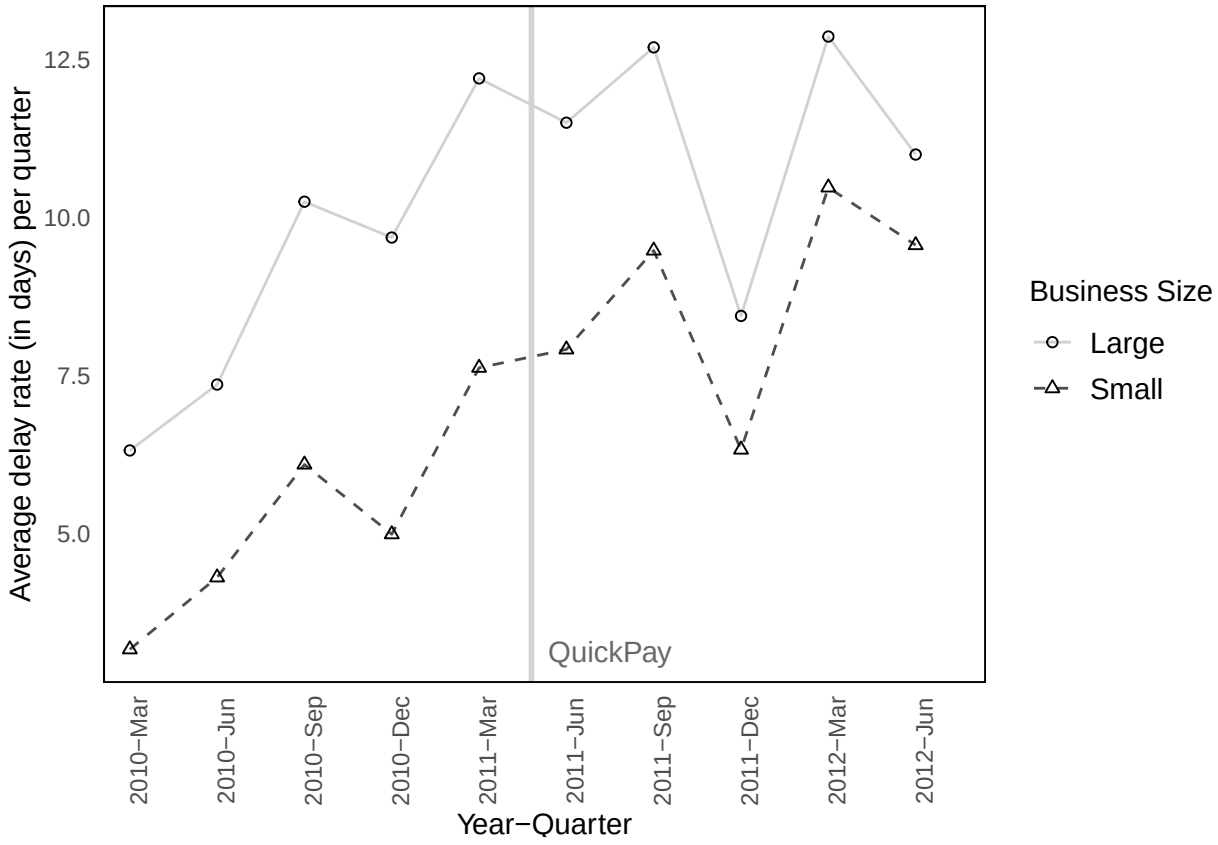
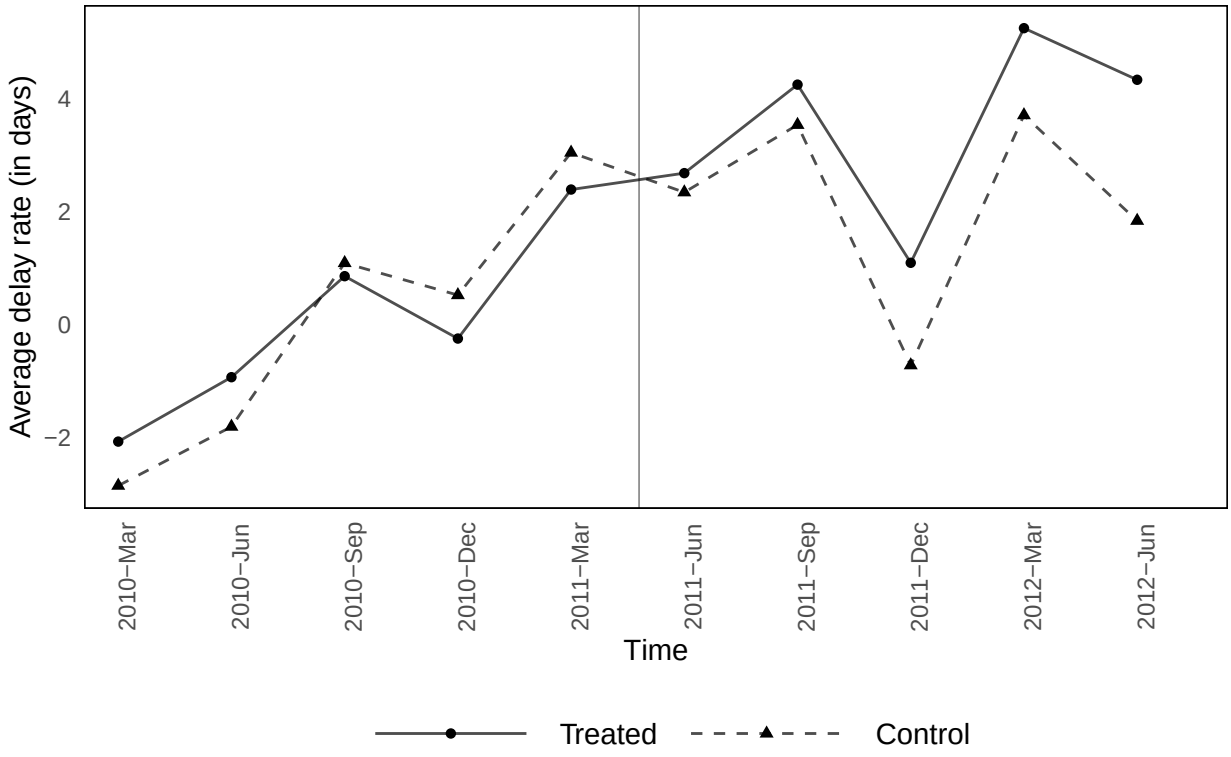
Percentage Delay Rate: QuickPay (2009-2012)

