



Quantifying the Value of Union Labor in Construction Projects

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Hollywood, FL
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Disclosure Statement

This document and the information contained herein are considered disclosable and are derived from the work commissioned by the Mechanical Industry Investment Fund (MIAF).

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Project File: MCA-Y301-RES

Outline

- *Background*
- Introduction to IPA
- Database and Methodology
- Analysis
- Conclusions

Background

- In 2008, IPA presented research on the drivers of US labor productivity at the UA/MCAA labor conference. The study identified a range of drivers of labor productivity. Among these were the type of labor employed on projects. The study showed that union labor in the US, was 15 percent more productive than open shop labor
- In 2022, the (MIAF) requested IPA update the study and do a deeper dive into the drivers that explain the differences in productivity between union and open shop labor in the US
- The following presentation are the findings taken from that study

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Improving Your System Performance Is Our Mission



IPA's Mission

Conduct research into the functioning of capital projects and project systems

Apply the results of that research to help our customers create and use capital assets more efficiently

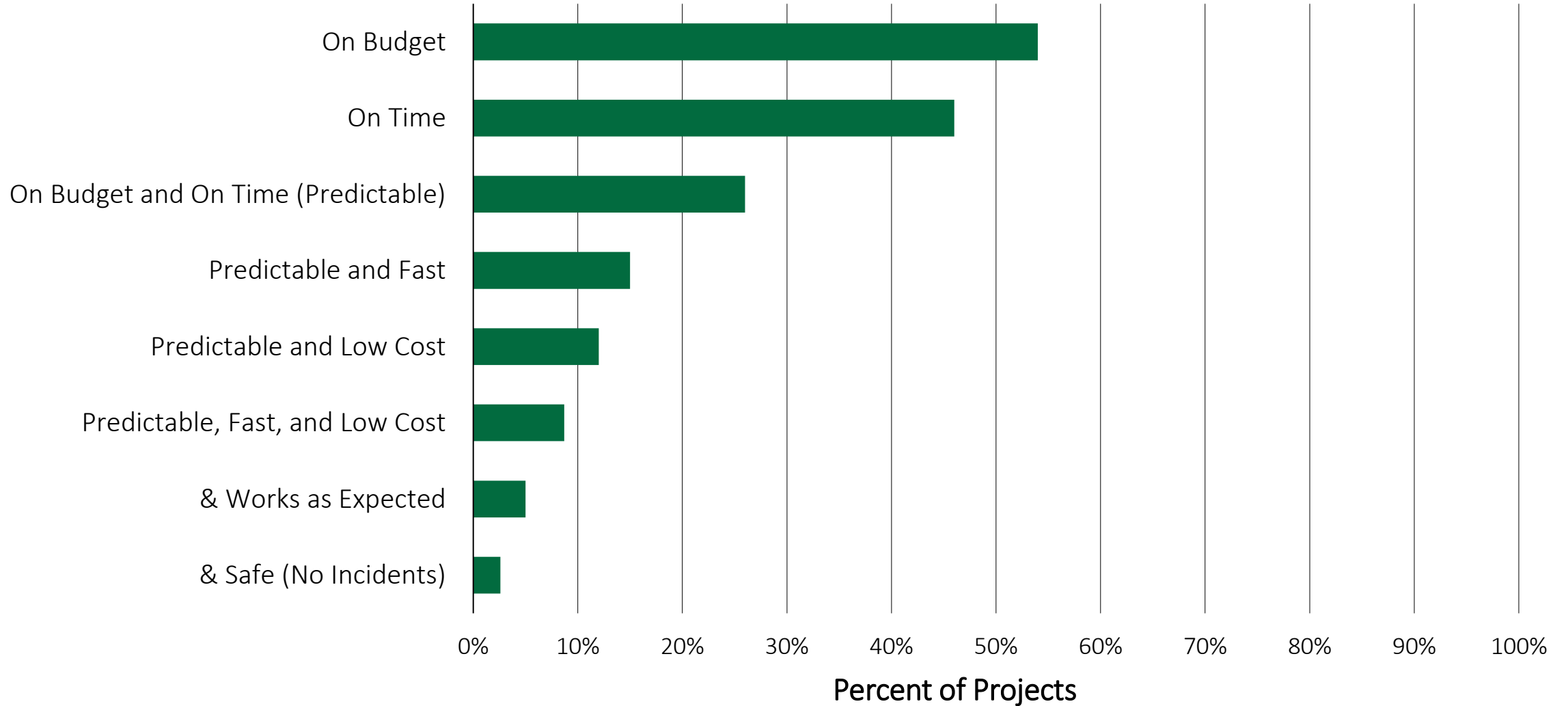
How We Achieve Our Mission

Empirical research

Quantitative benchmarking

Quantitative project risk assessment

Few Capital Projects Meet All Objectives



Results based on projects in the IPA database

IPA Is a Data-Driven Research Company

The world's leading advisory firm on capital projects

A benchmarking, research, and consulting organization founded in 1987 devoted to the empirical research of capital project systems

Offices in Australia, Brazil, Singapore, the UK, Netherlands, and the US

Proprietary & Granular Databases

We maintain a steady flow of high quality proprietary non-public domain capital project data



Research

Our database enables the research that flows into our products and services



Clients

We have unparalleled access to a global network of capital intensive organizations and their leaderships



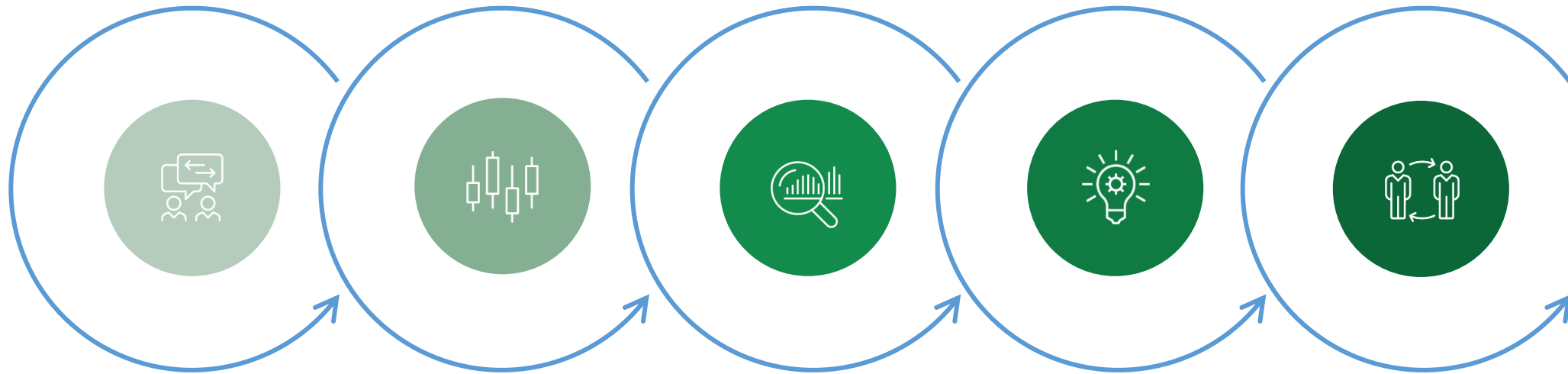
Validation

Our recommendations are continuously verified to yield business value



IPA's Unique Methodology

Built on Data, Research, and Development



Collect Data

Actual data direct from the project teams

Carefully Normalize Data

Make fair comparisons for benchmarking and research

Research

Use statistical models to analyze data to link practices and results and identify trends

