

Percentage Delay Rate (with Time Independent Clean Control): QuickPay (2009-2012)

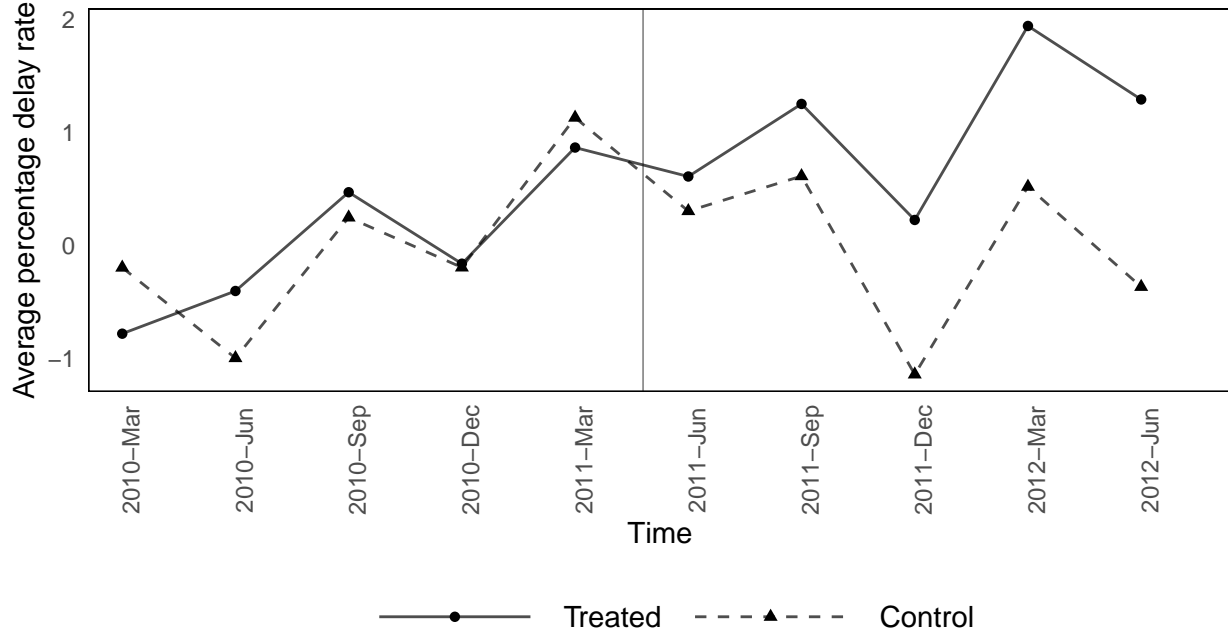
Feb 13, 2023

- Sample consists of a “time independent” clean control group
 - This means we keep all small projects.
 - We keep only those large projects that don’t have a concurrent small project in *any* quarter.
- When we analyze congestion effect, we restrict to only one type of contractor. That is, contractors that hold only small project or only large project in the sample horizon.
- Number of offers received is also winsorized.

1 Setup

2 Demeaned delay rate (in percentage)

- Subtract the average pre-quickpay delay rate from each observation



3 Summary statistics

4 Baseline Regressions

$$PercentDelay_{it} = \beta_0 + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 (Treat_i \times Post_t) + e_{it}$$

| Variable | SB.Mean | SB.Std Dev | SB.5% | SB.95% | SB.Obs | LB.Mean | LB.Std Dev | LB.5% | LB.95% | LB.Obs |
|-----------------------------------|---------|------------|-------|---------|--------|---------|------------|-------|---------|--------|
| Percentage delay | 3.88 | 25.08 | 0.00 | 14.07 | 45944 | 5.69 | 30.93 | 0.00 | 33.59 | 35894 |
| Initial duration (in days) | 256.25 | 155.34 | 76.00 | 489.00 | 45944 | 282.14 | 163.94 | 80.00 | 568.00 | 35894 |
| Initial budget (000s) | 534.94 | 2338.67 | 3.31 | 2535.99 | 45944 | 1440.09 | 5164.52 | 3.71 | 7492.45 | 35894 |
| Number of offers | 4.58 | 6.59 | 1.00 | 15.00 | 45944 | 3.96 | 9.30 | 1.00 | 13.00 | 35894 |
| Project stage | 0.33 | 0.23 | 0.02 | 0.75 | 45944 | 0.34 | 0.24 | 0.02 | 0.75 | 35894 |
| Positive delay (indicator) | 0.06 | 0.24 | 0.00 | 1.00 | 45944 | 0.08 | 0.28 | 0.00 | 1.00 | 35894 |
| Negative delay (indicator) | 0.01 | 0.09 | 0.00 | 0.00 | 45944 | 0.01 | 0.09 | 0.00 | 0.00 | 35894 |
| Competitively awarded (indicator) | 0.87 | 0.33 | 0.00 | 1.00 | 45944 | 0.81 | 0.39 | 0.00 | 1.00 | 35894 |
| Contract financing (indicator) | 0.13 | 0.33 | 0.00 | 1.00 | 45944 | 0.14 | 0.34 | 0.00 | 1.00 | 35894 |

Table 1: Before QuickPay

| Variable | SB.Mean | SB.Std Dev | SB.5% | SB.95% | SB.Obs | LB.Mean | LB.Std Dev | LB.5% | LB.95% | LB.Obs |
|-----------------------------------|---------|------------|-------|---------|--------|---------|------------|-------|----------|--------|
| Percentage delay | 4.36 | 23.32 | 0.00 | 27.22 | 67523 | 4.54 | 24.02 | 0.00 | 29.59 | 60748 |
| Initial duration (in days) | 293.29 | 179.56 | 87.00 | 606.00 | 67523 | 337.92 | 199.09 | 90.00 | 733.00 | 60748 |
| Initial budget (000s) | 750.96 | 2911.52 | 3.51 | 3886.88 | 67523 | 1824.54 | 6141.86 | 3.72 | 10306.48 | 60748 |
| Number of offers | 4.62 | 5.60 | 1.00 | 15.00 | 67523 | 3.67 | 7.12 | 1.00 | 12.00 | 60748 |
| Project stage | 0.41 | 0.26 | 0.03 | 0.85 | 67523 | 0.43 | 0.26 | 0.03 | 0.85 | 60748 |
| Positive delay (indicator) | 0.09 | 0.28 | 0.00 | 1.00 | 67523 | 0.10 | 0.29 | 0.00 | 1.00 | 60748 |
| Negative delay (indicator) | 0.01 | 0.08 | 0.00 | 0.00 | 67523 | 0.01 | 0.10 | 0.00 | 0.00 | 60748 |
| Competitively awarded (indicator) | 0.87 | 0.34 | 0.00 | 1.00 | 67523 | 0.72 | 0.45 | 0.00 | 1.00 | 60748 |
| Contract financing (indicator) | 0.13 | 0.33 | 0.00 | 1.00 | 67523 | 0.14 | 0.35 | 0.00 | 1.00 | 60748 |

