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

Feb 03, 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

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## Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
## i Please use `linewidth` instead.
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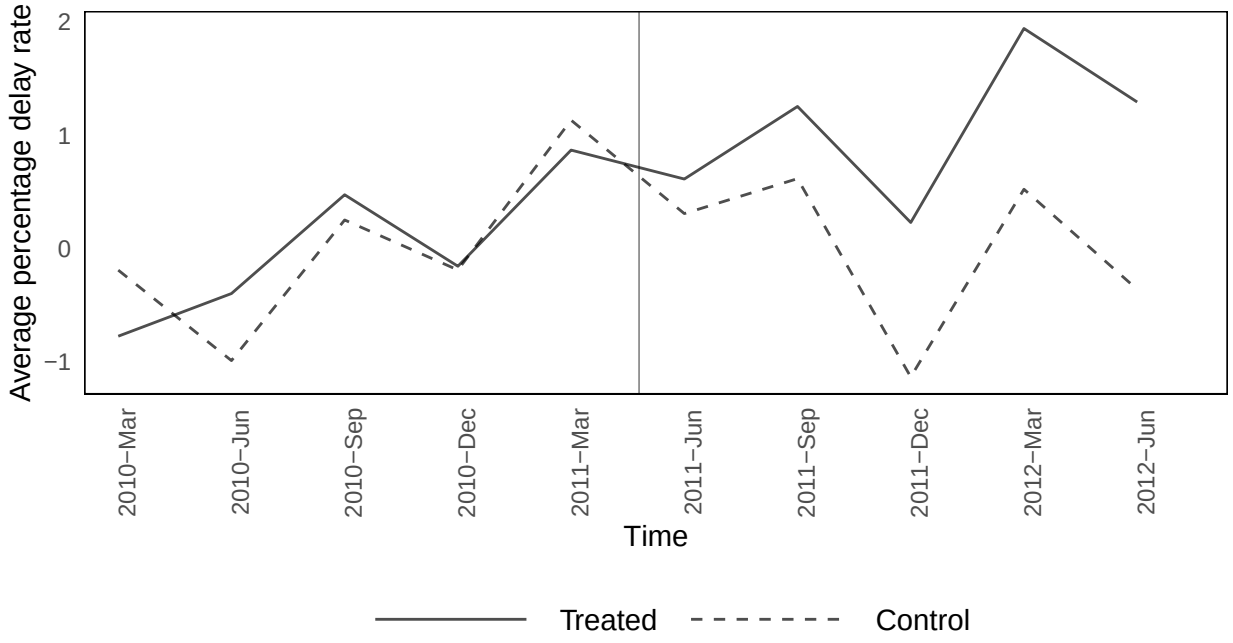

3 Baseline Regressions

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

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

Table 1: Effect of QuickPay on project delay rates

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.76^{***}	-1.30^{***}	-1.35^{***}	-0.90^{***}	-0.91^{***}
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
$Post_t$	-0.21^{*}	-5.57^{***}			
	(0.12)	(0.78)			
$Treat_i \times Post_t$	1.10^{***}	0.97^{***}	1.01^{***}	0.99^{***}	1.01^{***}
	(0.14)	(0.14)	(0.14)	(0.13)	(0.13)
Constant	5.27^{***}	43.19^{***}			
	(0.10)	(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	0.002	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.

3.1 Days of delay

Table 2: Effect of QuickPay on project delay rates

	$DelayDays_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-3.44^{***}	-2.28^{***}	-2.38^{***}	-1.81^{***}	-1.84^{***}
	(0.19)	(0.18)	(0.18)	(0.18)	(0.18)
$Post_t$	1.24^{***}	-5.79^{***}			
	(0.20)	(1.23)			
$Treat_i \times Post_t$	1.51^{***}	1.69^{***}	1.78^{***}	1.72^{***}	1.74^{***}
	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)
Constant	8.80^{***}	53.07^{***}			
	(0.16)	(0.92)			
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	223,373	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.