Jul 15, 2022

1 Delay days over time

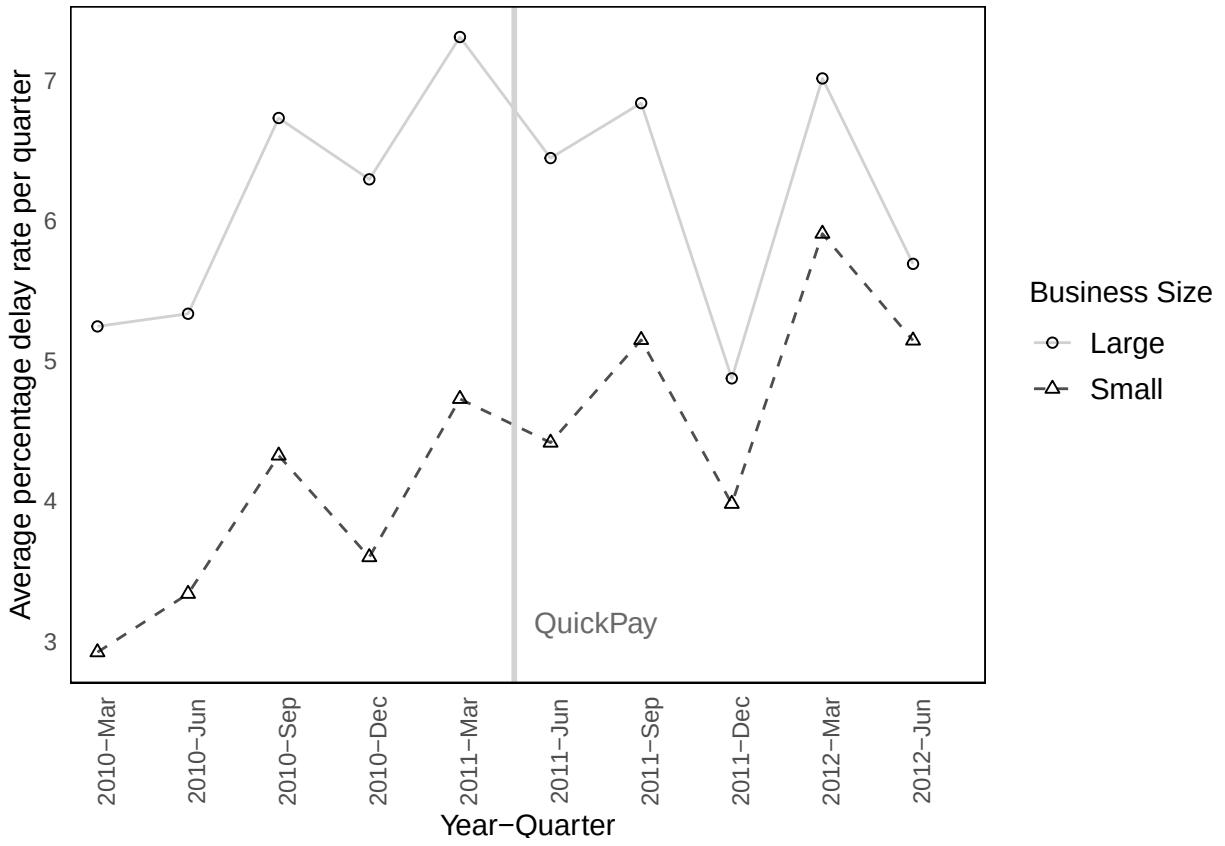


2 Delay days over time (de-meaned)



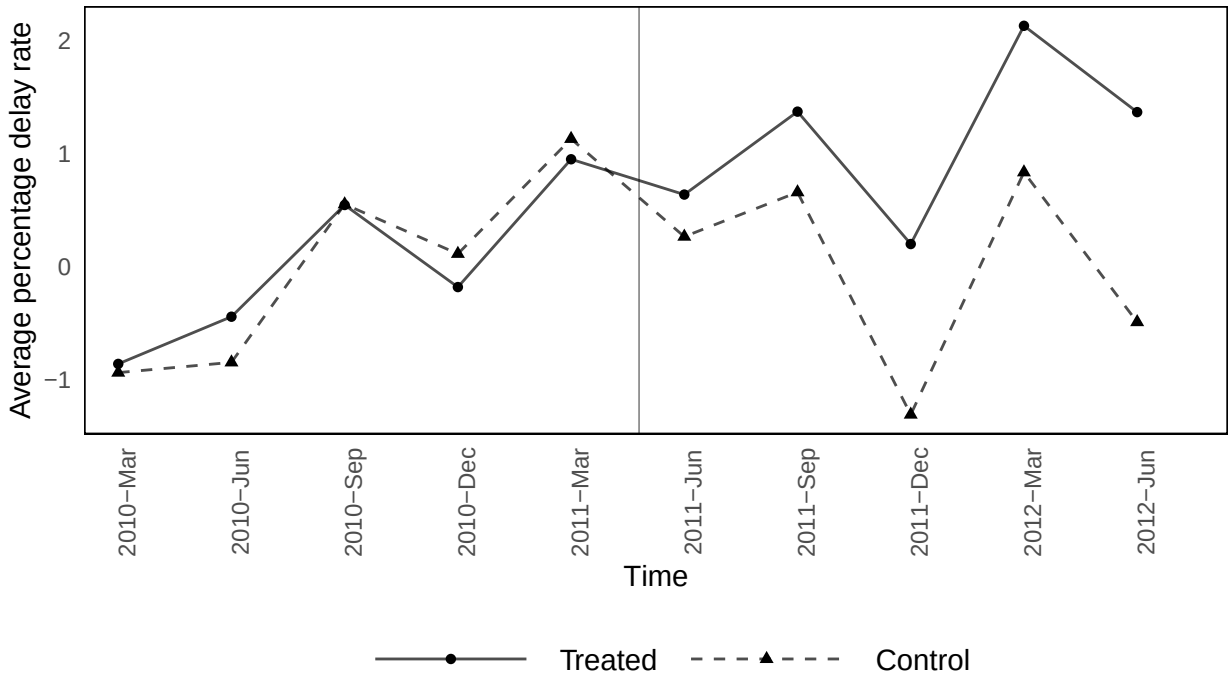
3 Percentage delays over time

- Sample restricted to projects for which start dates matches the one in API
  - This is done by using first reported "action_date" and "date_signed"
- $PercentDelay_{it} = 100 \times Delay_{it}/Duration_{i,t-1}$
  - $Duration_{i,t-1} = Deadline_{i,t-1} - StartDate_i$