Table 2: After QuickPay

$$\begin{aligned}
PercentDelay_{it} = & \alpha + \beta_0 Treat_i + \beta_1 Post_t + \beta_2 (Treat_i \times Post_t) \\
& + X_i + (Post_t \times X_i) + \mu_t + \theta_{firm} + \lambda_{task} + \epsilon_{it}
\end{aligned}$$

| var_name | SB.before | LB.before | SB.after | LB.after |
|----------------------|-----------|-----------|----------|----------|
| Number of tasks | 786 | 707 | 947 | 900 |
| Number of industries | 64 | 65 | 62 | 64 |

Table 3: Effect of QuickPay on project delay rates

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | -1.76*** (0.11) | -1.30*** (0.11) | -1.35*** (0.11) | -0.90*** (0.11) | -0.91*** (0.11) |
| <i>Post_t</i> | -0.21* (0.12) | -5.57*** (0.78) | | | |
| <i>Treat_i × Post_t</i> | 1.10*** (0.14) | 0.97*** (0.14) | 1.01*** (0.14) | 0.99*** (0.13) | 1.01*** (0.13) |
| Constant | 5.27*** (0.10) | 43.19*** (0.61) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t</i> × (Duration, Budget, Bids) | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 223,244 | 201,738 | 201,738 | 201,738 | 201,738 |
| R ² | 0.002 | 0.17 | 0.18 | 0.21 | 0.21 |
| Adjusted R ² | 0.002 | 0.17 | 0.18 | 0.21 | 0.21 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

5 Days of delay (One Quarter)

Table 4: Effect of QuickPay on project delay rates

| | <i>DelayDays_{it}</i> | | | | |
|--|-------------------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | -3.44*** (0.19) | -2.28*** (0.18) | -2.38*** (0.18) | -1.81*** (0.18) | -1.84*** (0.18) |
| <i>Post_t</i> | 1.24*** (0.20) | -5.79*** (1.23) | | | |
| <i>Treat_i × Post_t</i> | 1.51*** (0.24) | 1.69*** (0.24) | 1.78*** (0.24) | 1.72*** (0.24) | 1.74*** (0.24) |
| Constant | 8.80*** (0.16) | 53.07*** (0.92) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t</i> × (Duration, Budget, Bids) | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 223,373 | 201,867 | 201,867 | 201,867 | 201,867 |
| R ² | 0.004 | 0.14 | 0.14 | 0.18 | 0.18 |
| Adjusted R ² | 0.004 | 0.14 | 0.14 | 0.17 | 0.17 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

6 Days of delay (Two Quarters)

Table 5: Effect of QuickPay on project delay rates

| | <i>DelayRate_{it}</i> | | | | |
|--|-------------------------------|---------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | -8.52*** (0.52) | -5.20*** (0.53) | -5.37*** (0.53) | -3.93*** (0.55) | -3.77*** (0.55) |
| <i>Post_t</i> | 4.43*** (0.59) | -18.77*** (3.66) | | | |
| <i>Treat_i × Post_t</i> | 3.17*** (0.70) | 3.58*** (0.73) | 3.75*** (0.73) | 3.89*** (0.74) | 3.87*** (0.74) |
| Constant | 21.06*** (0.45) | 116.48*** (2.67) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t × (Duration, Budget, Bids)</i> | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Year-Quarter fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 94,123 | 84,737 | 84,737 | 84,737 | 84,737 |
| R ² | 0.01 | 0.17 | 0.17 | 0.22 | 0.22 |
| Adjusted R ² | 0.01 | 0.17 | 0.17 | 0.20 | 0.21 |

Note:

*p<0.1; **p<0.05; ***p<0.01
SEs are robust and clustered at the project level.

7 Positive delays: Logit

Table 6: Logit model: Effect of QuickPay

| Dependent Variable: | $I(Delay_{it} > 0)$ | | | | |
|--------------------------|---------------------|--------------------|--------------------|--------------------|--------------------|
| Model: | (1) | (2) | (3) | (4) | (5) |
| <i>Variables</i> | | | | | |
| Constant | -1.99*** (0.02) | 3.22*** (0.13) | | | |
| $Treat_i$ | -0.44*** (0.03) | -0.22*** (0.03) | -0.24*** (0.03) | -0.21*** (0.03) | -0.23*** (0.03) |
| $Post_t$ | 0.10*** (0.02) | -1.42*** (0.15) | | | |
| $Treat_i \times Post_t$ | 0.21*** (0.03) | 0.21*** (0.04) | 0.23*** (0.04) | 0.23*** (0.04) | 0.23*** (0.04) |
| Controls | | Yes | Yes | Yes | Yes |
| Controls $\times Post_t$ | | Yes | Yes | Yes | Yes |
| <i>Fixed-effects</i> | | | | | |
| Time | | | Yes | Yes | Yes |
| Task code | | | | Yes | Yes |
| NAICS code | | | | | Yes |
| <i>Fit statistics</i> | | | | | |
| Observations | 223,373 | 201,867 | 201,867 | 199,508 | 199,470 |
| Squared Correlation | 0.003 | 0.24 | 0.24 | 0.28 | 0.28 |
| Pseudo R^2 | 0.005 | 0.24 | 0.24 | 0.30 | 0.30 |
| BIC | 152,027.7 | 112,255.0 | 112,164.9 | 113,713.7 | 113,928.5 |