4 Event study

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

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## NOTE: 231,007 observations removed because of NA values (LHS: 209,501, RHS: 230,878).
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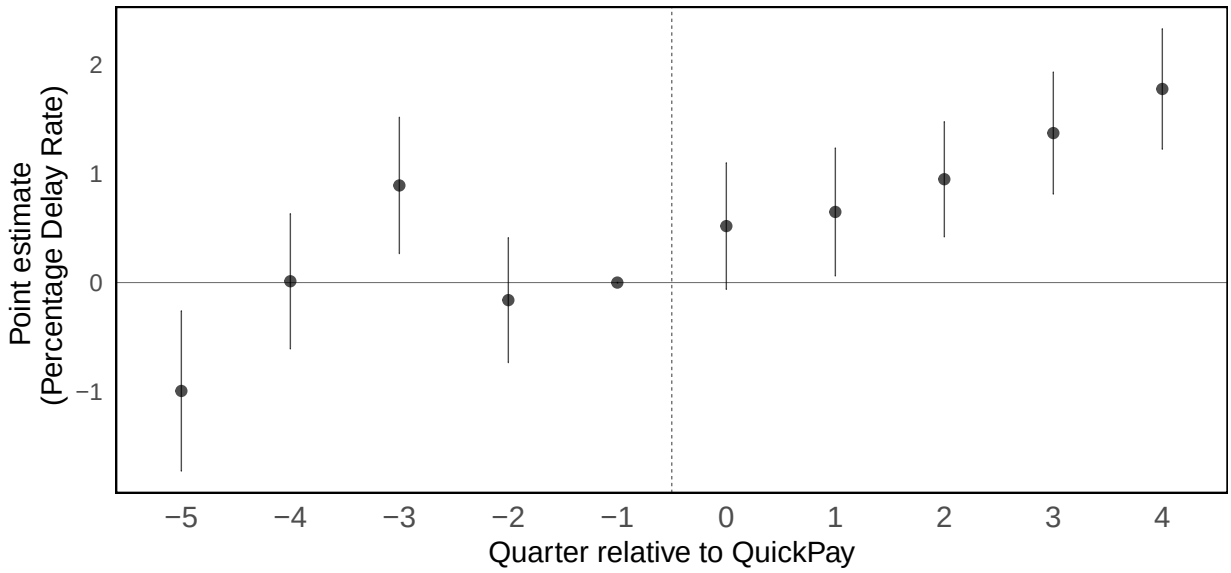

5 Parallel Trends Test

Table 3: Linear Time Trend Before QuickPay

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.37^{***}	-0.65	-0.65	-0.44	-0.52
	(0.41)	(0.41)	(0.41)	(0.41)	(0.41)
$QuarterNum$	0.42^{***}	-1.16^{**}			
	(0.08)	(0.50)			
$Treat_i \times QuarterNum$	-0.09	-0.17^{*}	-0.17^{*}	-0.03	-0.03
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Constant	3.36^{***}	48.76^{***}			
	(0.35)	(2.32)			
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	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.

6 Temporal Placebo Test

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

[1] 4

Table 4: Placebo test: Treatment Time 2010-09-30

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.62^{***}	-1.56^{***}	-1.57^{***}	-0.80^{***}	-0.85^{***}
	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)
$Post$	1.12^{***}	-5.03^{***}			
	(0.21)	(1.50)			
$Treat_i \times Post$	-0.20	0.23	0.23	0.31	0.32
	(0.25)	(0.25)	(0.25)	(0.25)	(0.25)
Constant	4.45^{***}	48.36^{***}			
	(0.19)	(1.30)			
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	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.

7 Cross-sectional placebo

- Projects are randomly assigned into treatment or control

Table 5: Effect of QuickPay on project delay rates

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	0.002	−0.03	−0.03	0.02	0.01
	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)
$Post_t$	0.52***	−4.41***			
	(0.09)	(0.75)			
$Treat_i \times Post_t$	0.02	0.01	0.02	−0.02	−0.01
	(0.13)	(0.12)	(0.12)	(0.12)	(0.12)
Constant	4.12***	41.64***			
	(0.07)	(0.58)			
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	0.0003	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.