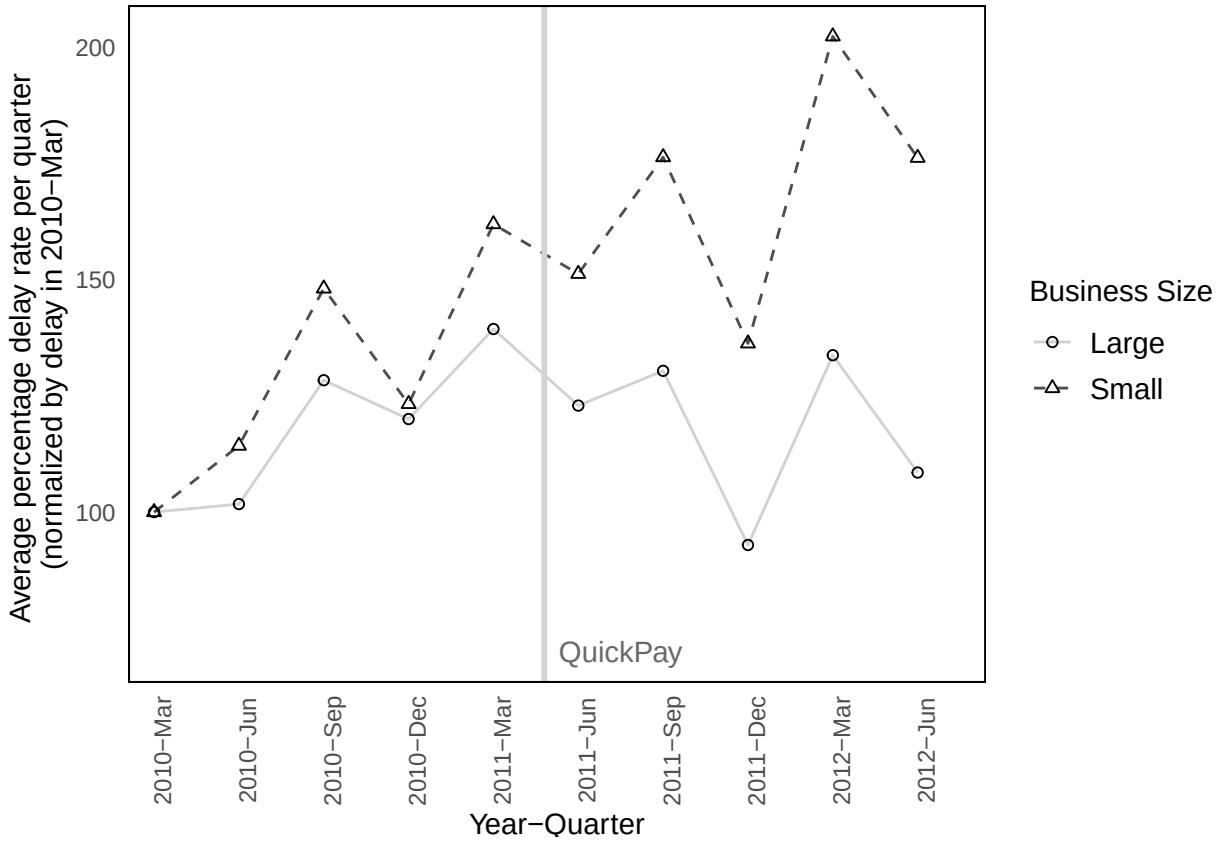


4 Demeaned delay rate (in percentage)

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



4.1 Normalized delay rate (in percentage)



5 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)
$Treat_i$	-2.48^{***}	-1.59^{***}	-1.62^{***}	-1.31^{***}	-1.33^{***}
	(0.12)	(0.10)	(0.10)	(0.10)	(0.10)
$Post_t$	-0.32^{***}	-8.32^{***}			
	(0.12)	(0.81)			
$Treat_i \times Post_t$	1.27^{***}	1.10^{***}	1.13^{***}	1.18^{***}	1.23^{***}
	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)
Constant	6.44^{***}	53.81^{***}			
	(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	260,056	235,960	235,960	235,960	235,960
R^2	0.003	0.22	0.22	0.25	0.26
Adjusted R^2	0.003	0.22	0.22	0.25	0.25

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 Event study

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

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## NOTE: 242,843 observations removed because of NA values (LHS: 242,843, RHS: 9,862).
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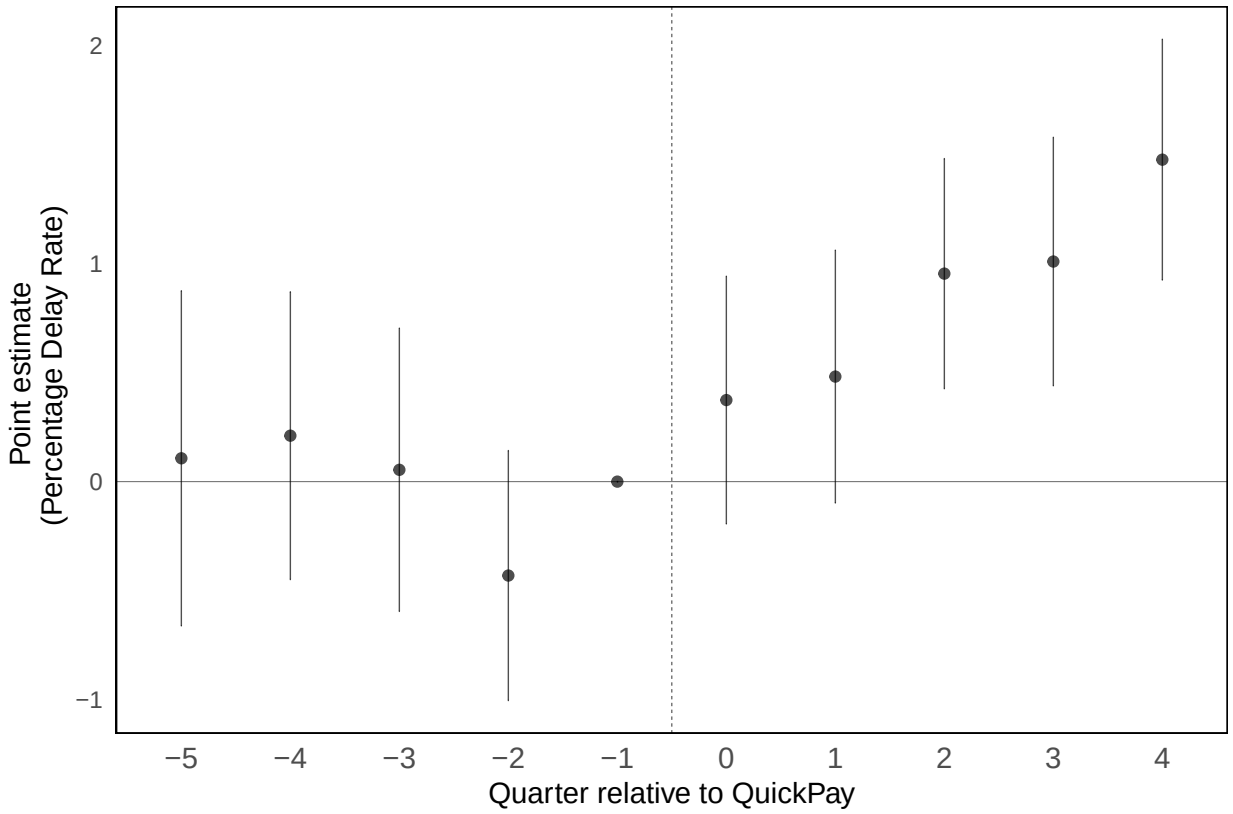

Point estimate
(Percentage Delay Rate)
2
1
0
−1
−5
−4
−3
−2
−1
0
1
2
3
4
Quarter relative to QuickPay

7 Parallel Trends Test

Table 2: Linear Time Trend Before QuickPay

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.85^{***}	-1.18^{***}	-1.19^{***}	-1.14^{***}	-1.27^{***}
	(0.42)	(0.38)	(0.38)	(0.37)	(0.37)
$QuarterNum$	0.51^{***}	-1.49^{***}			
	(0.07)	(0.49)			
$Treat_i \times QuarterNum$	-0.14	-0.11	-0.11	0.04	0.05
	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)
Constant	4.15^{***}	60.96^{***}			
	(0.35)	(2.30)			
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	97,705	90,650	90,650	90,650	90,650
R^2	0.01	0.26	0.26	0.32	0.32
Adjusted R^2	0.01	0.26	0.26	0.31	0.31

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.

8 Placebo Test

8.1 Placebo Regression Tables

[1] 3

Table 3: Placebo test: Treatment Time 2010-06-30

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-4.50^{***}	-4.12^{***}	-4.13^{***}	-2.77^{***}	-2.99^{***}
	(0.78)	(0.70)	(0.70)	(0.67)	(0.67)
$Post$	2.49^{***}	-8.64^{*}			
	(0.67)	(4.70)			
$Treat_i \times Post$	-1.25	0.64	0.62	0.83	0.91
	(0.81)	(0.73)	(0.73)	(0.71)	(0.70)
Constant	10.33^{***}	122.58^{***}			
	(0.65)	(4.49)			
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	97,705	90,650	90,650	90,650	90,650
R^2	0.01	0.32	0.32	0.37	0.37
Adjusted R^2	0.01	0.32	0.32	0.36	0.36

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.

[1] 4

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

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-4.58^{***}	-3.43^{***}	-3.43^{***}	-2.21^{***}	-2.45^{***}
	(0.49)	(0.42)	(0.42)	(0.42)	(0.41)
$Post$	2.52^{***}	-12.11^{***}			
	(0.47)	(3.07)			
$Treat_i \times Post$	-1.40^{**}	-0.20	-0.19	0.26	0.38
	(0.56)	(0.49)	(0.49)	(0.48)	(0.48)
Constant	10.68^{***}	124.33^{***}			
	(0.41)	(2.70)			
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	97,705	90,650	90,650	90,650	90,650
R^2	0.01	0.32	0.32	0.37	0.37
Adjusted R^2	0.01	0.32	0.32	0.36	0.36

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.