Clustered (Project ID) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

8 Positive delays: Conditional TE

Table 7: Conditional TE: Positive delay

| | <i>PercentDelay_{it}(conditional on positive)</i> | | | | |
|--|---|----------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | -5.87 (5.42) | -22.68*** (4.28) | -22.85*** (4.28) | -25.17*** (4.59) | -25.24*** (4.64) |
| <i>Post_t</i> | -51.73*** (4.68) | -36.01* (19.74) | | | |
| <i>Treat_i × Post_t</i> | 15.61** (6.20) | 22.58*** (4.98) | 22.77*** (4.99) | 26.76*** (5.03) | 28.25*** (5.03) |
| Constant | 160.76*** (4.08) | 694.17*** (15.55) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t × (Duration, Budget, Bids)</i> | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 24,084 | 24,045 | 24,045 | 24,045 | 24,045 |
| R ² | 0.01 | 0.39 | 0.39 | 0.46 | 0.47 |
| Adjusted R ² | 0.01 | 0.39 | 0.39 | 0.44 | 0.45 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

9 Negative delays: Logit

Table 8: Logit model: Effect of QuickPay

| Dependent Variable: | $I(Delay_{it} < 0)$ | | | | |
|--------------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
| Model: | (1) | (2) | (3) | (4) | (5) |
| <i>Variables</i> | | | | | |
| Constant | -4.61*** (0.06) | -10.07*** (0.44) | | | |
| $Treat_i$ | -0.29*** (0.08) | 0.13 (0.09) | 0.14* (0.09) | 0.02 (0.09) | 0.02 (0.09) |
| $Post_t$ | 0.07 (0.07) | 1.50*** (0.56) | | | |
| $Treat_i \times Post_t$ | -0.24** (0.10) | -0.31*** (0.11) | -0.32*** (0.11) | -0.29*** (0.10) | -0.29*** (0.10) |
| Controls | | Yes | Yes | Yes | Yes |
| Controls $\times Post_t$ | | Yes | Yes | Yes | Yes |
| <i>Fixed-effects</i> | | | | | |
| Time | | | Yes | Yes | Yes |
| Task code | | | | Yes | Yes |
| NAICS code | | | | | Yes |
| <i>Fit statistics</i> | | | | | |
| Observations | 223,373 | 201,867 | 201,867 | 177,464 | 176,917 |
| Squared Correlation | 0.0004 | 0.007 | 0.008 | 0.02 | 0.03 |
| Pseudo R ² | 0.004 | 0.05 | 0.06 | 0.12 | 0.12 |
| BIC | 20,766.4 | 19,492.5 | 19,549.3 | 21,853.5 | 22,368.3 |

Clustered (Project ID) standard-errors in parentheses

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

10 Negative delays: Conditional TE

Table 9: Conditional TE: Negative delay (conditional on negative)

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|-------------------|-------------------|-----------------|-----------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | 3.72* (2.15) | 2.28 (1.98) | 2.27 (2.00) | 0.74 (2.43) | 1.06 (2.47) |
| <i>Post_t</i> | 8.13*** (2.01) | -2.26 (9.66) | | | |
| <i>Treat_i × Post_t</i> | -8.74*** (2.72) | -5.62** (2.47) | -5.44** (2.48) | -2.87 (3.00) | -3.55 (3.03) |
| Constant | -35.47*** (1.66) | 7.39 (8.06) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t × (Duration, Budget, Bids)</i> | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 1,786 | 1,786 | 1,786 | 1,786 | 1,786 |
| R ² | 0.01 | 0.22 | 0.23 | 0.39 | 0.43 |
| Adjusted R ² | 0.01 | 0.22 | 0.22 | 0.24 | 0.27 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

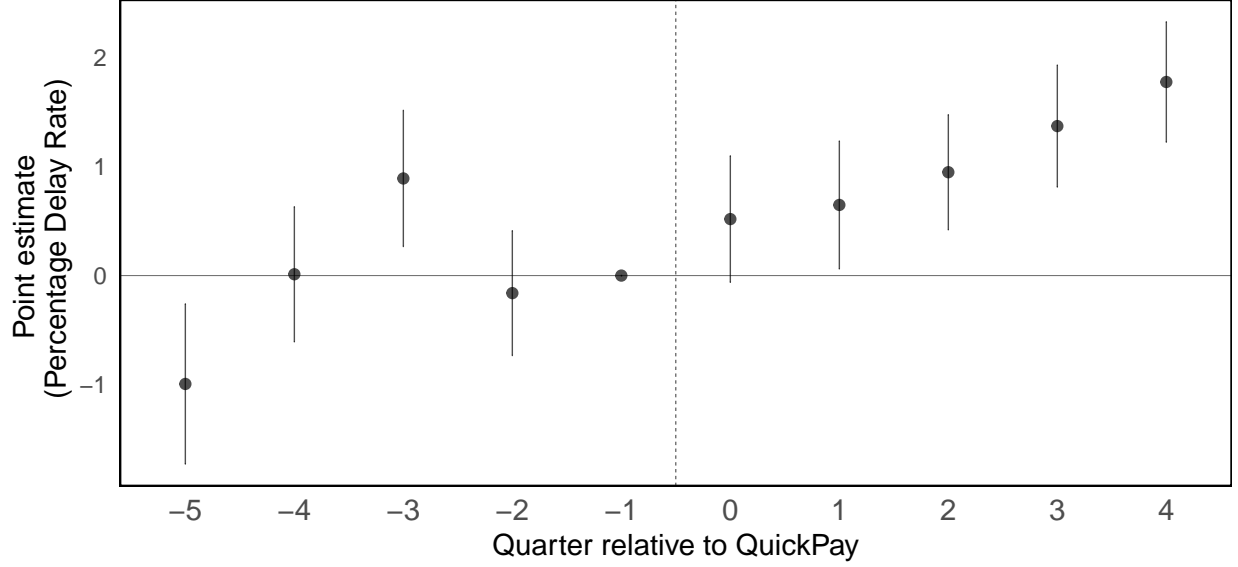
SEs are robust and clustered at the project level.

11 Event study

$$PercentDelay_{it} = \beta_0 + \beta_1 Treat_i + \beta_2 Treat_i \times Quarter_t + Controls + \gamma_{task} + \theta_{naics} + \lambda_{quarter} + \epsilon_{it}$$

Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.

i Please use `linewidth` instead.