8 Summary statistics

9 Congestion Effect

9.1 Number of projects per contractor

9.1.1 Contractors holding only small or only large projects

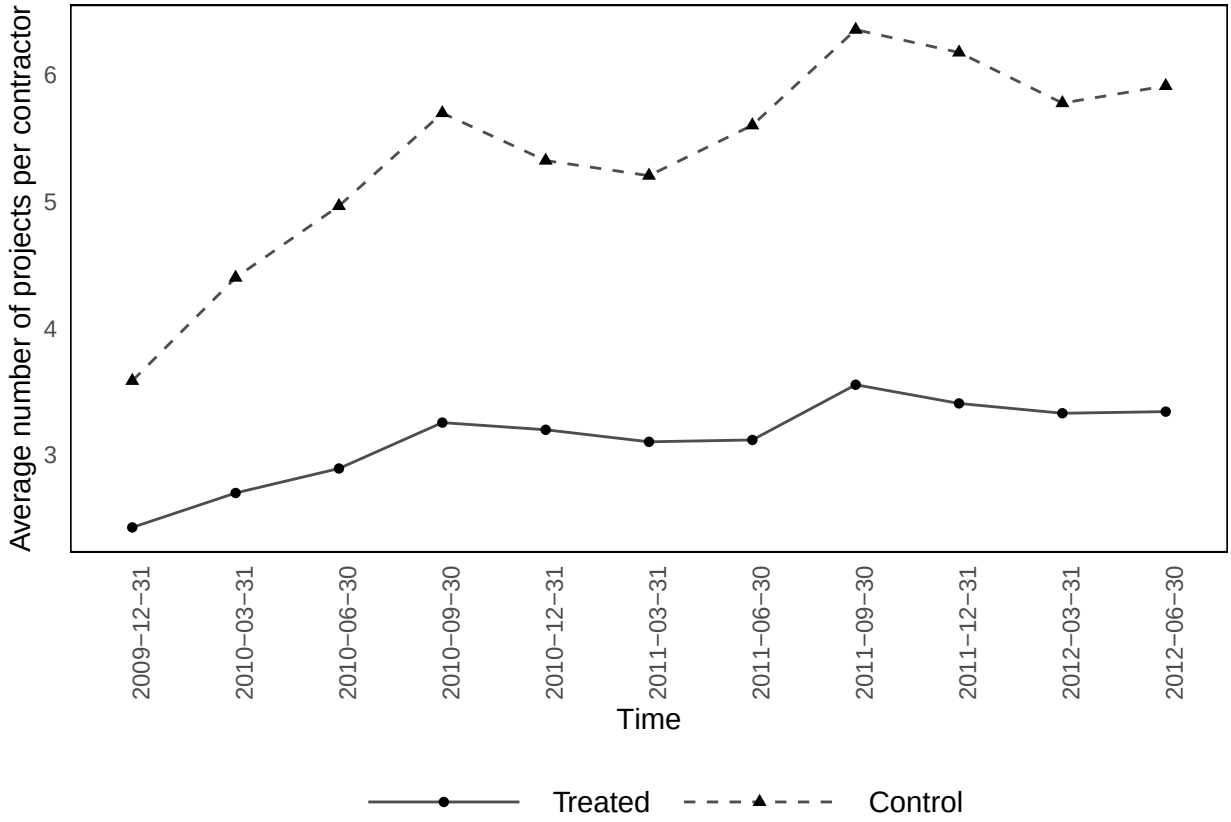

Table 6: Num Contractor Projects and QuickPay reform

	Number of projects	
	(1)	(2)
$Treat_i$	-2.03^{***}	-2.03^{***}
	(0.39)	(0.39)
$Post_t$	0.94^{**}	
	(0.41)	
$Treat_i \times Post_t$	-0.58	-0.58
	(0.41)	(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.