9 Summary statistics

10 Number of projects per contractor

10.1 Contractors holding only small or only large projects

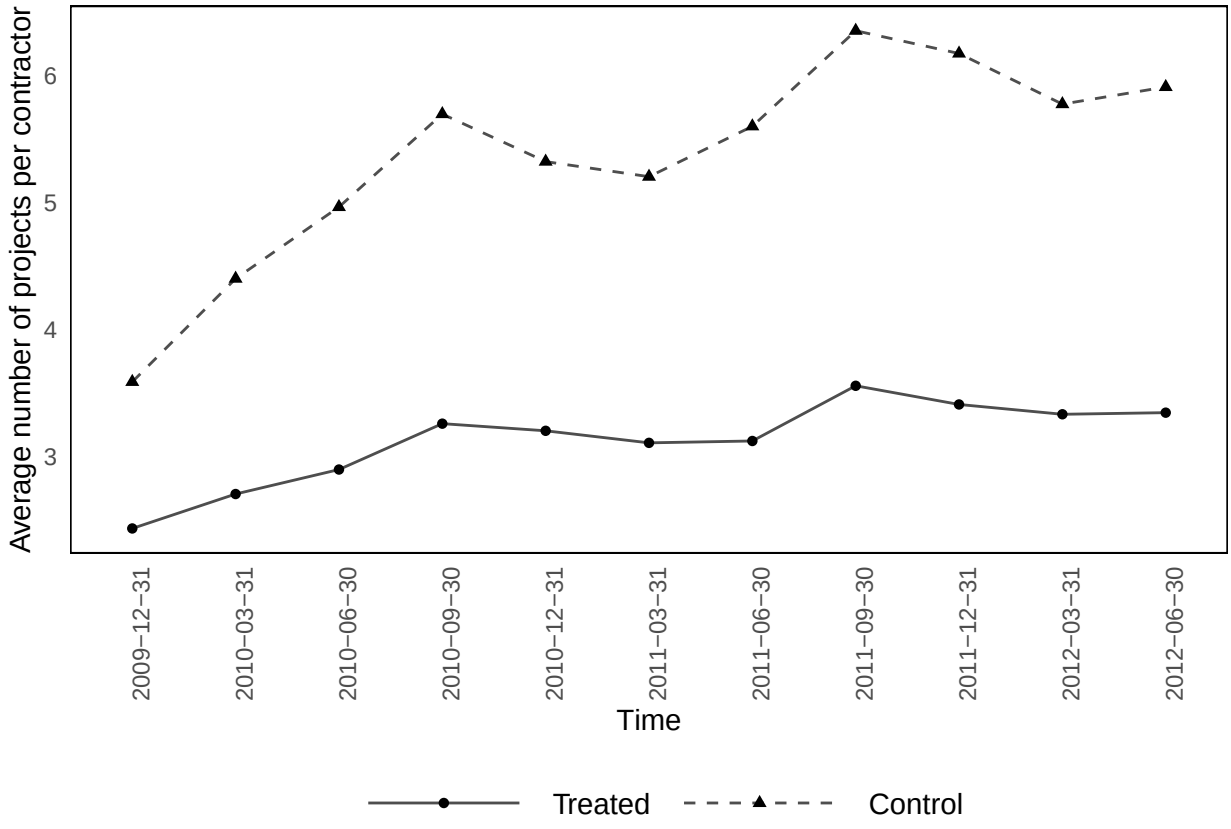


Table 5: Num Contractor Projects and QuickPay reform

	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.

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

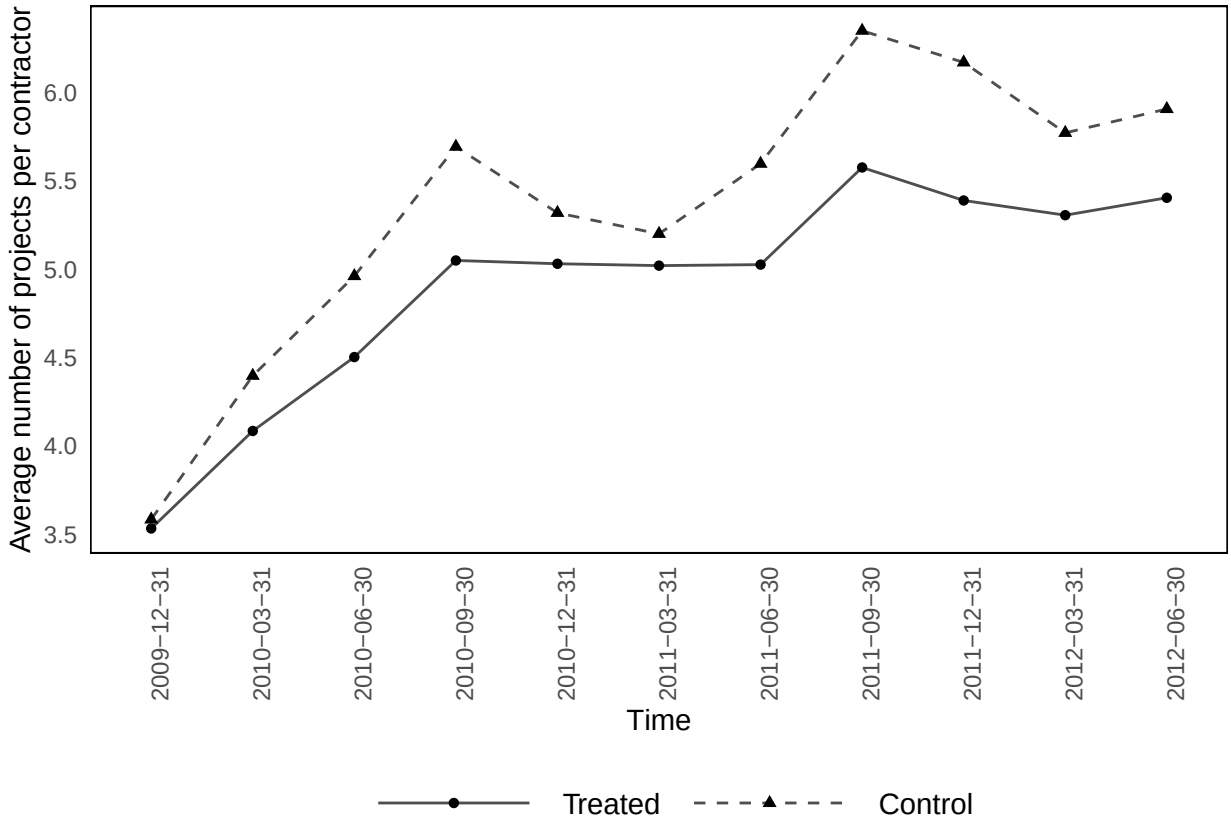


Table 6: Num Contractor Projects and QuickPay reform

	Number of projects	
	(1)	(2)
$Treat_i$	−0.37	−0.35
	(0.43)	(0.43)
$Post_t$	0.94**	
	(0.41)	
$Treat_i \times Post_t$	−0.25	−0.27
	(0.42)	(0.42)
Constant	5.03***	
	(0.38)	
Time fixed effects	No	Yes
Observations	97,640	97,640
R^2	0.0004	0.001
Adjusted R^2	0.0003	0.001

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.

