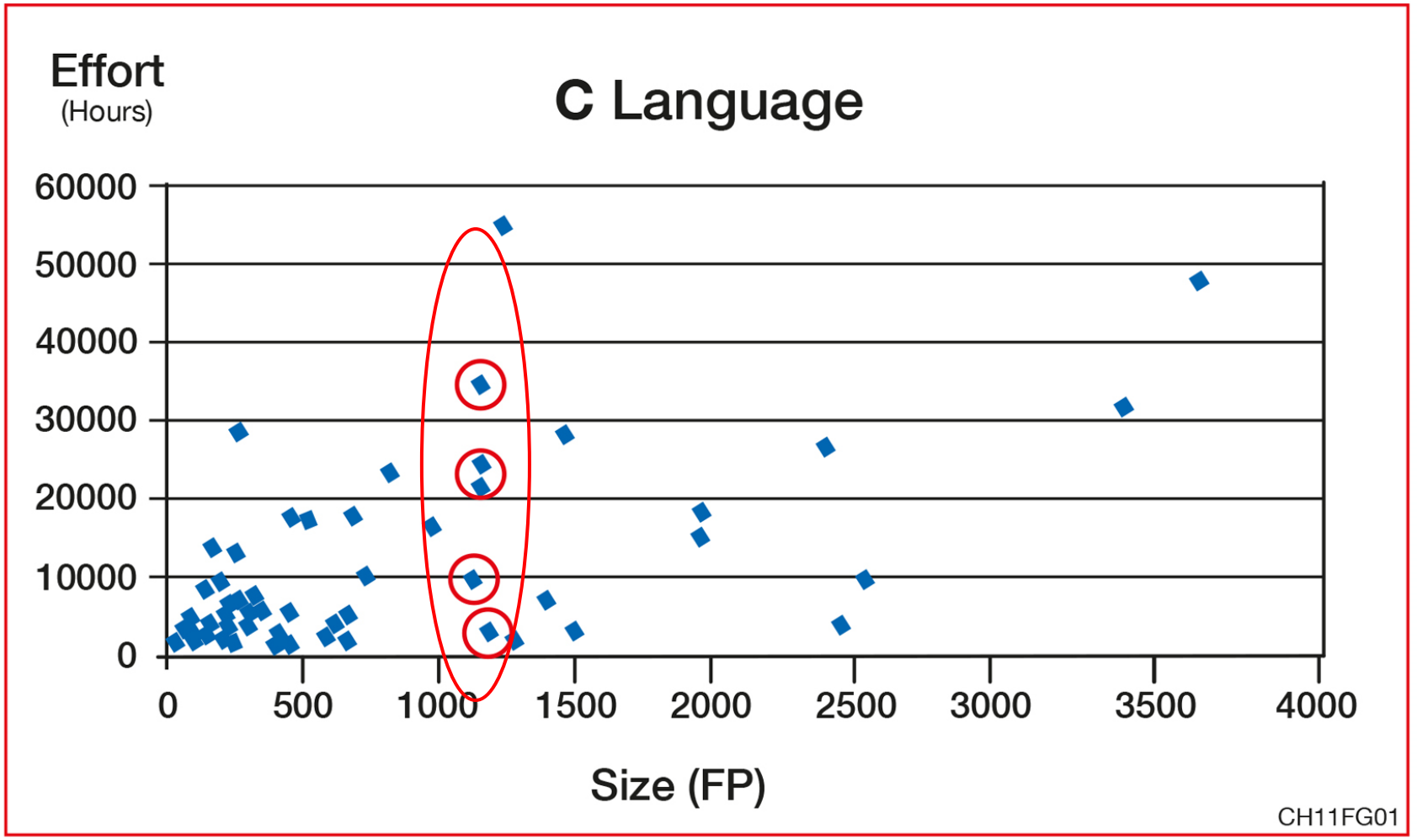
11.1 Introduction

Variations in productivity

- Software project productivity can vary considerably:
  - Projects of similar functional size may have required significantly different levels of effort for their development.
- How to handle this issue?
  1. Identify projects which have significantly different productivity ratios.
  2. Try to discover which factors (cost drivers) have such a strong influence (positive or negative) on the productivity of these projects.
  3. Introduce the cost drivers into the estimation process.