Transfer Knowledge

Develop products and services that span the full spectrum of project system improvement

Enrich Database

Data and client feedback to update database and tools

IPA's Proprietary Database



Over 24,000 Projects With More Than 30 million Data Points

Industrial Projects

11,000+ projects
Major industrial projects

Site & Sustaining Capital

10,000+ projects
Non-major projects (from \$50k to \$50 million)

Planned Shutdowns/Turnarounds

700+ turnarounds
Facility turnarounds

Megaprojects

750+ projects
Billion dollar class projects from all industries

Organizational Effectiveness Database

800+ organizations
E&P, refining, MMM, chemicals, gathering & distribution, life sciences, consumer products, infrastructure, and power

Exploration & Production

2,000+ projects
Onshore and offshore petroleum production

Hydrocarbon Processing

7,100+ projects
Refining and midstream

Chemicals

7,700+ projects
Commodity and specialty chemicals

Mining, Minerals, & Metals (MMM)

1,500+ projects; 170+ with mine scope
Mineral processing, mines, civil, finishing, etc.

Pipeline

1,800+ projects
Pipelines, terminals, booster stations, etc.

Life Sciences

900+ projects
Biopharma, API, OSD, sterile manufacturing, labs

Nutrition & Consumer Goods

800+ projects
Blending, forming, packaging, etc.

Infrastructure

200+ projects
Ports, terminals, rail, airports, hospitals, etc.

Power & Renewables

500+ projects
Generation (coal, gas, hydro, nuclear, wind, solar), distribution, and transmission

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Database Description

Recent Industrial Projects in the United States – Used for the 2022 study

Characteristic	United States N= 1,550 Mean and range
Project Size MM \$US 2022	89 (median) 0.2 > 6,000
Authorization Year	2007 (2000 – 2022)
Labor Force Make up for Project	51 percent Open Shop 25 percent Union 24 percent Mixed
Project Type	21 percent Greenfield/Colocated 37 percent Add on/Expansion 39 percent Revamp 3 percent Other
Industrial Sector	29 percent Oil Refining 38 percent Chemicals 8 percent Pharmaceuticals 8 percent Consumer Products 9 percent Distribution 5 percent Mining, Metals and Minerals 3 percent Pulp and Paper/other

Table 1

Drivers of Labor Productivity

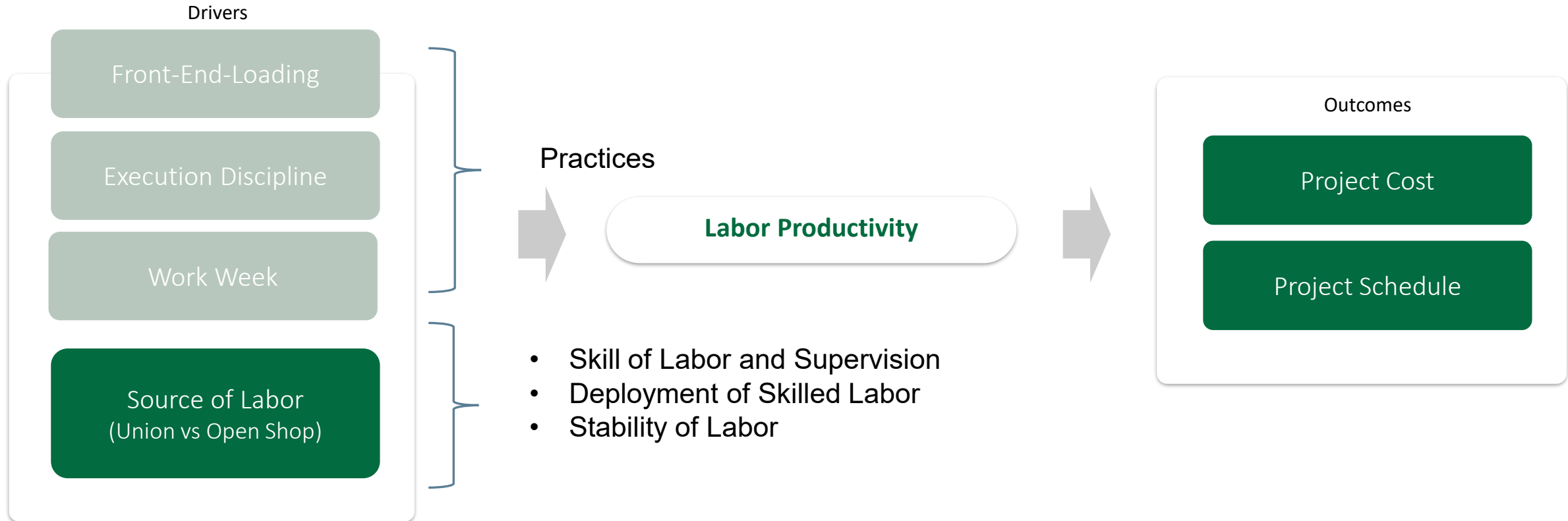


Figure 2

Methodology - Regression Analysis

- Regression analysis is a statistical method to quantify the relationship(s) between one or more variables, or drivers, on a given outcome
- The relationship is expressed by an algebraic equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \mu$$

- The relationship between each independent variable (X_n) and the dependent variable (Y) is quantified by the coefficients (β_n)
- The regression analysis calculates the coefficients that minimize the error (μ) within the model

So How Does the Apply to Labor Productivity

- We use regression analysis to predict the overall hours required for a project as well as the labor hours by craft per installed quantity controlling. In both cases, we controlled for a variety of factors including the project scope, project type, size, owner practices etc.
- If the project requires more hours than the benchmark, the labor productivity is lower/worse than the Industry benchmark. Likewise if fewer labor hours than the benchmark are required, the productivity is better/higher than the Industry benchmark
- We express the labor productivity as an Index with 1.00 being Industry average. A value greater than 1.00 is higher/better productivity

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Drivers of Labor Productivity