11 Total budget

11.1 Contractors holding only small or only large projects

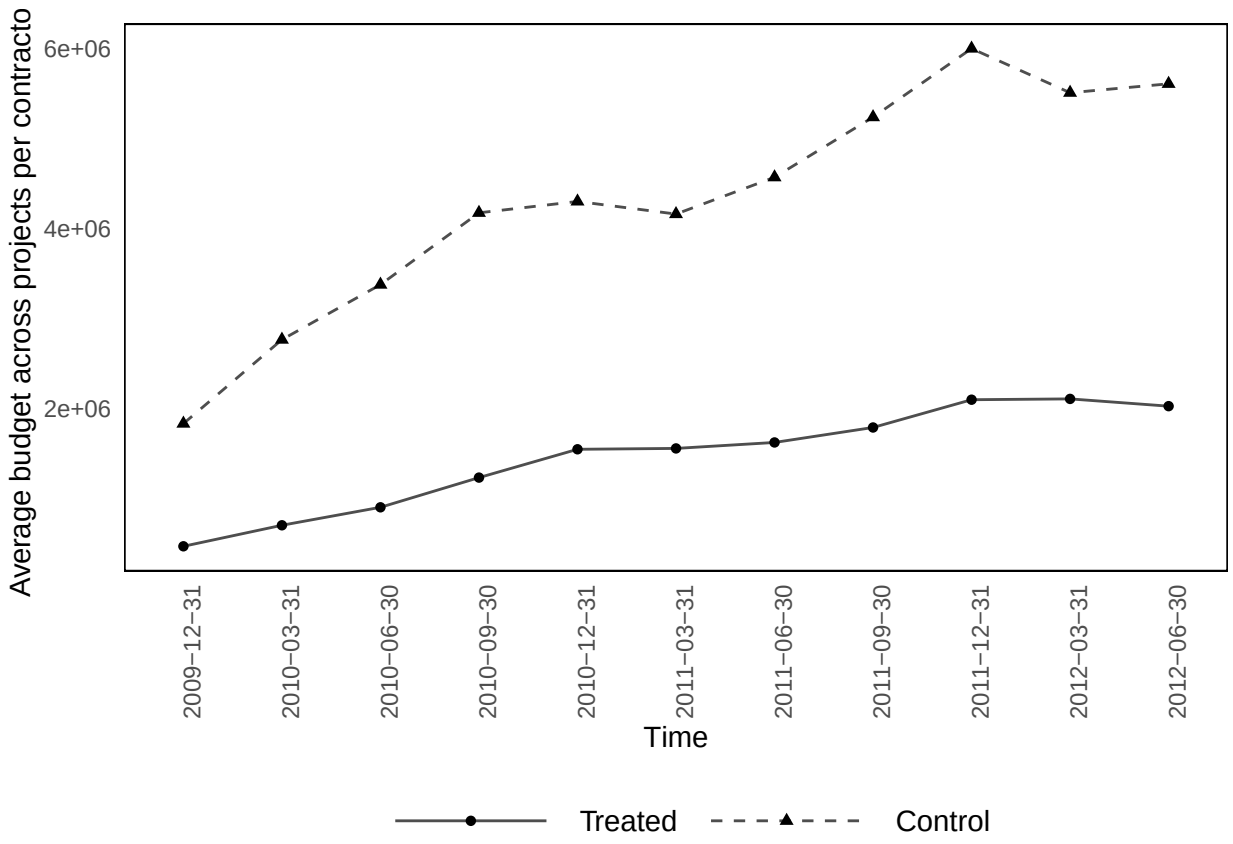


Table 7: Contractor Project Budget and QuickPay reform

	Total budget	
	(1)	(2)
$Treat_i$	$-2{,}503{,}033.00^{***}$	$-2{,}497{,}737.00^{***}$
	(454,885.70)	(456,972.80)
$Post_t$	$1{,}715{,}503.00^{***}$	
	(229,333.50)	
$Treat_i \times Post_t$	$-953{,}041.30^{***}$	$-955{,}237.70^{***}$
	(231,908.60)	(233,131.80)
Constant	$3{,}666{,}740.00^{***}$	
	(453,287.80)	
Time fixed effects	No	Yes
Observations	84,391	84,391
R^2	0.01	0.02
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.

12 Number of tasks

12.1 Contractors holding only small or only large projects

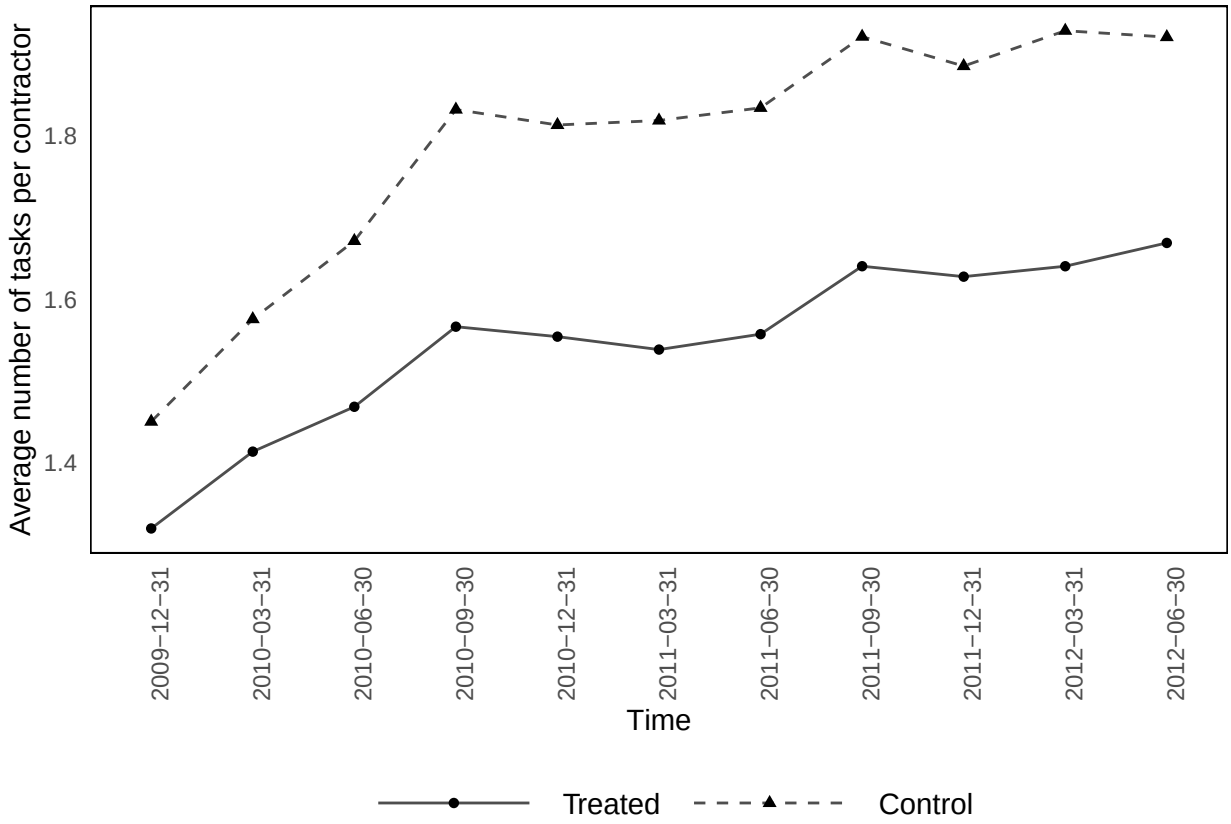


Table 8: Contractor Project Tasks and QuickPay reform

	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.