9.1.2 Contractors holding at least one small project are "treated"

9.2 Total budget

9.2.1 Contractors holding only small or only large projects

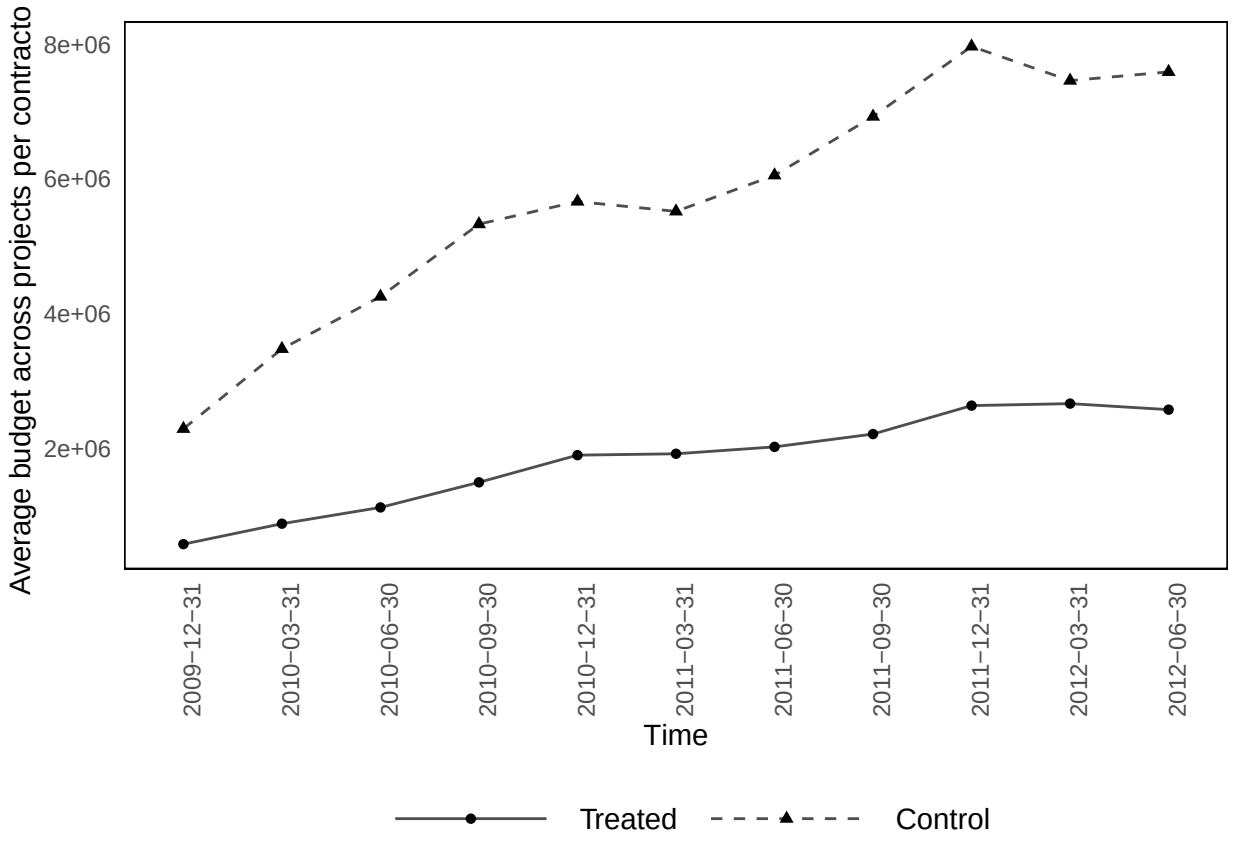

Table 7: Contractor Project Budget and QuickPay reform

	Total budget	
	(1)	(2)
$Treat_i$	$-3{,}303{,}977.00^{***}$	$-3{,}296{,}074.00^{***}$
	(525,130.10)	(527,240.20)
$Post_t$	$2{,}457{,}755.00^{***}$	
	(287,992.90)	
$Treat_i \times Post_t$	$-1{,}472{,}315.00^{***}$	$-1{,}475{,}519.00^{***}$
	(291,443.10)	(292,600.50)
Constant	$4{,}733{,}618.00^{***}$	
	(522,700.30)	
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.