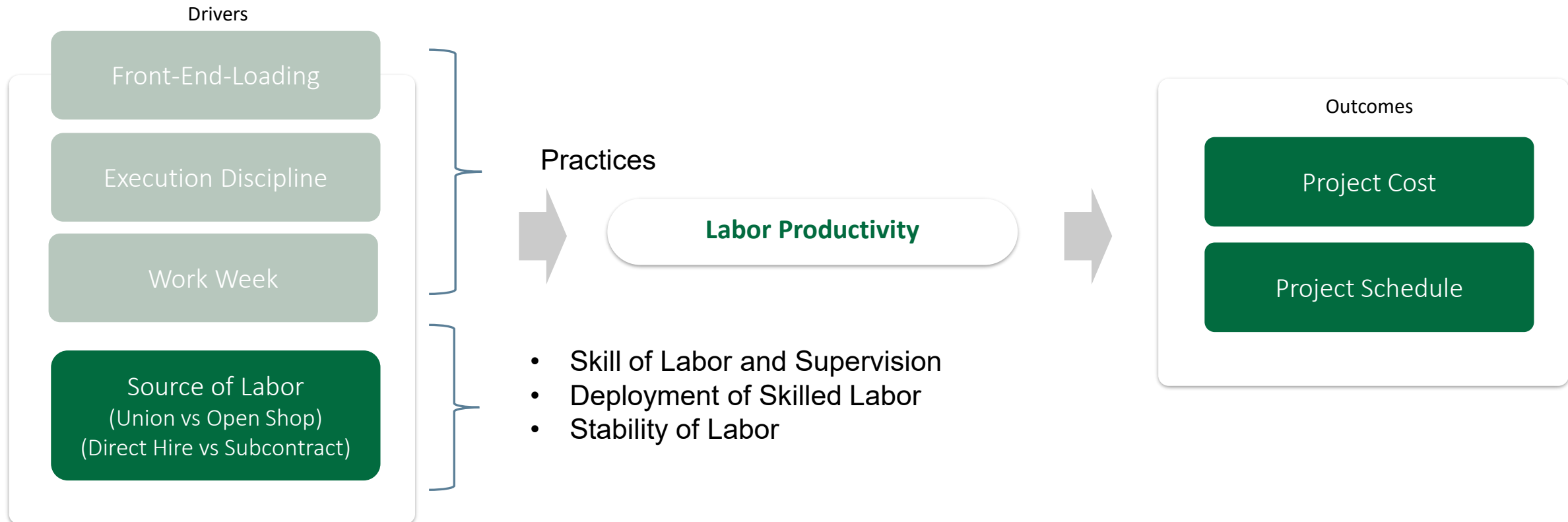


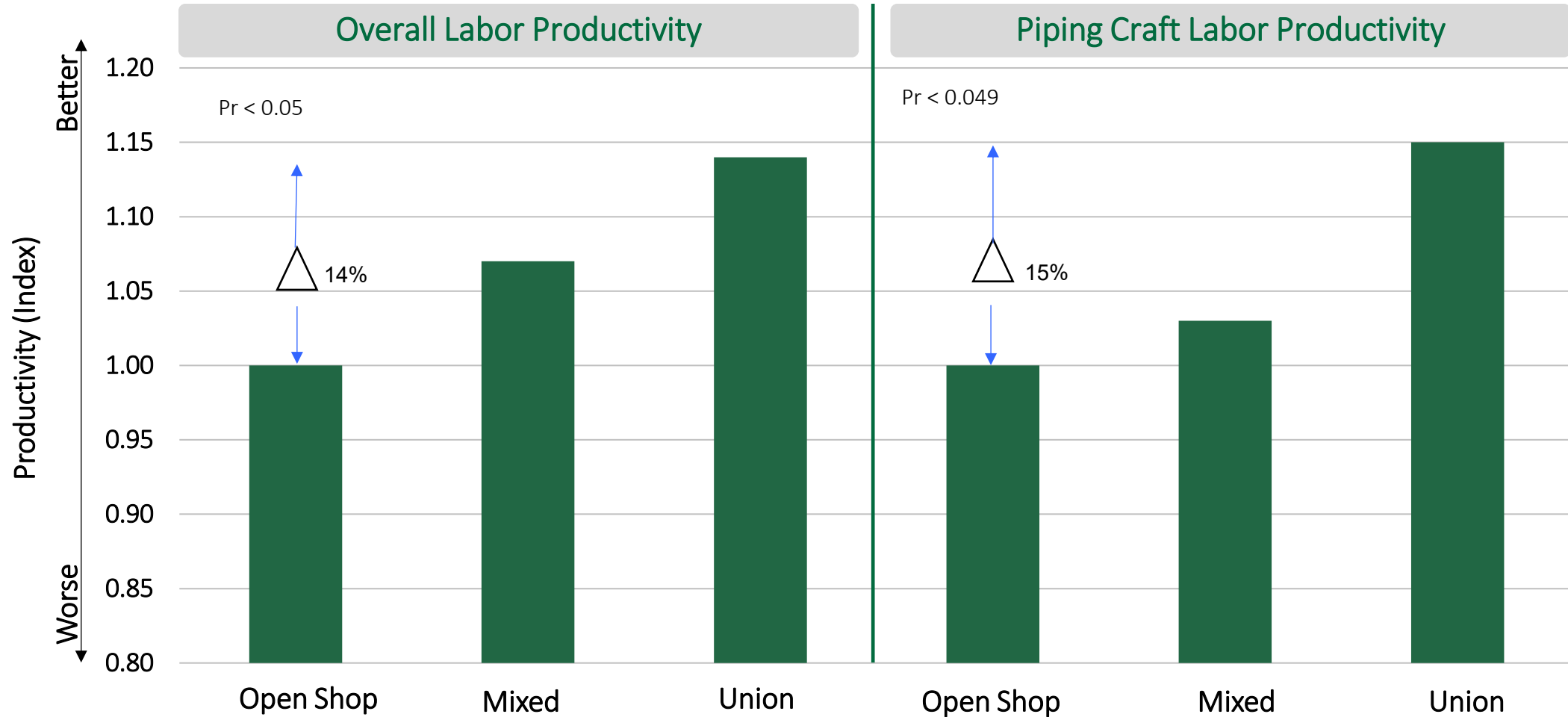
Figure 2

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 - *Labor source and labor productivity*
 - *Labor source and overall project costs*
- Conclusions

Union Labor vs Mixed and Open Shop Labor Productivity

Union labor is significantly more productive with both methodologies (overall and by craft)