12 Parallel Trends Test

Table 10: Linear Time Trend Before QuickPay

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|------------------|-----------------|-----------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | -1.37*** (0.41) | -0.65 (0.41) | -0.65 (0.41) | -0.44 (0.41) | -0.52 (0.41) |
| <i>QuarterNum</i> | 0.42*** (0.08) | -1.16** (0.50) | | | |
| <i>Treat_i × QuarterNum</i> | -0.09 (0.09) | -0.17* (0.09) | -0.17* (0.09) | -0.03 (0.09) | -0.03 (0.09) |
| Constant | 3.36*** (0.35) | 48.76*** (2.32) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t × (Duration, Budget, Bids)</i> | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 84,367 | 77,984 | 77,984 | 77,984 | 77,984 |
| R ² | 0.005 | 0.20 | 0.20 | 0.26 | 0.27 |
| Adjusted R ² | 0.005 | 0.20 | 0.20 | 0.25 | 0.26 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

Observations are for quarters before quickpay.

13 Temporal Placebo Test

- Restrict to pre-QuickPay observations
- Assign “treatment date” as 2010-09-30

[1] 4

Table 11: Placebo test: Treatment Time 2010-09-30

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | −1.62*** (0.22) | −1.56*** (0.22) | −1.57*** (0.22) | −0.80*** (0.22) | −0.85*** (0.22) |
| <i>Post</i> | 1.12*** (0.21) | −5.03*** (1.50) | | | |
| <i>Treat_i × Post</i> | −0.20 (0.25) | 0.23 (0.25) | 0.23 (0.25) | 0.31 (0.25) | 0.32 (0.25) |
| Constant | 4.45*** (0.19) | 48.36*** (1.30) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t</i> × (Duration, Budget, Bids) | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 84,367 | 77,984 | 77,984 | 77,984 | 77,984 |
| R ² | 0.004 | 0.20 | 0.20 | 0.26 | 0.27 |
| Adjusted R ² | 0.004 | 0.20 | 0.20 | 0.25 | 0.26 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

Observations are for quarters before quickpay.

14 Cross-sectional placebo

- Projects are randomly assigned into treatment or control

Table 12: Effect of QuickPay on project delay rates

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|-----------------|-----------------|-----------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | −0.04 (0.10) | −0.10 (0.09) | −0.10 (0.09) | −0.07 (0.09) | −0.07 (0.09) |
| <i>Post_t</i> | 0.52*** (0.09) | −4.41*** (0.75) | | | |
| <i>Treat_i × Post_t</i> | 0.02 (0.13) | 0.02 (0.12) | 0.02 (0.12) | 0.03 (0.11) | 0.03 (0.11) |
| Constant | 4.14*** (0.07) | 41.68*** (0.58) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t × (Duration, Budget, Bids)</i> | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 223,244 | 201,738 | 201,738 | 201,738 | 201,738 |
| R ² | 0.0003 | 0.17 | 0.17 | 0.21 | 0.21 |
| Adjusted R ² | 0.0003 | 0.17 | 0.17 | 0.21 | 0.21 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

15 Congestion Effect

15.1 Number of projects per contractor

15.1.1 Contractors holding only small or only large projects

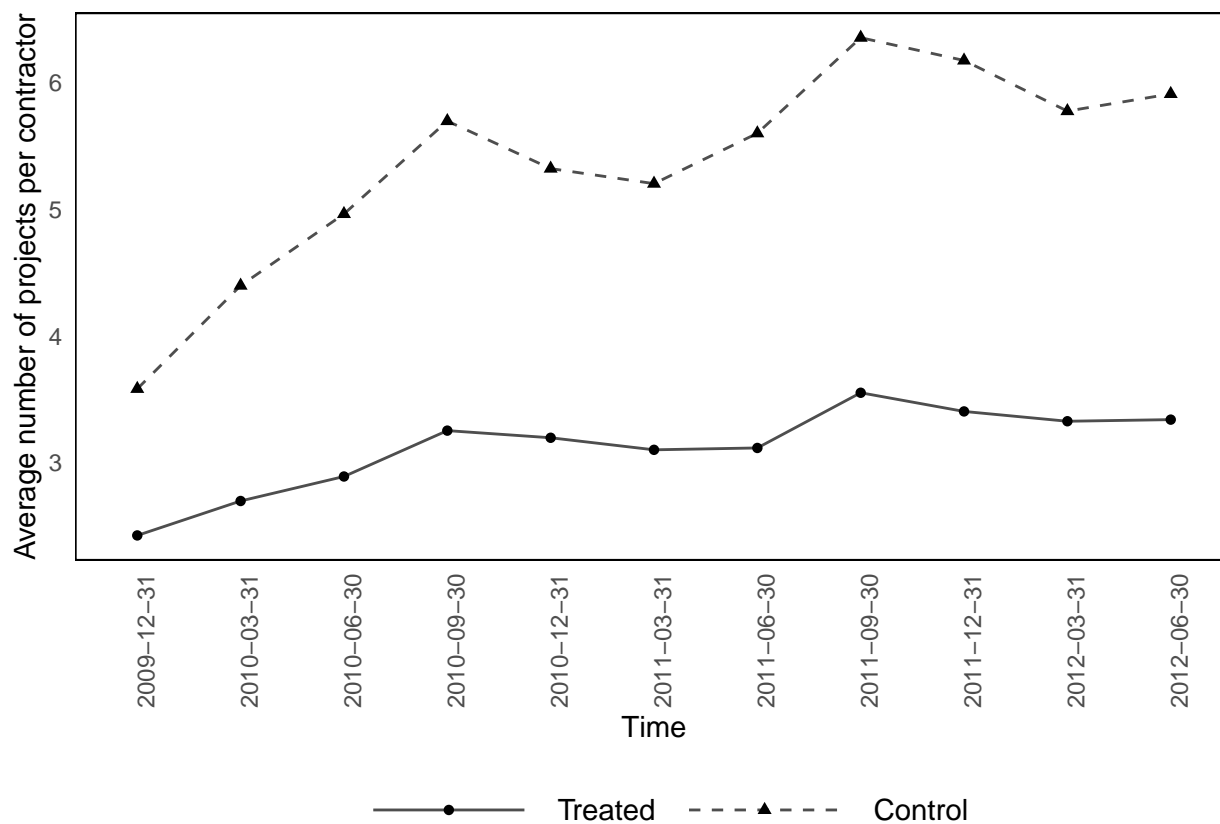


Table 13: Num Contractor Projects and QuickPay reform

| | Number of projects | |
|-------------------------|--------------------|--------------------|
| | (1) | (2) |
| $Treat_i$ | -2.03*** (0.39) | -2.03*** (0.39) |
| $Post_t$ | 0.94** (0.41) | |
| $Treat_i \times Post_t$ | -0.58 (0.41) | -0.58 (0.41) |
| Constant | 5.03*** (0.38) | |
| Time fixed effects | No | Yes |
| Observations | 84,391 | 84,391 |
| R^2 | 0.005 | 0.01 |
| Adjusted R^2 | 0.005 | 0.01 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a contractor-quarter.