9.3 Number of tasks

9.3.1 Contractors holding only small or only large projects

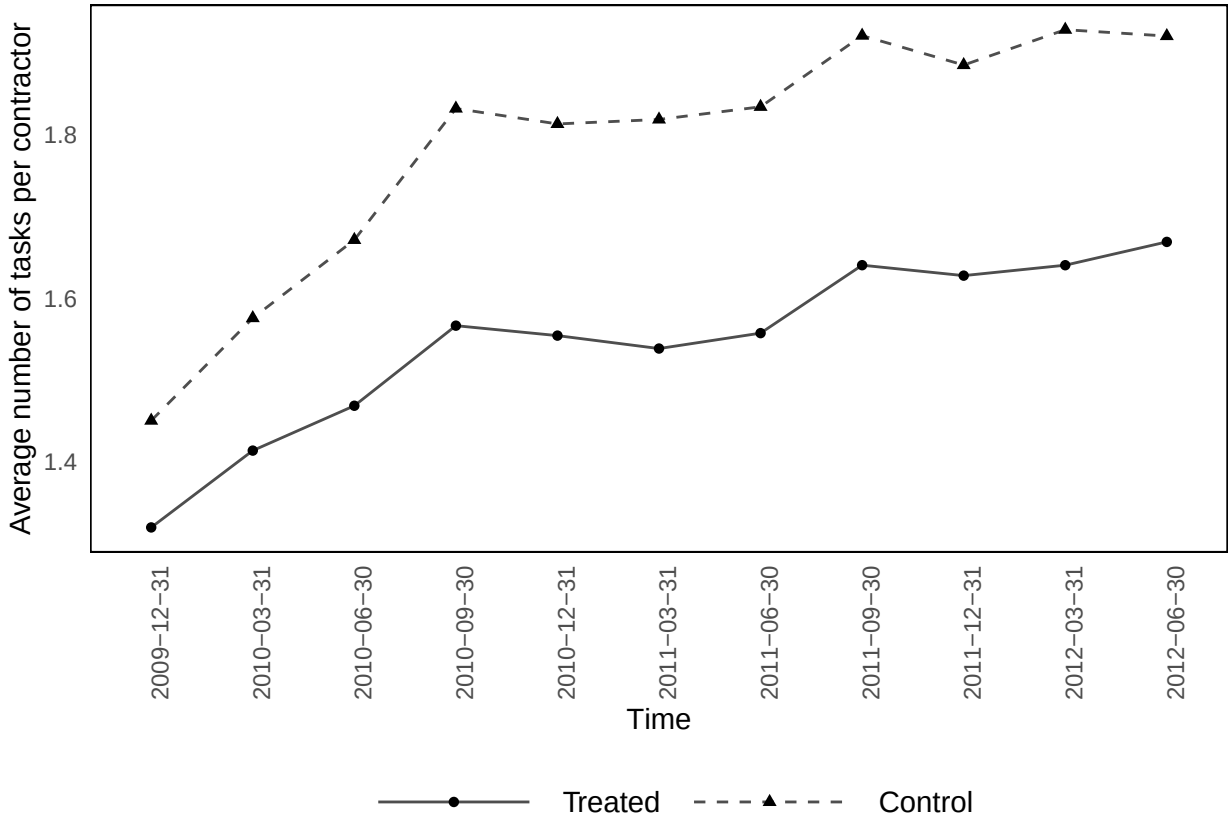

Table 8: Contractor Project Tasks and QuickPay reform

	Number of tasks	
	(1)	(2)
$Treat_i$	-0.23^{***}	-0.23^{***}
	(0.04)	(0.04)
$Post_t$	0.17^{***}	
	(0.02)	
$Treat_i \times Post_t$	-0.04	-0.04
	(0.03)	(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.

10 Project portfolio: Spillover effect

10.1 Regression 1: DID on large projects

- Sample restricted to large projects only.
- Treat 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 9: Project Portfolio and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	1.53^{***}	-0.55^{***}	-0.64^{***}	0.43^{**}	0.46^{***}
	(0.23)	(0.17)	(0.17)	(0.17)	(0.17)
$Post_t$	-0.35^{***}	-13.73^{***}			
	(0.13)	(1.19)			
$Treat_i \times Post_t$	0.08	0.52^{**}	0.60^{***}	0.23	0.33
	(0.27)	(0.22)	(0.22)	(0.22)	(0.22)
Constant	5.96^{***}	64.62^{***}			
	(0.11)	(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.

10.2 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 10: (Incremental effect) Project Portfolio and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-0.79^{***}	-0.48^{***}	-0.54^{***}	-0.68^{***}	-0.71^{***}
	(0.13)	(0.11)	(0.11)	(0.12)	(0.12)
$Treat_{i,l}$	-2.74^{***}	-2.46^{***}	-2.41^{***}	-0.72^{***}	-0.64^{***}
	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)
$Post_t$	-0.21^{*}	-5.41^{***}			
	(0.12)	(0.79)			
$Treat_i \times Post_t$	1.22^{***}	1.04^{***}	1.09^{***}	1.11^{***}	1.13^{***}
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
$Treat_{i,l} \times Post_t$	-0.48^{***}	-0.28^{**}	-0.33^{**}	-0.38^{***}	-0.38^{***}
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Constant	5.27^{***}	43.79^{***}			
	(0.10)	(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.
Large projects whose contractor holds small projects are removed.