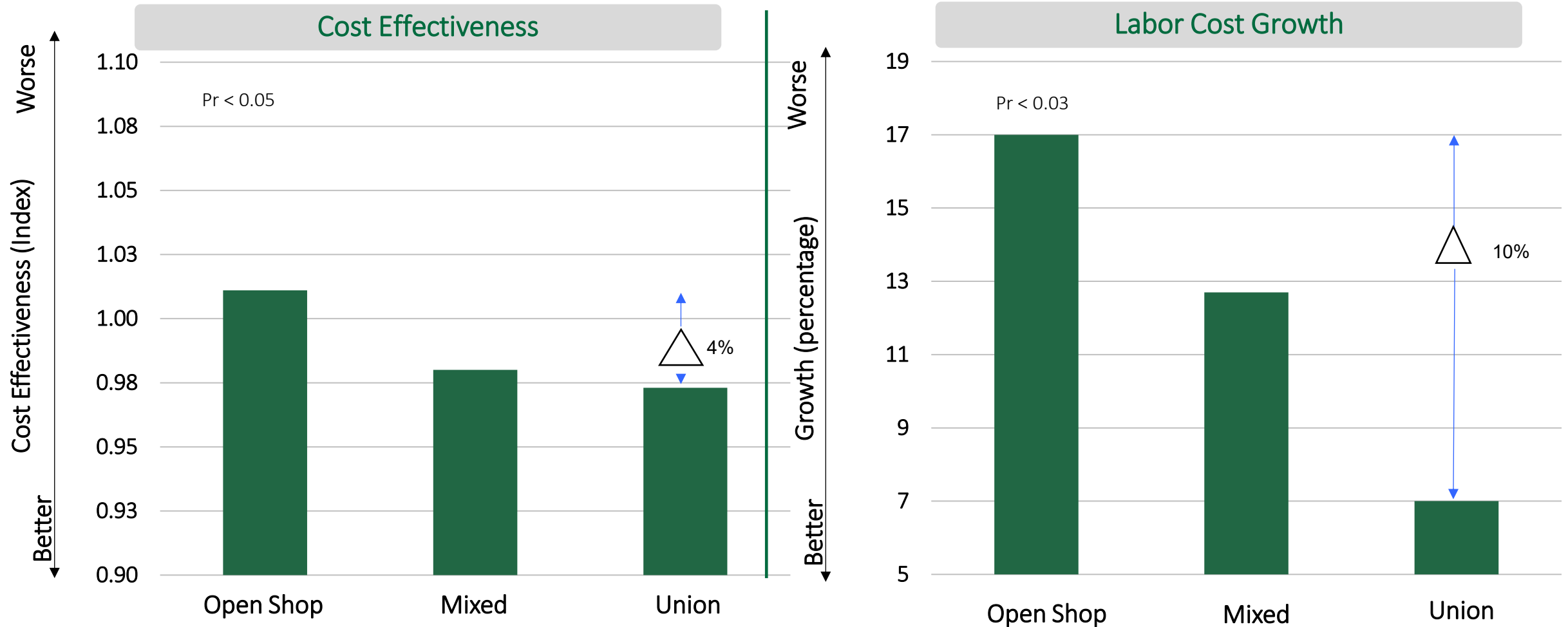


*Statistical significance shown is open shop versus Union

Figure 3

Union Labor vs. Mixed and Open Shop Project Cost Performance

Projects employing union labor cost less overall, and more predictable labor costs



*Statistical significance shown is open shop versus Union

Figure 4

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 - *Labor source and skill of the labor*
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Perception of Skills for Pipe Fitter Craft and Journeymen

Union labor more likely to be rated above average or highly skilled than open shop or mixed

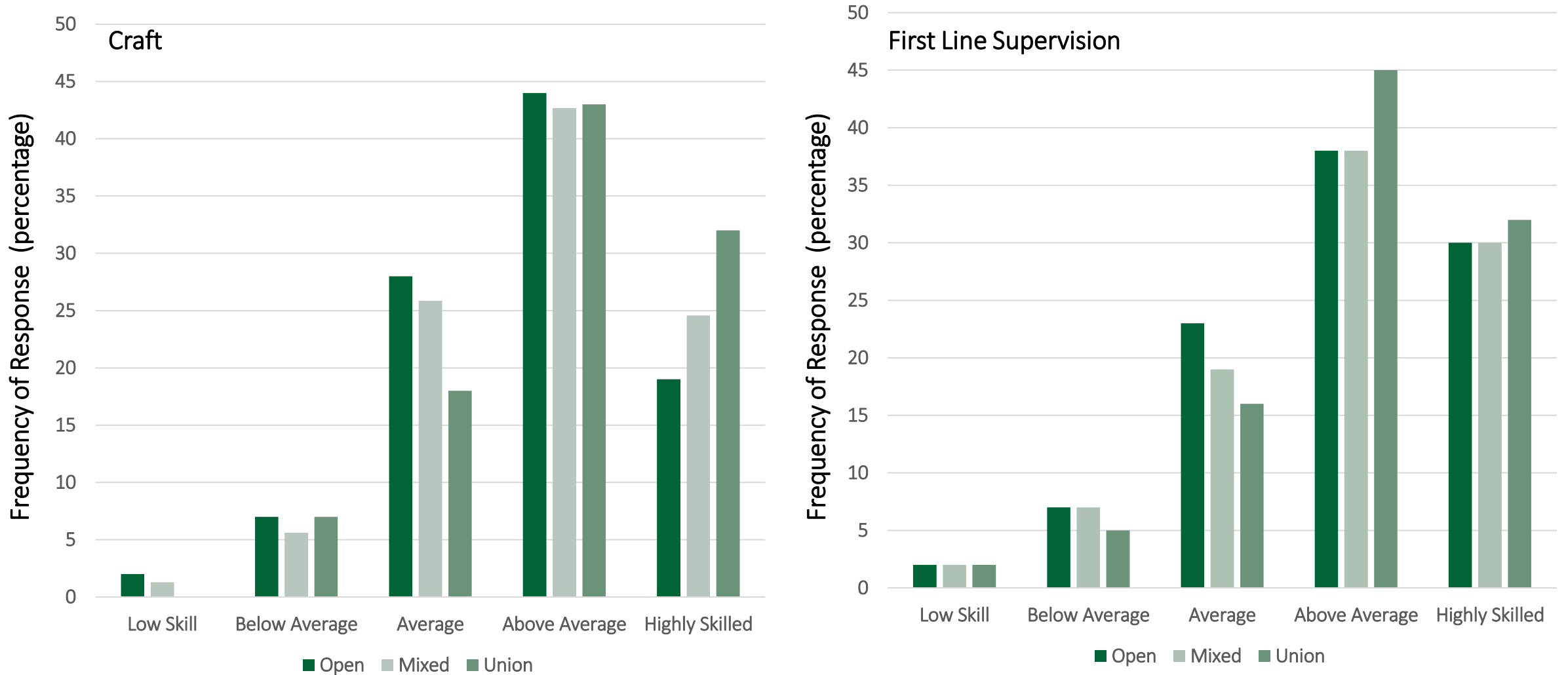
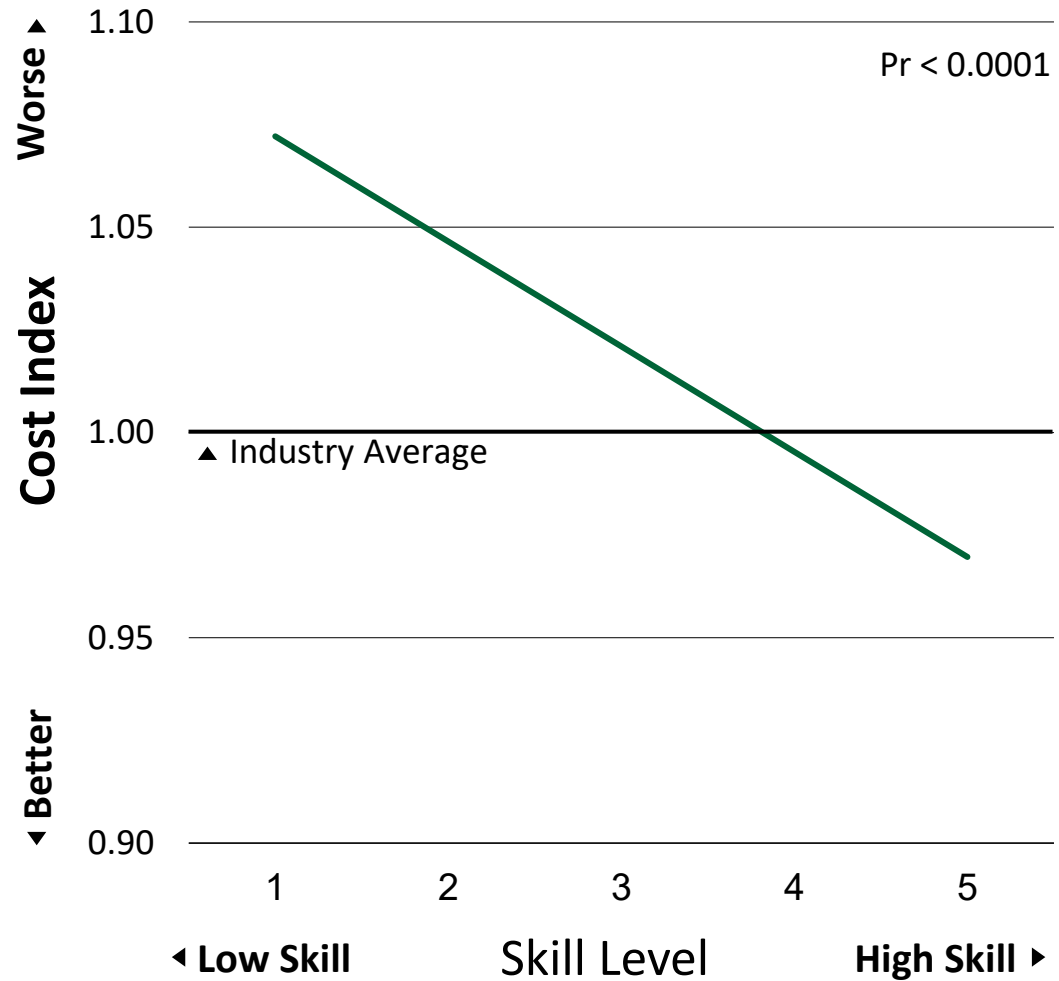