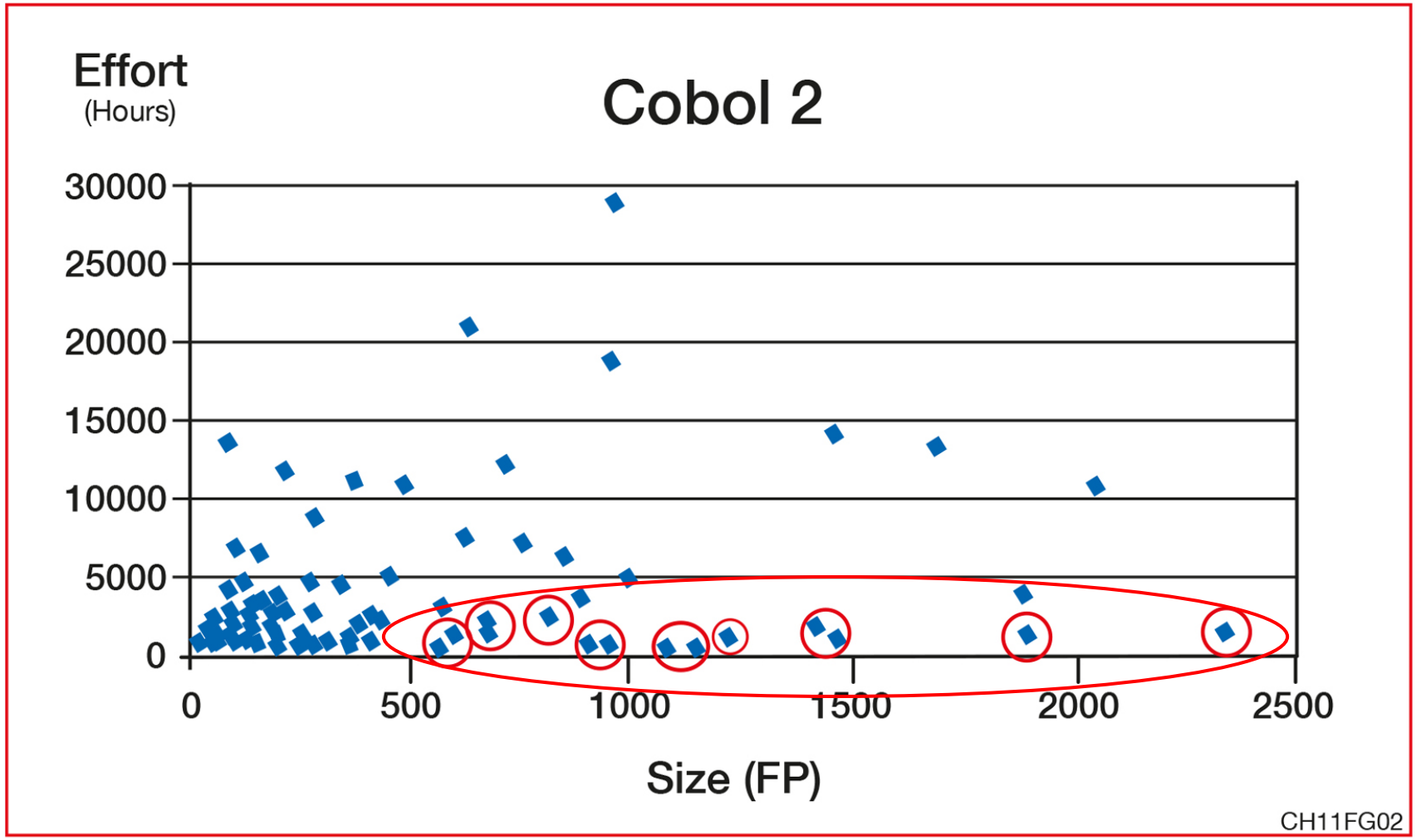
11.2 Identification of Productivity Extremes

Variation of effort for projects with similar size



C Projects from ISBSG R9 (N=118)

Projects with very low unit effort regardless of their size



(ISBSG R9, Cobol 2) N=115

11.3 Investigation of Productivity Extremes

Investigation of factors

Explore the factors (variables) recorded that might explain the size/effort relationship.

Projects with very low unit effort

- ISBSG repository available: 115 projects
- Variables identified:
  1. The operating system (O/S)
  2. The primary database management system (DBMS)
  3. The Data Quality Rating (DQR)
  4. The resource level (RL): the personnel recording the effort
  5. The type of organization that sent the data
  6. The reference table approach: the IFPUG Function Points version used to count the tables of codes in the software.

Projects with very high unit effort

- ISBSG repository: Projects in Java, Cobol, C, and SQL (Tables 11.4 to 11.7)
- Variables identified:
    1. Standard FP: IFPUG standard used to count Function Points.
    2. Max Team Size: Maximum number of people who worked on the project at the same time (peak time).
    3. Resource Level (RL)
    4. Project Elapsed Time (PET): Duration, in months, to complete development of the project.

11.4 Lessons Learned for Estimation Purposes

Lessons learned from extreme projects

- Identify candidate explanatory variables that might explain the behaviors of these projects.
- Analyze the variables and their impact on producvity.
- Benefits for practitioners:
  - The variables can provide valuable clues for early detection of potentially extreme projects.
    - The monitoring most optimistic or the most pessimistic value should be selected.
    - Avoid to be caught with an estimate that would need to be tripled or quadrupled later on.

Exercises

1. In Figure 11.1, what is the range of variation of productivity for projects of a similar size of around 700 FP?
2. In Figure 11.2, what is the range of variation of productivity for projects of a similar size, around 1,000 FP?
3. Do the projects circled in red in Figure 11.2 exhibit low or high unit effort?
4. In Figure 11.1, which candidate variables are identified as candidate factors of very low or very high unit effort for the projects in C?
5. In Table 11.7, which candidate variables are identified as candidate factors for high unit effort for the SQL projects?
6. Are the variables identified as candidate factors in question 5 known only at the end of the project? Or, by contrast, are they known up front? If the latter, how can you integrate these factors into your risk analysis and into your estimation process?

Term Assignments

1. Select a dataset documented in the literature (or from the ISBSG repository). Represent it graphically and identify the ranges of productivity.

2. Study the dataset from your organization. Select the most productive project and the least productive one. What is the difference in productivity? What are the most obvious factors influencing the most productive one? The least productive one?

3. You have identified a few key factors in your responses to exercise 4 that have a major impact on productivity (for either very high or very low productivity). Are these factors known only at the end of the project, or are they known up front? If the latter, how can you integrate these factors into your risk analysis and into your estimation process? Based on your findings, propose an enhancement to your organization's estimation process.

4. Select samples from the ISBSG repository. Compare them in terms of their extremes in unit effort.

5. Using the samples from the previous exercise, compare the factors of the extreme projects and identify factors common to projects with very low or very high unit effort.