SEs are robust and clustered at the contractor level.

Sample restricted to contractors performing only one type of project.

15.1.2 Contractors holding at least one small project are “treated”

15.2 Total budget

15.2.1 Contractors holding only small or only large projects

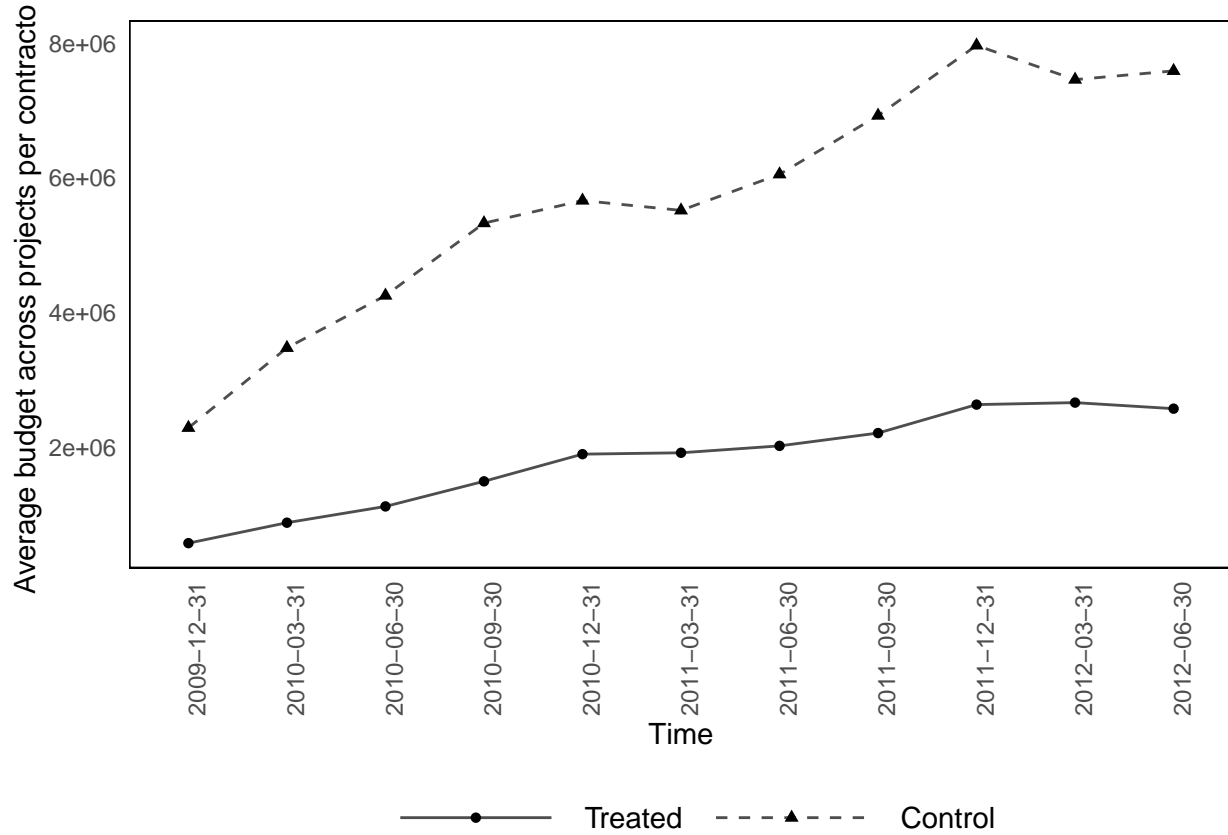


Table 14: Contractor Project Budget and QuickPay reform

| Total budget (000,000s) | | |
|-------------------------|--------------------|--------------------|
| | (1) | (2) |
| $Treat_i$ | -3.30*** (0.53) | -3.30*** (0.53) |
| $Post_t$ | 2.46*** (0.29) | |
| $Treat_i \times Post_t$ | -1.47*** (0.29) | -1.48*** (0.29) |
| Constant | 4.73*** (0.52) | |
| Time fixed effects | No | Yes |
| Observations | 84,391 | 84,391 |
| R ² | 0.02 | 0.02 |
| Adjusted R ² | 0.02 | 0.02 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a contractor-quarter.

SEs are robust and clustered at the contractor level.

Sample restricted to contractors performing only one type of project.