Figure 7

Influence of Labor Skills on Project Cost Competitiveness

Piping First Line Supervision



Piping Craft

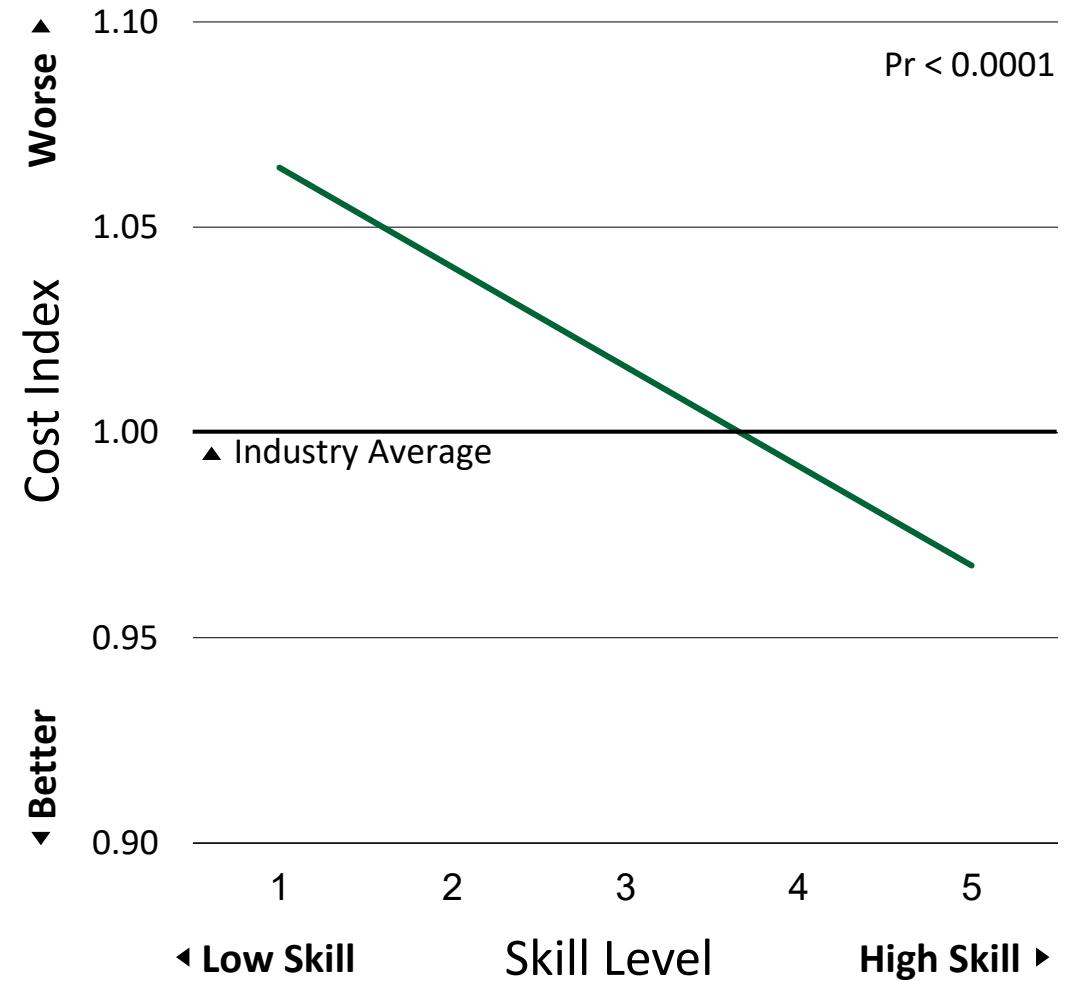
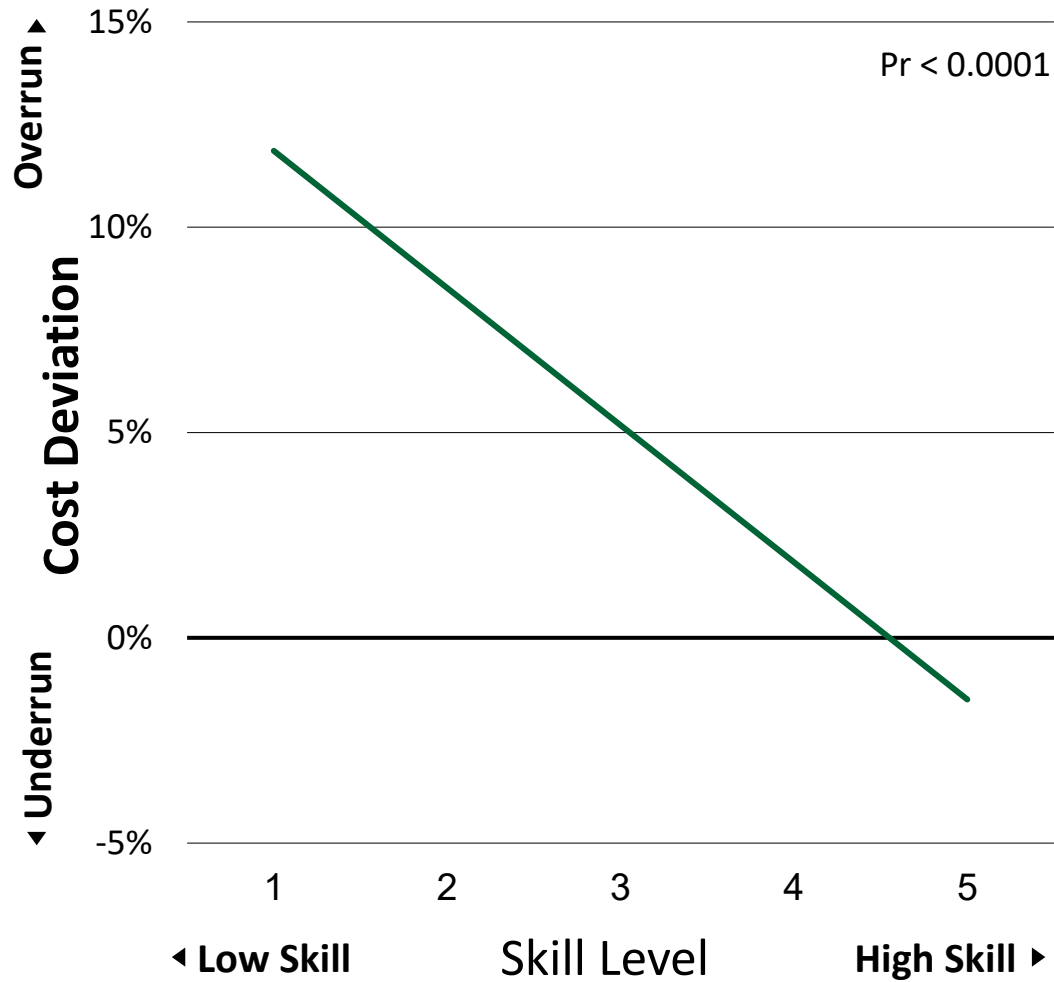