13 Project portfolio: Num Large Projects/Total Projects

13.1 Continuous

Table 9: Project Portfolio and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	0.89	0.36	0.36	−0.36	−0.40
	(0.61)	(0.54)	(0.54)	(0.49)	(0.49)
$Post_t$	0.26	−7.39***			
	(0.75)	(1.05)			
Proportion Large Projects	3.43***	1.97***	1.99***	0.96*	0.93*
	(0.63)	(0.55)	(0.55)	(0.51)	(0.51)
$Treat_i \times Post_t \times$ Proportion Large Projects	0.68	0.12	0.13	0.73	0.74
	(0.75)	(0.70)	(0.69)	(0.66)	(0.66)
$Post_t \times$ Proportion Large Projects	−0.61	−1.01	−1.02	−0.48	−0.53
	(0.77)	(0.71)	(0.71)	(0.68)	(0.68)
$Treat_i \times$ Proportion Large Projects	−5.41***	−3.71***	−3.80***	−1.91***	−1.81**
	(0.85)	(0.79)	(0.79)	(0.74)	(0.74)
$Treat_i \times Post_t \times$ Proportion Large Projects	0.55	1.00	1.07	−0.29	−0.34
	(1.08)	(1.05)	(1.04)	(1.01)	(1.01)
Constant	3.11***	51.93***			
	(0.61)	(0.80)			
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	260,056	235,960	235,960	235,960	235,960
R^2	0.003	0.22	0.22	0.25	0.26
Adjusted R^2	0.003	0.22	0.22	0.25	0.25

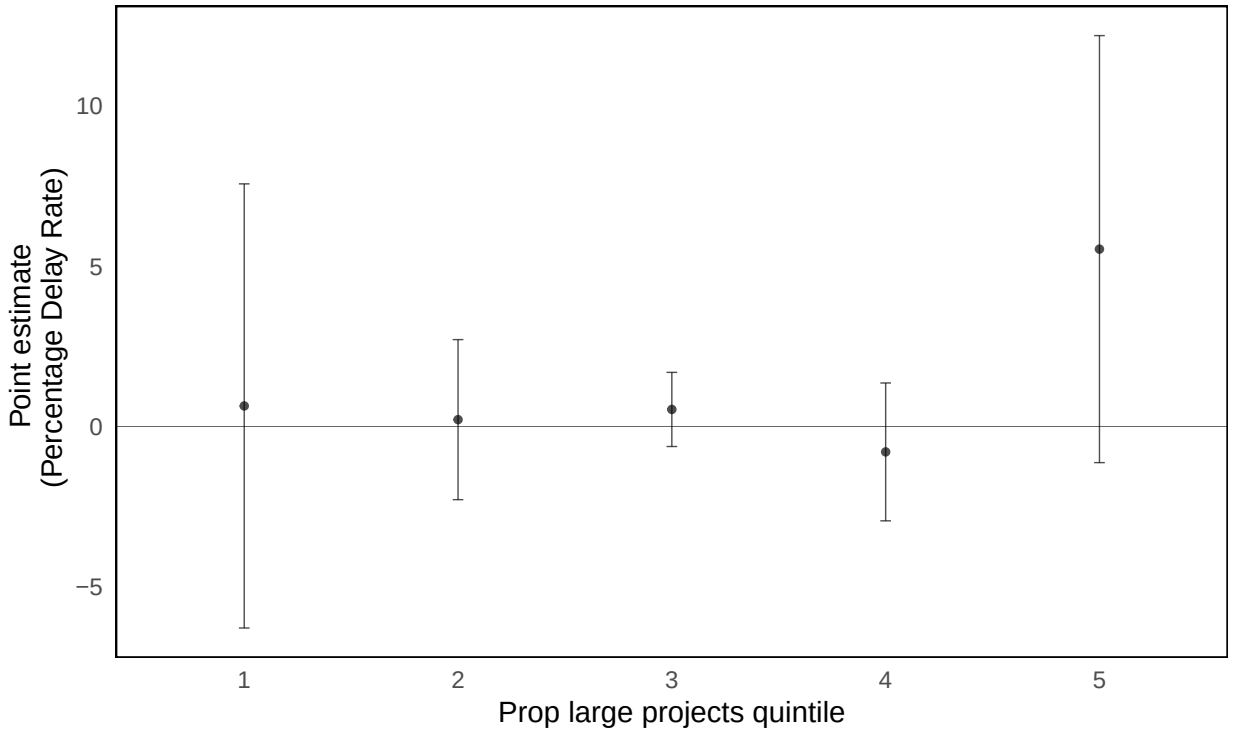
Note: *p<0.1; **p<0.05; ***p<0.01
Each observation is a project-quarter.
SEs are robust and clustered at the project level.

Table 10: Project Portfolio and QuickPay reform: Restricted Sample

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	3.26^{***}	0.66	0.54	0.43	0.40
	(0.71)	(0.61)	(0.61)	(0.55)	(0.55)
$Post_t$	2.04^{**}	-13.50^{***}			
	(0.82)	(1.83)			
Proportion Large Projects	13.82^{***}	4.32^{***}	4.21^{***}	2.31^{***}	2.00^{***}
	(0.91)	(0.68)	(0.68)	(0.62)	(0.62)
$Treat_i \times Post_t \times$ Proportion Large Projects	-1.73^{**}	-1.09	-1.06	-0.12	0.01
	(0.84)	(0.76)	(0.76)	(0.73)	(0.73)
$Post_t \times$ Proportion Large Projects	-4.18^{***}	-1.57^{*}	-1.58^{*}	-0.94	-0.92
	(1.06)	(0.86)	(0.86)	(0.83)	(0.83)
$Treat_i \times$ Proportion Large Projects	-10.70^{***}	-4.19^{***}	-4.05^{***}	-3.78^{***}	-4.05^{***}
	(1.10)	(0.94)	(0.94)	(0.89)	(0.90)
$Treat_i \times Post_t \times$ Proportion Large Projects	5.89^{***}	3.66^{***}	3.70^{***}	2.12^{*}	1.98
	(1.34)	(1.22)	(1.21)	(1.21)	(1.21)
Constant	-1.72^{**}	57.32^{***}			
	(0.70)	(1.36)			
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	49,222	45,643	45,643	45,643	45,643
R^2	0.05	0.38	0.38	0.43	0.43
Adjusted R^2	0.05	0.37	0.38	0.42	0.43

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 observations with at least one small and one large project

13.2 Discrete



14 Project portfolio: Budget Large Projects/Total Budget Across Projects

Table 11: Project Portfolio and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	−0.69	−0.02	0.05	−0.36	−0.41
	(0.59)	(0.50)	(0.50)	(0.46)	(0.46)
$Post_t$	−0.66	−7.79***			
	(0.73)	(1.01)			
Proportion Large Projects Budget	1.79***	1.55***	1.65***	0.95**	0.91*
	(0.60)	(0.51)	(0.51)	(0.48)	(0.48)
$Treat_i \times Post_t \times$ Proportion Large Projects Budget	1.61**	0.47	0.42	0.78	0.79
	(0.74)	(0.65)	(0.65)	(0.62)	(0.61)
$Post_t \times$ Proportion Large Projects Budget	0.34	−0.63	−0.71	−0.43	−0.47
	(0.75)	(0.66)	(0.66)	(0.63)	(0.63)
$Treat_i \times$ Proportion Large Projects Budget	−3.99***	−4.00***	−4.18***	−2.28***	−2.21***
	(0.75)	(0.69)	(0.69)	(0.64)	(0.64)
$Treat_i \times Post_t \times$ Proportion Large Projects Budget	−0.55	1.28	1.41	−0.11	−0.09
	(0.98)	(0.91)	(0.91)	(0.87)	(0.87)
Constant	4.70***	52.38***			
	(0.59)	(0.76)			
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	260,056	235,960	235,960	235,960	235,960
R^2	0.003	0.22	0.22	0.25	0.26
Adjusted R^2	0.003	0.22	0.22	0.25	0.25

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.