15.3 Number of tasks

15.3.1 Contractors holding only small or only large projects

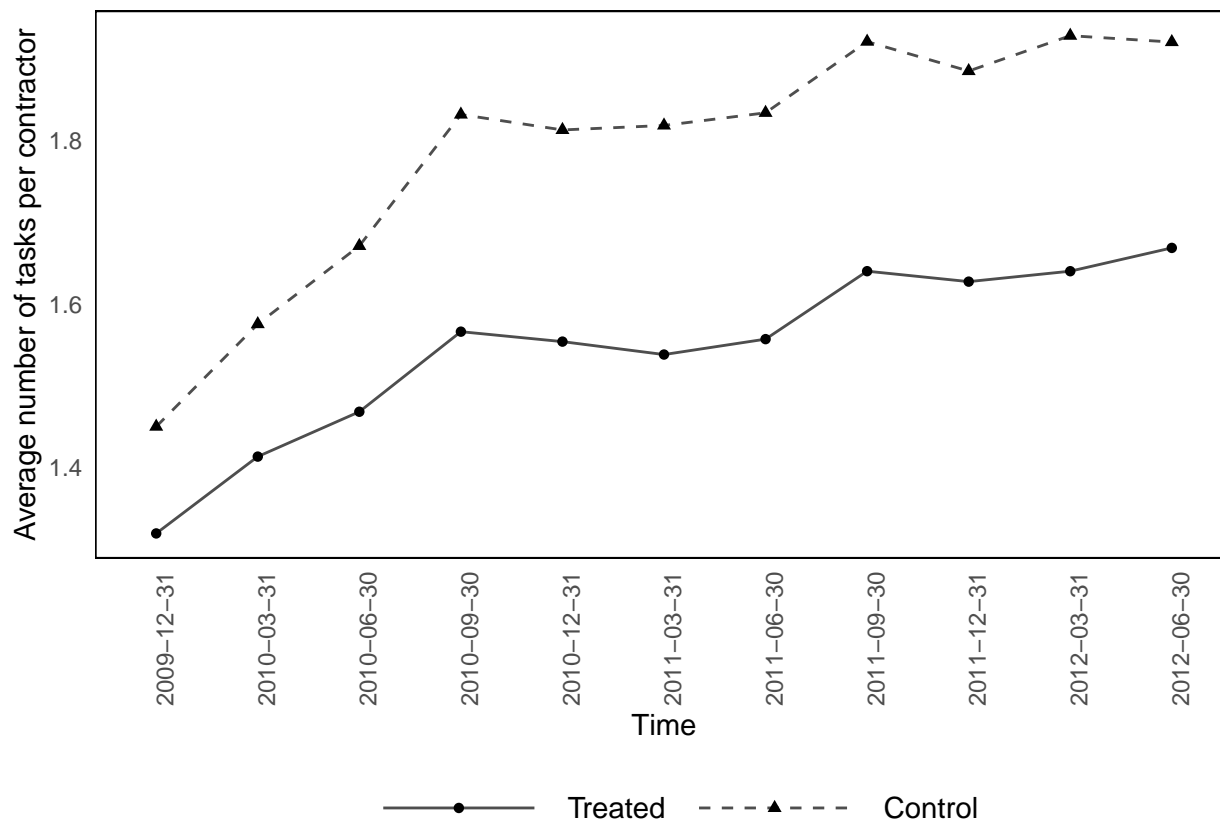


Table 15: Contractor Project Tasks and QuickPay reform

| Number of tasks | | |
|-------------------------|--------------------|--------------------|
| | (1) | (2) |
| $Treat_i$ | -0.23*** (0.04) | -0.23*** (0.04) |
| $Post_t$ | 0.17*** (0.02) | |
| $Treat_i \times Post_t$ | -0.04 (0.03) | -0.04 (0.03) |
| Constant | 1.73*** (0.04) | |
| Time fixed effects | No | Yes |
| Observations | 84,391 | 84,391 |
| R ² | 0.01 | 0.01 |
| Adjusted R ² | 0.01 | 0.01 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a contractor-quarter.

SEs are robust and clustered at the contractor level.

Sample restricted to contractors performing only one type of project.

16 Project portfolio: Spillover effect

16.1 Regression 1: DID on large projects

- Sample restricted to large projects only.
- $Treat_i$ is an indicator that equals one for LARGE projects whose contractor has at least one small project at any point, and is zero otherwise

Table 16: Project Portfolio and QuickPay reform

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|---------------------|--------------------|------------------|-------------------|
| | (1) | (2) | (3) | (4) | (5) |
| $Treat_i$ | 1.53*** (0.23) | -0.55*** (0.17) | -0.64*** (0.17) | 0.43** (0.17) | 0.46*** (0.17) |
| $Post_t$ | -0.35*** (0.13) | -13.73*** (1.19) | | | |
| $Treat_i \times Post_t$ | 0.08 (0.27) | 0.52** (0.22) | 0.60*** (0.22) | 0.23 (0.22) | 0.33 (0.22) |
| Constant | 5.96*** (0.11) | 64.62*** (0.91) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| $Post_t \times$ (Duration, Budget, Bids) | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 117,787 | 110,601 | 110,601 | 110,601 | 110,601 |
| R ² | 0.002 | 0.26 | 0.26 | 0.30 | 0.30 |
| Adjusted R ² | 0.002 | 0.26 | 0.26 | 0.29 | 0.29 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

Sample restricted to large projects only.

16.2 Regression 2: Incremental effect on small project with existing large project

- $Treat_{i,l}$ is an indicator that equals 1 for small projects whose contractor holds a large project at any point in time, and is zero otherwise.
- Large projects whose contractor holds small projects are removed to get a clean control group.

Table 17: (Incremental effect) Project Portfolio and QuickPay reform

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | -0.79*** (0.13) | -0.48*** (0.11) | -0.54*** (0.11) | -0.68*** (0.12) | -0.71*** (0.12) |
| <i>Treat_{i,l}</i> | -2.74*** (0.11) | -2.46*** (0.10) | -2.41*** (0.10) | -0.72*** (0.10) | -0.64*** (0.10) |
| <i>Post_t</i> | -0.21* (0.12) | -5.41*** (0.79) | | | |
| <i>Treat_i × Post_t</i> | 1.22*** (0.15) | 1.04*** (0.15) | 1.09*** (0.15) | 1.11*** (0.15) | 1.13*** (0.15) |
| <i>Treat_{i,l} × Post_t</i> | -0.48*** (0.14) | -0.28** (0.14) | -0.33** (0.14) | -0.38*** (0.14) | -0.38*** (0.14) |
| Constant | 5.27*** (0.10) | 43.79*** (0.61) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| <i>Post_t × (Duration, Budget, Bids)</i> | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 223,244 | 201,738 | 201,738 | 201,738 | 201,738 |
| R ² | 0.01 | 0.18 | 0.18 | 0.21 | 0.21 |
| Adjusted R ² | 0.01 | 0.18 | 0.18 | 0.21 | 0.21 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

Large projects whose contractor holds small projects are removed.