11 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)

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

11.1 Stage Quintile

11.2 Logged Stage Regressions

Table 11: Project Stage and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-2.65^{***}	-1.65^{***}	-1.73^{***}	-1.34^{***}	-1.37^{***}
	(0.23)	(0.21)	(0.21)	(0.21)	(0.20)
Log(Stage)	3.16^{***}	2.51^{***}	2.45^{***}	2.53^{***}	2.53^{***}
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
$Post_t$	-1.33^{***}	-5.06^{***}			
	(0.23)	(0.81)			
$Treat_i \times Post_t$	2.06^{***}	1.74^{***}	1.82^{***}	1.85^{***}	1.90^{***}
	(0.28)	(0.26)	(0.26)	(0.25)	(0.25)
$Treat_i \times$ Log(Stage)	-0.70^{***}	-0.20^{**}	-0.23^{**}	-0.27^{***}	-0.29^{***}
	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)
$Post_t \times$ Log(Stage)	-0.06	0.48^{***}	0.49^{***}	0.23^{**}	0.22^{**}
	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)
$Treat_i \times Post_t \times$ Log(Stage)	0.59^{***}	0.54^{***}	0.56^{***}	0.62^{***}	0.63^{***}
	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)
Constant	10.20^{***}	43.10^{***}			
	(0.19)	(0.62)			
Duration, Budget, Bids	No	Yes	Yes	Yes	Yes
$Post_t \times$ (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.

12 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

Table 12: Contract Financing and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-2.11^{***}	-1.19^{***}	-1.31^{***}	-0.67^{***}	-0.71^{***}
	(0.16)	(0.15)	(0.15)	(0.16)	(0.16)
$Post_t$	1.44^{***}	-8.73^{***}			
	(0.28)	(2.64)			
CF_i	1.32^{***}	1.64^{***}	1.40^{***}	-0.56	-0.64^{*}
	(0.37)	(0.32)	(0.31)	(0.34)	(0.34)
$Treat_i \times Post_t$	-0.03	2.35^{***}	2.46^{***}	2.40^{***}	2.43^{***}
	(0.33)	(0.43)	(0.43)	(0.45)	(0.45)
$Post_t \times CF_i$	0.04	-1.30^{**}	-1.07	0.39	0.44
	(0.65)	(0.66)	(0.65)	(0.68)	(0.68)
$Treat_i \times CF_i$	1.98^{***}	1.00^{**}	1.05^{***}	0.60	0.59
	(0.48)	(0.41)	(0.40)	(0.42)	(0.42)
$Treat_i \times Post_t \times CF_i$	0.77	-1.40	-1.44	-0.81	-0.88
	(0.89)	(0.90)	(0.89)	(0.92)	(0.92)
Constant	5.33^{***}	46.80^{***}			
	(0.14)	(0.84)			
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	65,191	55,291	55,291	55,291	55,291
R^2	0.01	0.18	0.18	0.23	0.23
Adjusted R^2	0.01	0.18	0.18	0.22	0.22

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.

13 Contract Financing (All Projects)

- $CF = 1$ if project was receiving contract financing

Table 13: Contract Financing (All Projects) and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.99^{***}	-1.56^{***}	-1.61^{***}	-1.05^{***}	-1.04^{***}
	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)
$Post_t$	-0.55^{***}	-5.69^{***}			
	(0.12)	(0.79)			
CF_i	1.35^{***}	1.37^{***}	1.24^{***}	-0.68^{***}	-0.67^{***}
	(0.27)	(0.23)	(0.23)	(0.24)	(0.24)
$Treat_i \times Post_t$	1.39^{***}	1.14^{***}	1.17^{***}	1.03^{***}	1.06^{***}
	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)
$Post_t \times CF_i$	1.85^{***}	0.28	0.38	0.39	0.42
	(0.33)	(0.30)	(0.30)	(0.30)	(0.30)
$Treat_i \times CF_i$	2.30^{***}	1.45^{***}	1.47^{***}	0.87^{***}	0.77^{***}
	(0.35)	(0.29)	(0.29)	(0.29)	(0.30)
$Treat_i \times Post_t \times CF_i$	-1.19^{***}	-0.66^{*}	-0.64^{*}	-0.29	-0.33
	(0.44)	(0.39)	(0.39)	(0.38)	(0.38)
Constant	5.05^{***}	44.04^{***}			
	(0.11)	(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.