Table 12: Project Portfolio and QuickPay reform: Restricted Sample

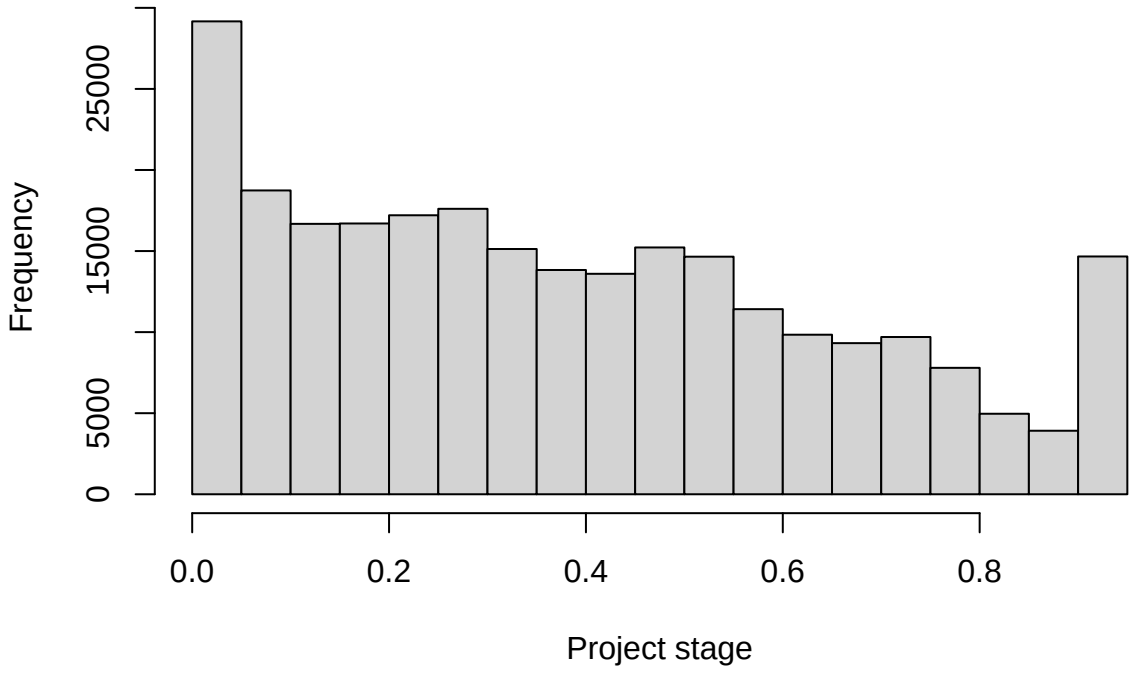
	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	0.24	0.21	0.18	0.95*	0.95*
	(0.62)	(0.55)	(0.55)	(0.52)	(0.52)
$Post_t$	0.56	−14.02***			
	(0.76)	(1.75)			
Proportion Large Projects Budget	10.03***	3.53***	3.54***	2.84***	2.58***
	(0.78)	(0.62)	(0.62)	(0.58)	(0.58)
$Treat_i \times Post_t \times$ Proportion Large Projects Budget	−0.28	−0.94	−0.97	−0.57	−0.50
	(0.77)	(0.69)	(0.69)	(0.67)	(0.67)
$Post_t \times$ Proportion Large Projects Budget	−2.43***	−1.23	−1.30*	−1.48**	−1.53**
	(0.94)	(0.77)	(0.77)	(0.75)	(0.75)
$Treat_i \times$ Proportion Large Projects Budget	−8.43***	−4.80***	−4.81***	−4.65***	−4.78***
	(0.92)	(0.81)	(0.81)	(0.77)	(0.77)
$Treat_i \times Post_t \times$ Proportion Large Projects Budget	3.95***	3.92***	4.04***	2.45**	2.38**
	(1.17)	(1.04)	(1.04)	(1.03)	(1.03)
Constant	1.48**	58.36***			
	(0.61)	(1.29)			
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	49,222	45,643	45,643	45,643	45,643
R^2	0.05	0.38	0.38	0.43	0.43
Adjusted R^2	0.05	0.37	0.38	0.42	0.43

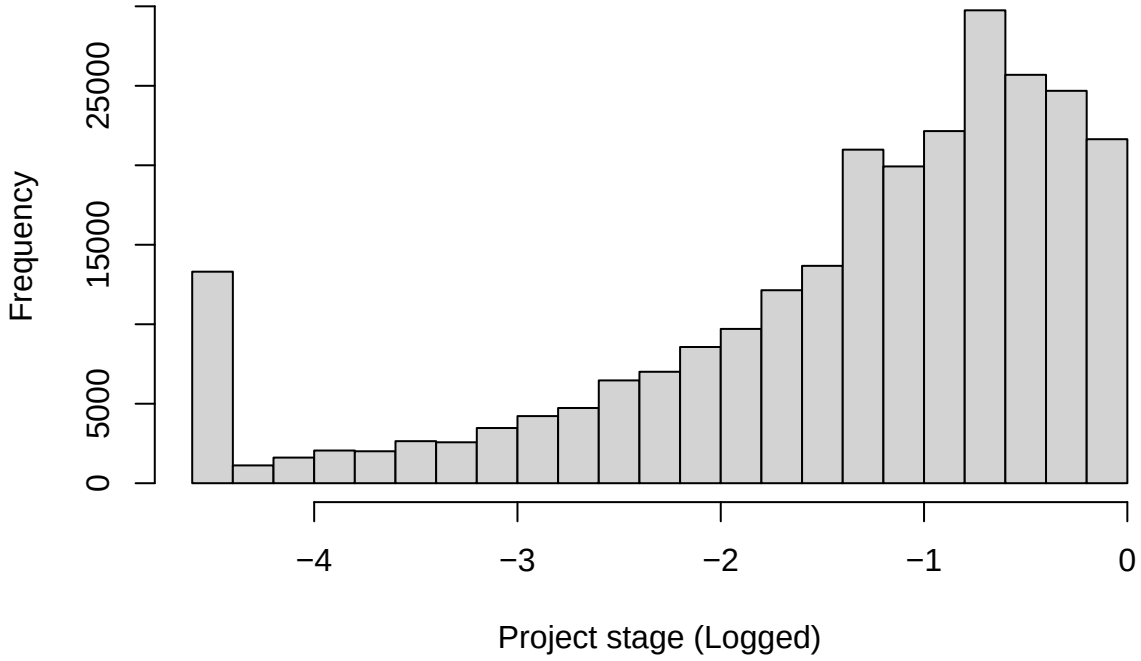
Note: *p<0.1; **p<0.05; ***p<0.01
Each observation is a project-quarter.
SEs are robust and clustered at the project level.
Sample restricted to observations with at least one small and one large project