17 Project Stage

- t indicates the end of the quarter
- We want to get stage of the project at the beginning of a given quarter (before any delays materialize)

$$Stage_{it} = \frac{ActionDate_{t-1} - StartDate_i}{Duration_{i,t-1}} \quad Stage_{it} = \frac{(t-1) - StartDate_i}{Duration_{i,t-1}}$$

17.1 Stage Quintile

17.2 Logged Stage Regressions

Table 18: Project Stage and QuickPay reform

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| $Treat_i$ | -2.65*** (0.23) | -1.65*** (0.21) | -1.73*** (0.21) | -1.34*** (0.21) | -1.37*** (0.20) |
| Log(Stage) | 3.16*** (0.08) | 2.51*** (0.07) | 2.45*** (0.07) | 2.53*** (0.07) | 2.53*** (0.07) |
| $Post_t$ | -1.33*** (0.23) | -5.06*** (0.81) | | | |
| $Treat_i \times Post_t$ | 2.06*** (0.28) | 1.74*** (0.26) | 1.82*** (0.26) | 1.85*** (0.25) | 1.90*** (0.25) |
| $Treat_i \times \text{Log(Stage)}$ | -0.70*** (0.10) | -0.20** (0.09) | -0.23** (0.09) | -0.27*** (0.09) | -0.29*** (0.09) |
| $Post_t \times \text{Log(Stage)}$ | -0.06 (0.10) | 0.48*** (0.09) | 0.49*** (0.09) | 0.23** (0.09) | 0.22** (0.09) |
| $Treat_i \times Post_t \times \text{Log(Stage)}$ | 0.59*** (0.12) | 0.54*** (0.11) | 0.56*** (0.11) | 0.62*** (0.11) | 0.63*** (0.11) |
| Constant | 10.20*** (0.19) | 43.10*** (0.62) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| $Post_t \times (\text{Duration, Budget, Bids})$ | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 223,213 | 201,738 | 201,738 | 201,738 | 201,738 |
| R ² | 0.06 | 0.18 | 0.18 | 0.21 | 0.22 |
| Adjusted R ² | 0.06 | 0.18 | 0.18 | 0.21 | 0.21 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

18 Contract Financing (Projects active on/before June 2010)

- $CF = 1$ if project was receiving contract financing
- Sample restricted to projects that started on or before June 2010
- Jobs act was launched in Sept 2010
- Archived, no significant effect (even when we consider all projects)

19 Contract financing (All Projects & Contractor level)

- For a given contractor, Percentage projects receiving $CF = (100 \times \text{Number of projects receiving } CF) / (\text{Number of projects})$

Table 19: Contract Financing and QuickPay reform

| | <i>PercentDelay_{it}</i> | | | | |
|---|----------------------------------|---------------------|---------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| $Treat_i$ | -1.65*** (0.12) | -1.33*** (0.11) | -1.37*** (0.11) | -0.97*** (0.12) | -0.95*** (0.12) |
| $Post_t$ | -0.03 (0.13) | -5.17*** (0.79) | | | |
| Percentage projects receiving CF | 0.05*** (0.004) | 0.04*** (0.003) | 0.04*** (0.003) | -0.003 (0.003) | -0.004 (0.003) |
| $Treat_i \times Post_t$ | 0.81*** (0.15) | 0.67*** (0.15) | 0.70*** (0.15) | 0.78*** (0.14) | 0.82*** (0.14) |
| $Post_t \times$ Percentage projects receiving CF | -0.01*** (0.004) | -0.02*** (0.004) | -0.02*** (0.004) | -0.01** (0.004) | -0.01** (0.004) |
| $Treat_i \times$ Percentage projects receiving CF | 0.01* (0.005) | 0.01* (0.004) | 0.01* (0.004) | 0.004 (0.004) | 0.002 (0.004) |
| $Treat_i \times Post_t \times$ Percentage projects receiving CF | 0.02*** (0.01) | 0.02*** (0.01) | 0.02*** (0.01) | 0.01** (0.01) | 0.01** (0.01) |
| Constant | 4.49*** (0.10) | 43.80*** (0.61) | | | |
| Duration, Budget, Bids | No | Yes | Yes | Yes | Yes |
| $Post_t \times$ (Duration, Budget, Bids) | No | Yes | Yes | Yes | Yes |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 223,244 | 201,738 | 201,738 | 201,738 | 201,738 |
| R ² | 0.01 | 0.18 | 0.18 | 0.21 | 0.21 |
| Adjusted R ² | 0.01 | 0.18 | 0.18 | 0.21 | 0.21 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

20 Competition

20.1 Impact on bidding metrics [All projects]

Table 20: Effect of Competition After QuickPay: Quickpay 2009-2011

| | <i>NumberOfBids_{it}</i> | <i>InitialDuration_{it}</i> | <i>InitialBudget_{it}</i> |
|---|----------------------------------|-------------------------------------|-----------------------------------|
| | (1) | (2) | (3) |
| <i>Treat_i</i> | 1.08*** (0.02) | -7.27*** (0.72) | -15,055.20*** (1,586.13) |
| <i>Treat_i × Post_t</i> | 0.09*** (0.03) | -3.38*** (1.00) | -29,491.30*** (2,296.49) |
| Task fixed effects | Yes | Yes | Yes |
| Time fixed effects | Yes | Yes | Yes |
| Observations | 227,609 | 220,550 | 227,732 |
| R ² | 0.20 | 0.20 | 0.24 |
| Adjusted R ² | 0.19 | 0.19 | 0.24 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

Sample restricted to fully competed projects.

20.2 Impact on delays

20.2.1 Subsample model II

Define

$$SA_i = \begin{cases} 1, & \text{if project was signed after QuickPay} \\ 0, & \text{otherwise} \end{cases}$$

$$SB_i = \begin{cases} 1, & \text{if project was signed before QuickPay} \\ 0, & \text{otherwise} \end{cases}$$

Table 21: Effect of QuickPay on competitively awarded projects

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | -2.26*** (0.13) | -1.93*** (0.12) | -1.94*** (0.12) | -0.50*** (0.12) | -0.51*** (0.12) |
| <i>SA_i</i> | -1.90*** (0.17) | 0.87*** (0.16) | 1.45*** (0.18) | 1.52*** (0.18) | 1.48*** (0.18) |
| <i>Post_t</i> | 1.18*** (0.16) | -1.16*** (0.16) | | | |
| <i>Treat_i × Post_t</i> | 0.23 (0.19) | 0.28 (0.18) | 0.30* (0.18) | 0.16 (0.17) | 0.16 (0.17) |
| <i>Treat_i × Post_t × SA_i</i> | 0.98*** (0.20) | 0.60*** (0.19) | 0.58*** (0.19) | 0.76*** (0.19) | 0.76*** (0.19) |
| Constant | 5.48*** (0.11) | 10.06*** (0.13) | | | |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 184,911 | 184,885 | 184,885 | 184,885 | 184,885 |
| R ² | 0.01 | 0.06 | 0.06 | 0.12 | 0.13 |
| Adjusted R ² | 0.01 | 0.06 | 0.06 | 0.12 | 0.12 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

Sample restricted to fully competed projects.