Figure 8

Influence of Labor Skills on Project Cost Growth

Piping First Line Supervision



Piping Craft

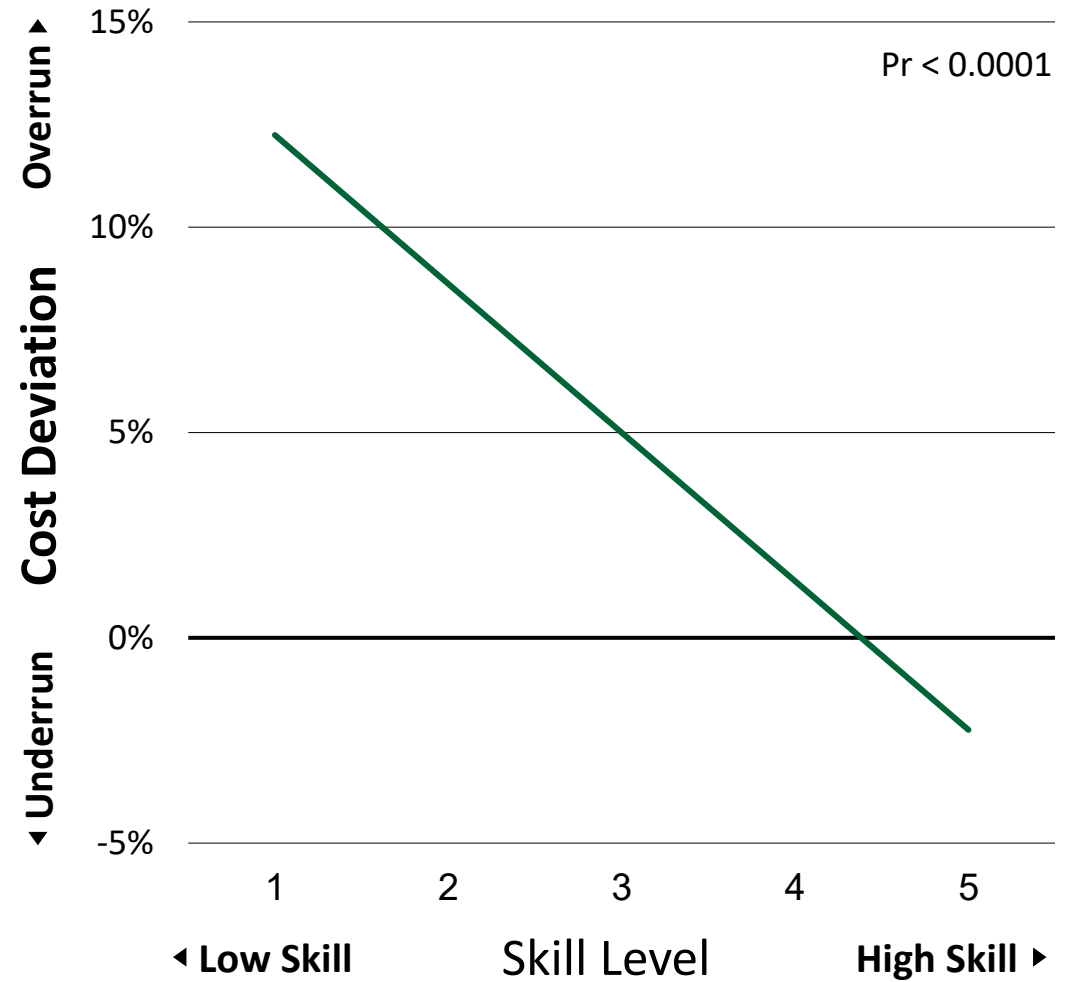
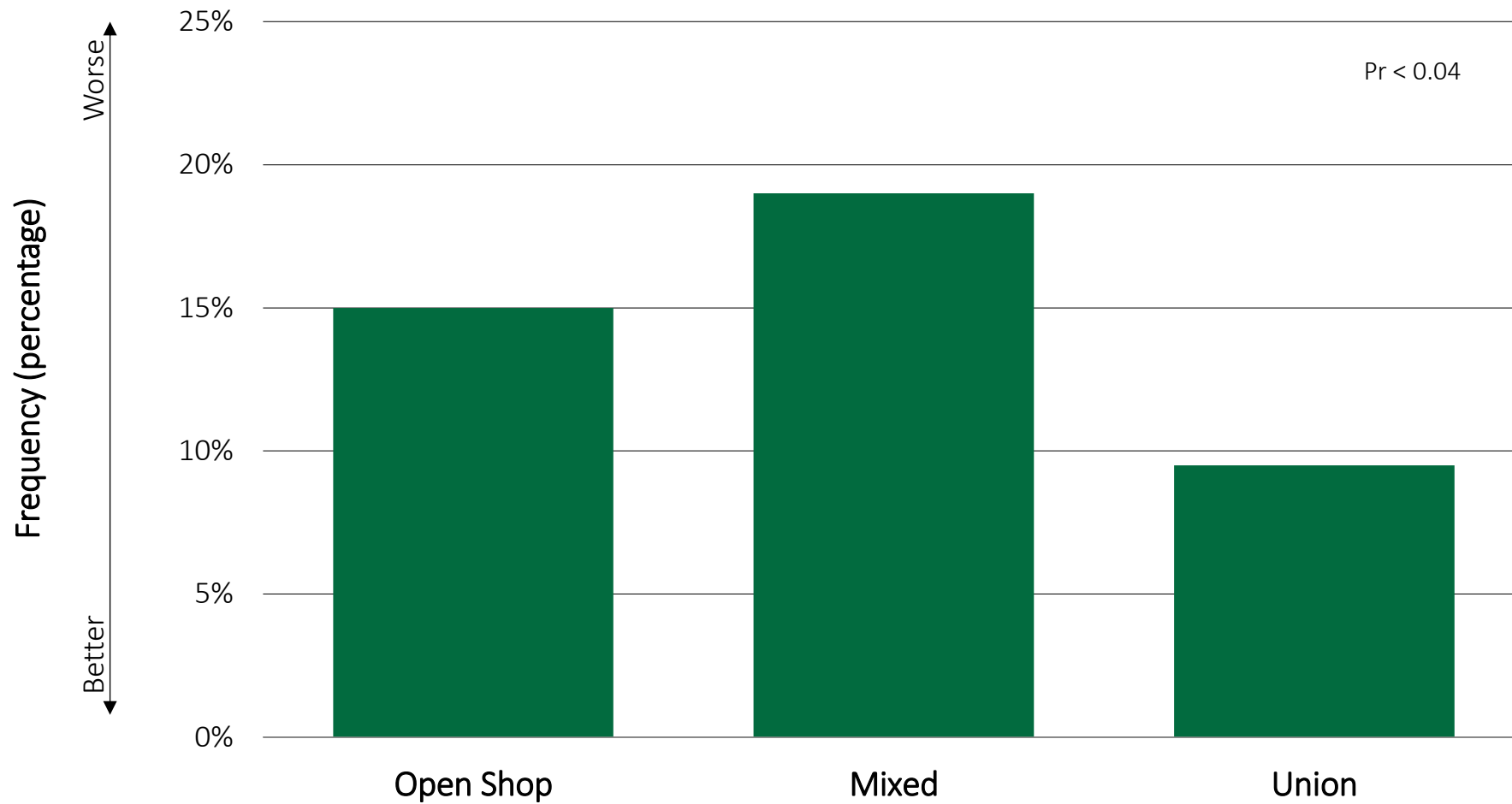