14 Receives Grants/Financial Assistance (Projects active on/before June 2010)

- $CF = 1$ if receives_grants==‘t’
- The variable “receives_grants” used to be called “receives financial assistance”

Table 14: Receives grants and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-2.05^{***}	-1.07^{***}	-1.19^{***}	-0.58^{***}	-0.63^{***}
	(0.15)	(0.14)	(0.14)	(0.16)	(0.16)
$Post_t$	1.56^{***}	-8.02^{***}			
	(0.26)	(2.61)			
CF_i	0.55	1.88^{***}	1.65^{**}	1.22^{*}	1.21^{*}
	(0.76)	(0.70)	(0.69)	(0.67)	(0.66)
$Treat_i \times Post_t$	0.08	2.06^{***}	2.17^{***}	2.21^{***}	2.21^{***}
	(0.32)	(0.39)	(0.39)	(0.40)	(0.40)
$Post_t \times CF_i$	-0.80	-1.57	-1.32	-0.38	-0.32
	(1.14)	(1.34)	(1.34)	(1.38)	(1.38)
$Treat_i \times CF_i$	2.63^{***}	1.37	1.48^{*}	0.46	0.42
	(0.93)	(0.85)	(0.84)	(0.81)	(0.82)
$Treat_i \times Post_t \times CF_i$	-0.32	-0.10	-0.20	0.18	0.38
	(1.44)	(1.76)	(1.75)	(1.80)	(1.79)
Constant	5.49^{***}	46.01^{***}			
	(0.13)	(0.83)			
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	65,191	55,291	55,291	55,291	55,291
R^2	0.01	0.18	0.18	0.23	0.23
Adjusted R^2	0.01	0.18	0.18	0.22	0.22

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 Receives Grants/Financial Assistance (All projects)

- $CF = 1$ if receives_grants==‘t’
- The variable “receives_grants” used to be called “receives financial assistance”

Table 15: Receives grants (All Projects) and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.84^{***}	-1.36^{***}	-1.41^{***}	-0.92^{***}	-0.93^{***}
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
$Post_t$	-0.21^{*}	-5.57^{***}			
	(0.12)	(0.78)			
CF_i	0.69	1.60^{***}	1.51^{***}	1.38^{***}	1.33^{***}
	(0.56)	(0.49)	(0.49)	(0.48)	(0.48)
$Treat_i \times Post_t$	1.09^{***}	0.96^{***}	1.00^{***}	1.00^{***}	1.02^{***}
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
$Post_t \times CF_i$	-0.28	-0.67	-0.63	-0.01	-0.02
	(0.60)	(0.58)	(0.58)	(0.58)	(0.58)
$Treat_i \times CF_i$	2.18^{***}	1.24^{**}	1.26^{**}	0.42	0.49
	(0.68)	(0.60)	(0.60)	(0.60)	(0.60)
$Treat_i \times Post_t \times CF_i$	0.01	0.18	0.18	-0.22	-0.23
	(0.76)	(0.73)	(0.73)	(0.73)	(0.73)
Constant	5.24^{***}	43.22^{***}			
	(0.10)	(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	0.003	0.18	0.18	0.21	0.21
Adjusted R^2	0.003	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.

16 Competition

16.1 Impact on bidding metrics [All projects]

Table 16: Effect of Competition After QuickPay: Quickpay 2009-2011

	$NumberOfBids_{it}$	$InitialDuration_{it}$	$InitialBudget_{it}$
	(1)	(2)	(3)
$Treat_i$	1.08^{***}	-7.27^{***}	$-15{,}055.20^{***}$
	(0.02)	(0.72)	(1,586.13)
$Treat_i \times Post_t$	0.09^{***}	-3.38^{***}	$-29{,}491.30^{***}$
	(0.03)	(1.00)	(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.