Table 22: Effect of QuickPay on non-competitively awarded projects

| | <i>PercentDelay_{it}</i> | | | | |
|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) |
| <i>Treat_i</i> | 1.16*** (0.28) | 0.96*** (0.27) | 0.89*** (0.27) | -0.17 (0.29) | -0.11 (0.28) |
| <i>SA_i</i> | -0.61*** (0.22) | 1.94*** (0.22) | 3.19*** (0.26) | 2.82*** (0.26) | 2.74*** (0.26) |
| <i>Post_t</i> | -0.79*** (0.24) | -3.11*** (0.25) | | | |
| <i>Treat_i × Post_t</i> | 2.69*** (0.40) | 2.44*** (0.38) | 2.34*** (0.39) | 1.85*** (0.38) | 1.76*** (0.39) |
| <i>Treat_i × Post_t × SA_i</i> | -1.89*** (0.39) | -1.67*** (0.37) | -1.63*** (0.37) | -1.87*** (0.37) | -1.75*** (0.37) |
| Constant | 4.40*** (0.20) | 9.65*** (0.25) | | | |
| Project stage | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | Yes |
| Observations | 38,175 | 38,170 | 38,170 | 38,170 | 38,170 |
| R ² | 0.01 | 0.06 | 0.07 | 0.15 | 0.15 |
| Adjusted R ² | 0.01 | 0.06 | 0.07 | 0.13 | 0.13 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.

Sample restricted to non-competed projects.

20.2.2 Four-way interaction

We run the following model:

$$\begin{aligned}
PercentDelay_{it} = & \beta_0 + \beta_1 Treat_i + \beta_2 StartedAfterQP_i + \beta_3 Post_t + \beta_4 Competitive_i \\
& + \beta_5 (Treat_i \times Competitive_i) + \beta_6 (Post_t \times Competitive_i) \\
& + \beta_7 (StartedAfterQP_i \times Competitive_i) + \beta_8 (Treat_i \times Post_t) \\
& + \beta_9 (Treat_i \times Post_t \times Competitive_i) \\
& + \beta_{10} (Treat_i \times Post_t \times StartedAfterQP_i) \\
& + \beta_{11} (Treat_i \times Post_t \times StartedAfterQP_i \times Competitive_i) + e_{it}
\end{aligned}$$

Interpretation:

- β_9 is the difference between treatment effect for competitive and non-competitive projects signed before quickpay.
- $\beta_9 + \beta_{11}$ is the difference between treatment effect for competitive and non-competitive projects signed *after* quickpay.
- β_{11} is our coefficient of interest because it tells us how much of the difference is there due to “aggressive bidding” after the policy.

Table 23: Effect of Competition After QuickPay: Quickpay 2009-2011

| | <i>PercentDelay_{it}</i> | | | | | |
|--|----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| <i>Treat_i</i> | 1.16*** (0.28) | 1.16*** (0.28) | 0.97*** (0.27) | 0.92*** (0.27) | -0.26 (0.27) | -0.28 (0.27) |
| <i>SA_i</i> | -0.61*** (0.22) | -0.61*** (0.22) | 1.79*** (0.21) | 2.50*** (0.22) | 2.32*** (0.21) | 2.26*** (0.21) |
| <i>Competitive_i</i> | 1.08*** (0.23) | 1.08*** (0.23) | 0.79*** (0.22) | 0.77*** (0.22) | -0.74*** (0.23) | -0.69*** (0.23) |
| <i>Post_t</i> | -0.79*** (0.24) | -0.79*** (0.24) | -2.97*** (0.24) | | | |
| <i>Treat_i × Competitive_i</i> | -3.42*** (0.31) | -3.42*** (0.31) | -2.90*** (0.29) | -2.85*** (0.29) | -0.27 (0.30) | -0.25 (0.30) |
| <i>Post_t × Competitive_i</i> | 1.97*** (0.29) | 1.97*** (0.29) | 1.78*** (0.28) | 1.74*** (0.28) | 0.73*** (0.28) | 0.64** (0.28) |
| <i>SA_i × Competitive_i</i> | -1.29*** (0.28) | -1.29*** (0.28) | -0.88*** (0.26) | -0.89*** (0.26) | -0.72*** (0.26) | -0.71*** (0.26) |
| <i>Treat_i × Post_t</i> | 2.69*** (0.40) | 2.69*** (0.40) | 2.45*** (0.38) | 2.42*** (0.38) | 1.66*** (0.38) | 1.59*** (0.38) |
| <i>Treat_i × Post_t × Competitive_i</i> | -2.45*** (0.44) | -2.45*** (0.44) | -2.17*** (0.42) | -2.13*** (0.42) | -1.48*** (0.42) | -1.41*** (0.42) |
| <i>Treat_i × Post_t × SA_i</i> | -1.89*** (0.39) | -1.89*** (0.39) | -1.68*** (0.37) | -1.68*** (0.37) | -1.44*** (0.36) | -1.44*** (0.36) |
| <i>Treat_i × Post_t × SA_i × Competitive_i</i> | 2.87*** (0.44) | 2.87*** (0.44) | 2.28*** (0.42) | 2.25*** (0.42) | 2.19*** (0.41) | 2.21*** (0.41) |
| Constant | 4.40*** (0.20) | 4.40*** (0.20) | 9.33*** (0.20) | | | |
| Project stage | No | No | Yes | Yes | Yes | Yes |
| Time fixed effects | No | No | No | Yes | Yes | Yes |
| Task fixed effects | No | No | No | No | Yes | Yes |
| Industry fixed effects | No | No | No | No | No | Yes |
| Observations | 223,086 | 223,086 | 223,055 | 223,055 | 223,055 | 223,055 |
| R ² | 0.01 | 0.01 | 0.06 | 0.06 | 0.12 | 0.12 |
| Adjusted R ² | 0.01 | 0.01 | 0.06 | 0.06 | 0.11 | 0.12 |

Note:

*p<0.1; **p<0.05; ***p<0.01

Each observation is a project-quarter.

SEs are robust and clustered at the project level.