Figure 9

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 - *Labor source and deployment of labor*
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Frequency of a Shortage of Skilled Labor



*Statistical significance shown is open shop versus Union

Figure 10

Cost Growth and Schedule Slip From Labor Shortage

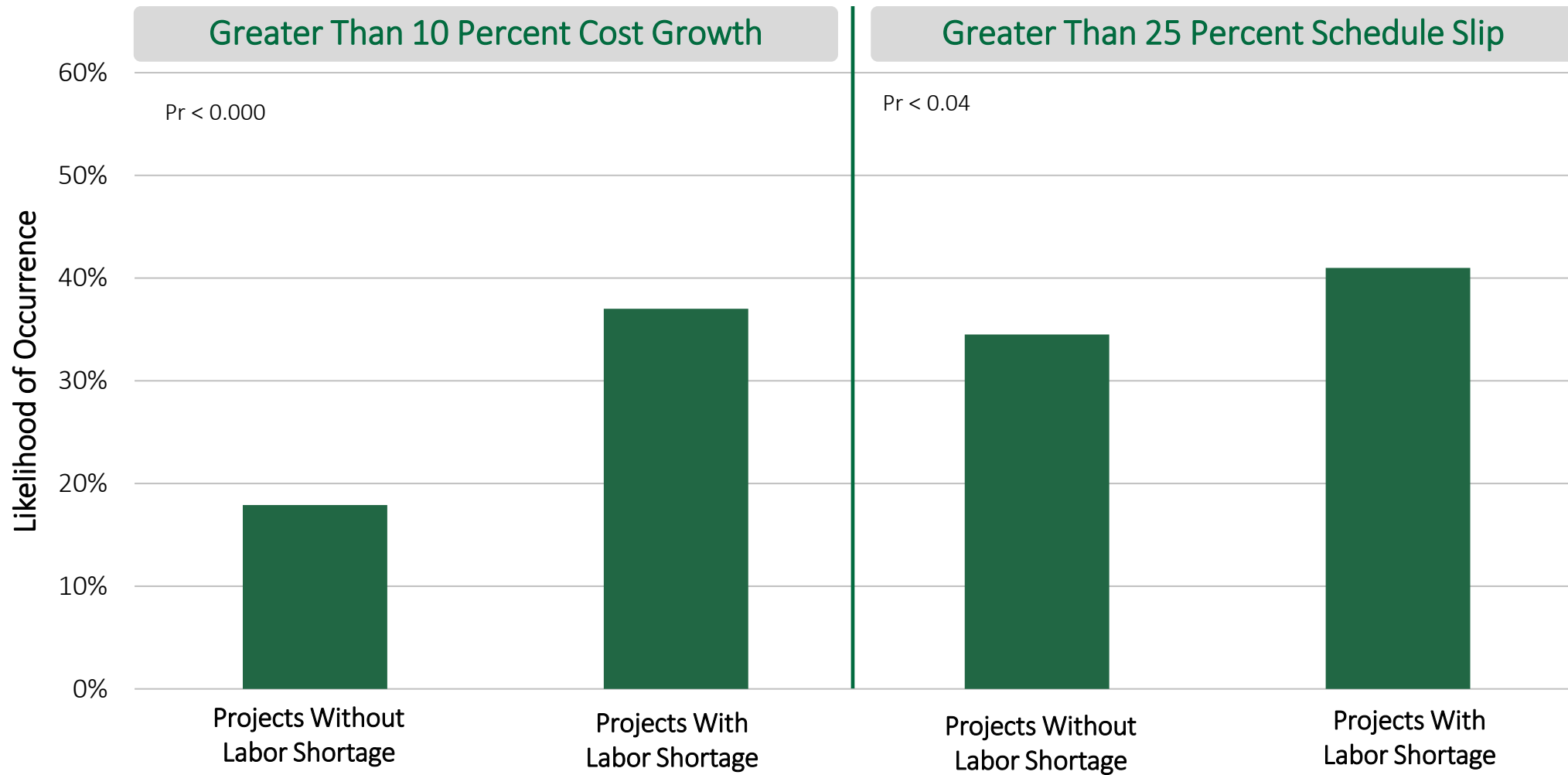
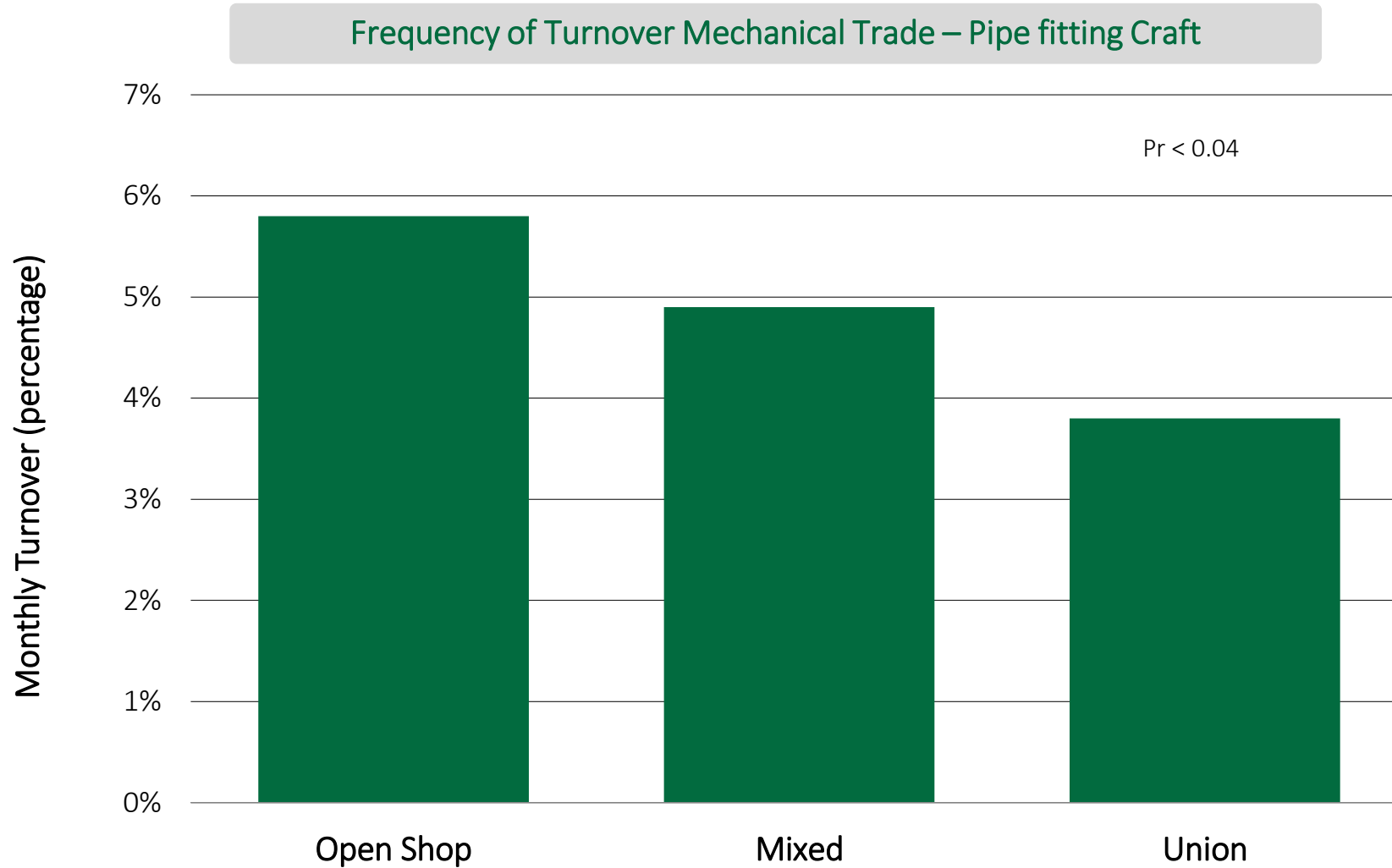