16.2 Impact on delays

16.2.1 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 17: Effect of QuickPay on competitively awarded projects

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-2.26^{***}	-1.93^{***}	-1.94^{***}	-0.50^{***}	-0.51^{***}
	(0.13)	(0.12)	(0.12)	(0.12)	(0.12)
SA_i	-1.90^{***}	0.87^{***}	1.45^{***}	1.52^{***}	1.48^{***}
	(0.17)	(0.16)	(0.18)	(0.18)	(0.18)
$Post_t$	1.18^{***}	-1.16^{***}			
	(0.16)	(0.16)			
$Treat_i \times Post_t$	0.23	0.28	0.30^{*}	0.16	0.16
	(0.19)	(0.18)	(0.18)	(0.17)	(0.17)
$Treat_i \times Post_t \times SA_i$	0.98^{***}	0.60^{***}	0.58^{***}	0.76^{***}	0.76^{***}
	(0.20)	(0.19)	(0.19)	(0.19)	(0.19)
Constant	5.48^{***}	10.06^{***}			
	(0.11)	(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 18: Effect of QuickPay on non-competitively awarded projects

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	1.16^{***}	0.96^{***}	0.89^{***}	-0.17	-0.11
	(0.28)	(0.27)	(0.27)	(0.29)	(0.28)
SA_i	-0.61^{***}	1.94^{***}	3.19^{***}	2.82^{***}	2.74^{***}
	(0.22)	(0.22)	(0.26)	(0.26)	(0.26)
$Post_t$	-0.79^{***}	-3.11^{***}			
	(0.24)	(0.25)			
$Treat_i \times Post_t$	2.69^{***}	2.44^{***}	2.34^{***}	1.85^{***}	1.76^{***}
	(0.40)	(0.38)	(0.39)	(0.38)	(0.39)
$Treat_i \times Post_t \times SA_i$	-1.89^{***}	-1.67^{***}	-1.63^{***}	-1.87^{***}	-1.75^{***}
	(0.39)	(0.37)	(0.37)	(0.37)	(0.37)
Constant	4.40^{***}	9.65^{***}			
	(0.20)	(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.

16.2.2 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 19: Effect of Competition After QuickPay: Quickpay 2009-2011

	$PercentDelay_{it}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$Treat_i$	1.16***	1.16***	0.97***	0.92***	−0.26	−0.28
	(0.28)	(0.28)	(0.27)	(0.27)	(0.27)	(0.27)
SA_i	−0.61***	−0.61***	1.79***	2.50***	2.32***	2.26***
	(0.22)	(0.22)	(0.21)	(0.22)	(0.21)	(0.21)
$Competitive_i$	1.08***	1.08***	0.79***	0.77***	−0.74***	−0.69***
	(0.23)	(0.23)	(0.22)	(0.22)	(0.23)	(0.23)
$Post_t$	−0.79***	−0.79***	−2.97***			
	(0.24)	(0.24)	(0.24)			
$Treat_i \times Competitive_i$	−3.42***	−3.42***	−2.90***	−2.85***	−0.27	−0.25
	(0.31)	(0.31)	(0.29)	(0.29)	(0.30)	(0.30)
$Post_t \times Competitive_i$	1.97***	1.97***	1.78***	1.74***	0.73***	0.64**
	(0.29)	(0.29)	(0.28)	(0.28)	(0.28)	(0.28)
$SA_i \times Competitive_i$	−1.29***	−1.29***	−0.88***	−0.89***	−0.72***	−0.71***
	(0.28)	(0.28)	(0.26)	(0.26)	(0.26)	(0.26)
$Treat_i \times Post_t$	2.69***	2.69***	2.45***	2.42***	1.66***	1.59***
	(0.40)	(0.40)	(0.38)	(0.38)	(0.38)	(0.38)
$Treat_i \times Post_t \times Competitive_i$	−2.45***	−2.45***	−2.17***	−2.13***	−1.48***	−1.41***
	(0.44)	(0.44)	(0.42)	(0.42)	(0.42)	(0.42)
$Treat_i \times Post_t \times SA_i$	−1.89***	−1.89***	−1.68***	−1.68***	−1.44***	−1.44***
	(0.39)	(0.39)	(0.37)	(0.37)	(0.36)	(0.36)
$Treat_i \times Post_t \times SA_i \times Competitive_i$	2.87***	2.87***	2.28***	2.25***	2.19***	2.21***
	(0.44)	(0.44)	(0.42)	(0.42)	(0.41)	(0.41)
Constant	4.40***	4.40***	9.33***			
	(0.20)	(0.20)	(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.