Figure 11

Outline

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 - *Labor source and turnover of labor*
- Conclusions

Frequency of Turnover of Labor



*Statistical significance shown is open shop versus Union

Controlled for practices and project size of \$100 MM

Influence of Labor Turnover on Project Cost Performance

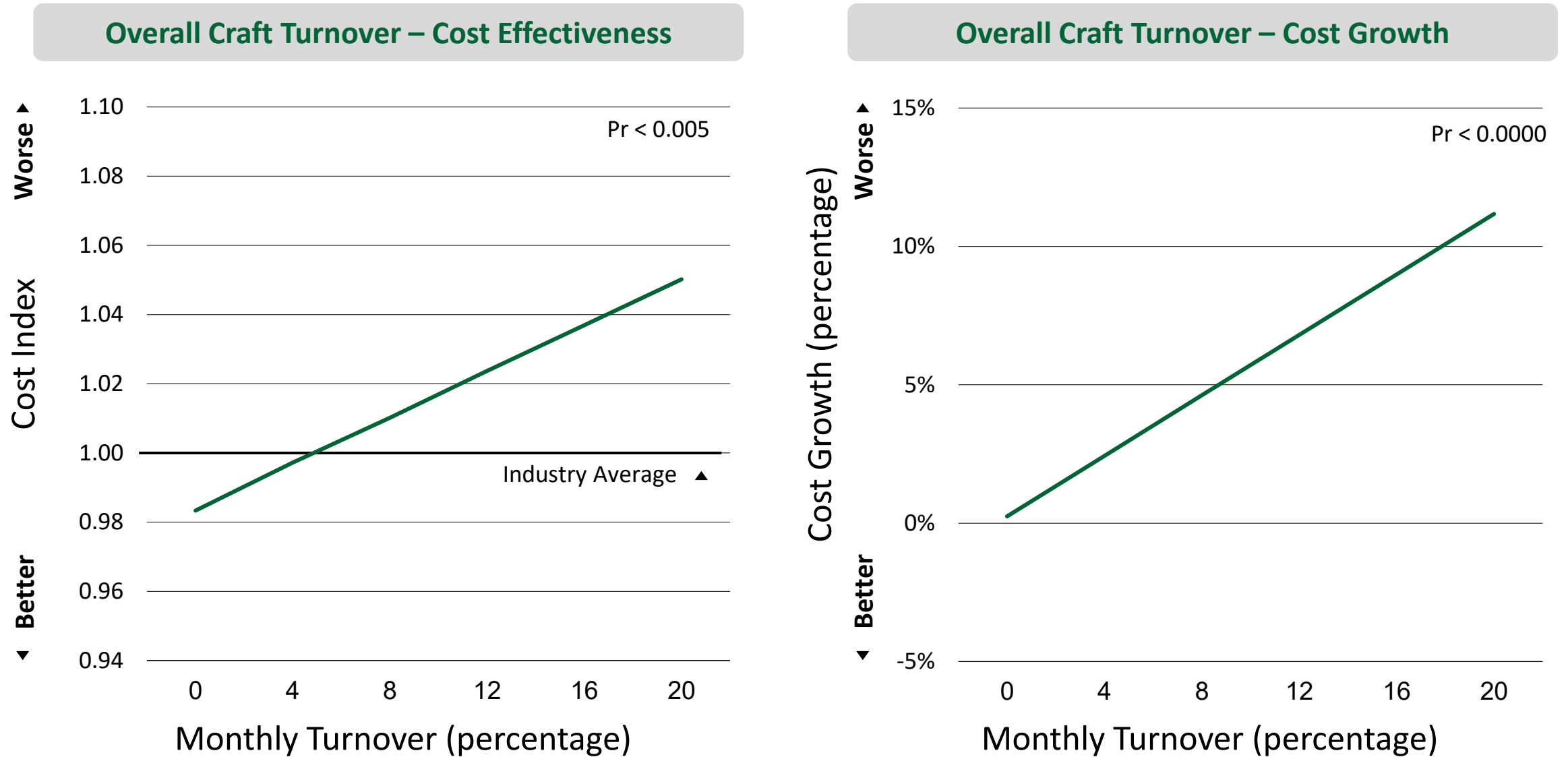


Figure 13

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Conclusions

- Productivity for union labor is 14 percent higher versus open shop labor
- Projects that use a mix of union and open shop labor have 8 percent better productivity than projects that use all open shop labor
- The use of union labor reduces the total cost of projects by an average of 4 percent versus when open shop labor is used
- The union craft labor and foremen have demonstrated a significantly higher level of skills versus open shop labor
- Strong relationships exist between higher craft skills and lower project total costs as well as better construction schedule predictability
- Projects are 40 percent less likely to experience a shortage of skilled labor when union labor is sourced versus open shop labor

Conclusions – cont.

- Projects that are short on skilled labor are twice as likely to have a 10 percent or higher cost overrun and are more likely to have schedule slip of 25 percent or higher
- Turnover of labor on projects is one-third less frequent when union labor is employed versus open shop labor
- Turnover of labor is linked to worse project cost and schedule outcomes
- Projects using a mix of union and open shop labor saw benefits from the presence of union labor in each of the measures of performance versus projects that employ solely open shop labor

THANK YOU



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