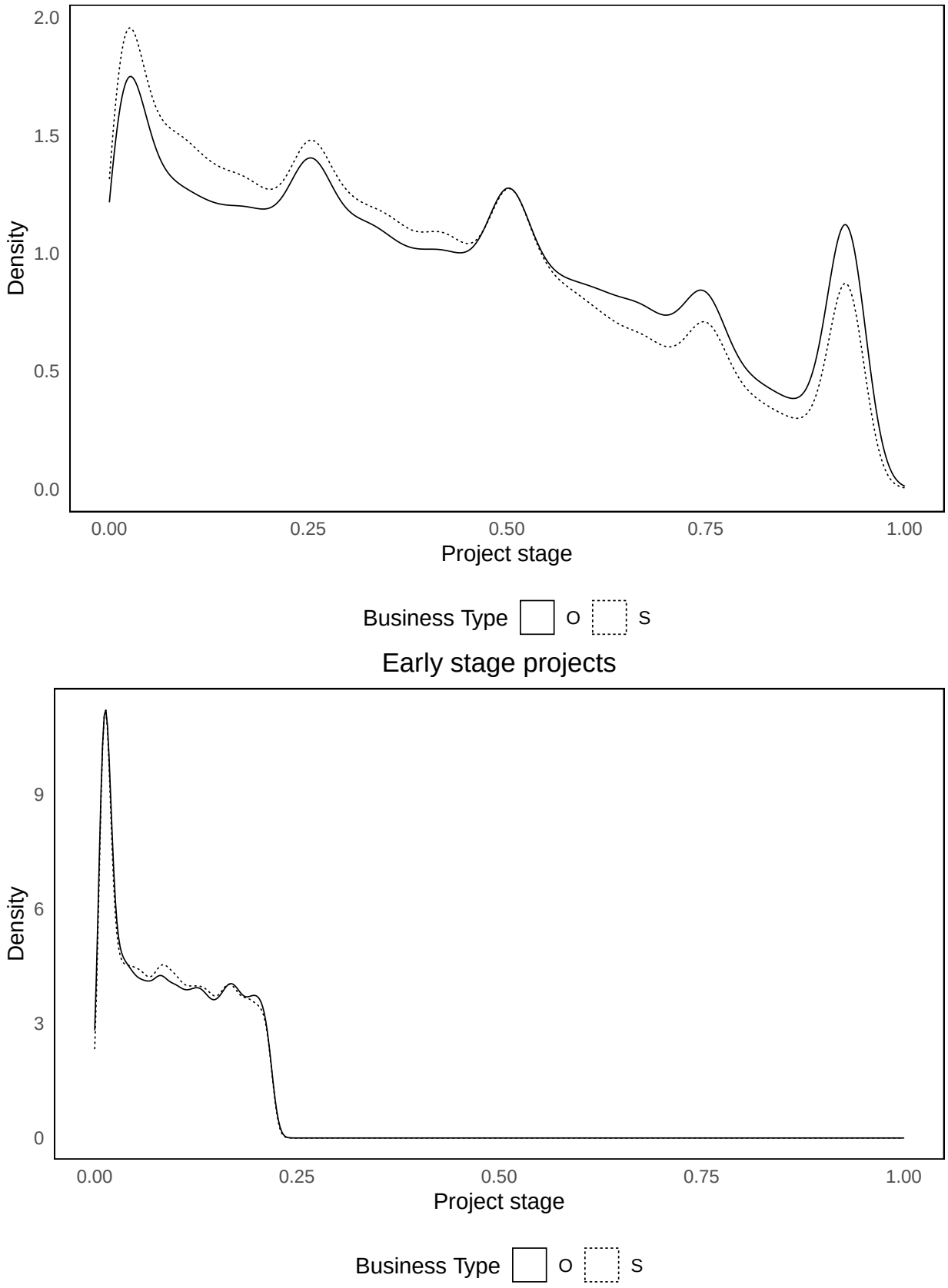
15 Project Stage

- 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)

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


Frequency
0
5000
15000
25000
0.0
0.2
0.4
0.6
0.8
Project stage


Frequency
0
5000
15000
25000
−4
−3
−2
−1
0
Project stage (Logged)


2.0
1.5
1.0
0.5
0.0
Density
0.00
0.25
0.50
0.75
1.00
Project stage
Business Type
O
S
Early stage projects
9
6
3
0
Density
0.00
0.25
0.50
0.75
1.00
Project stage
Business Type
O
S

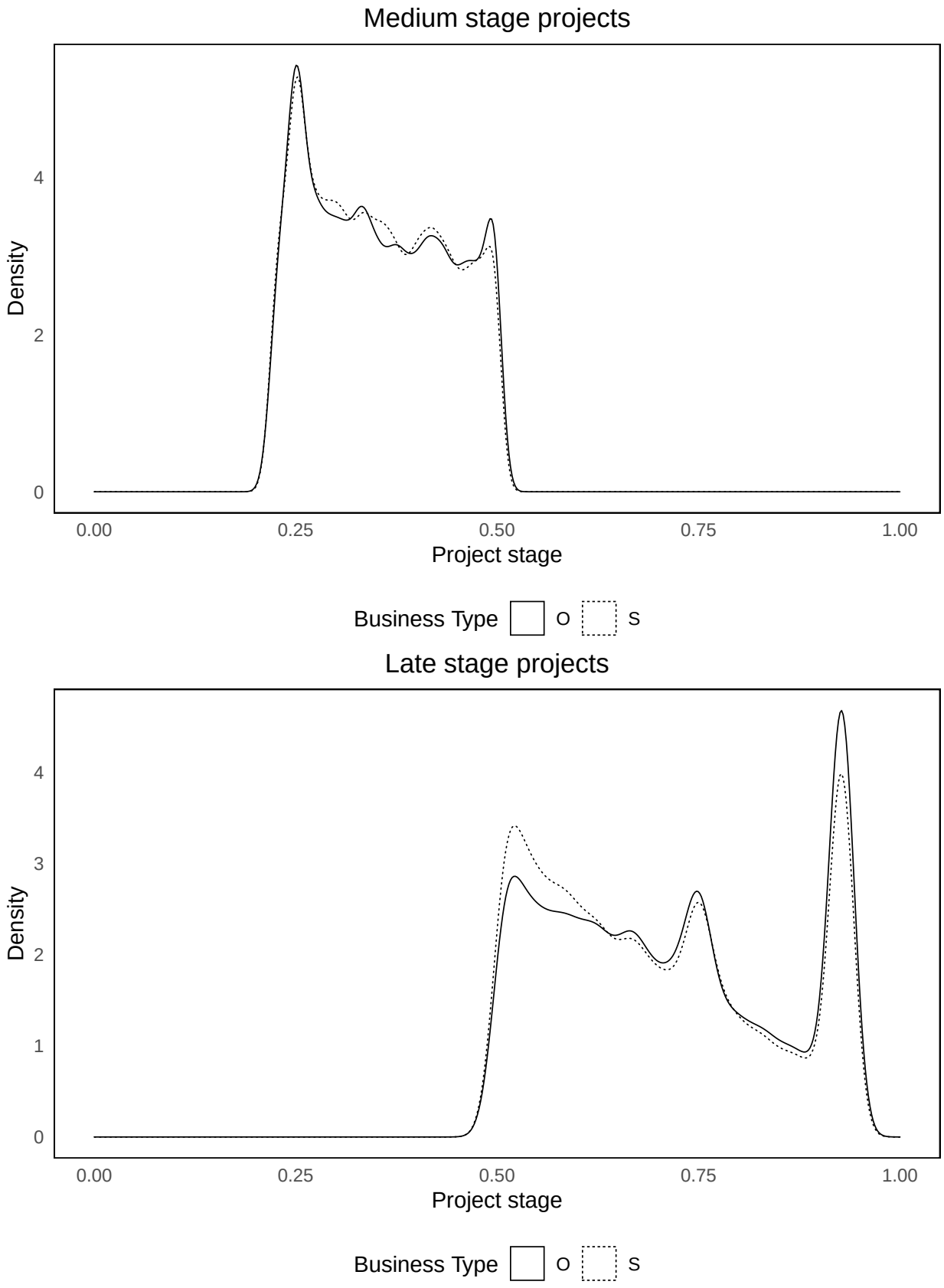
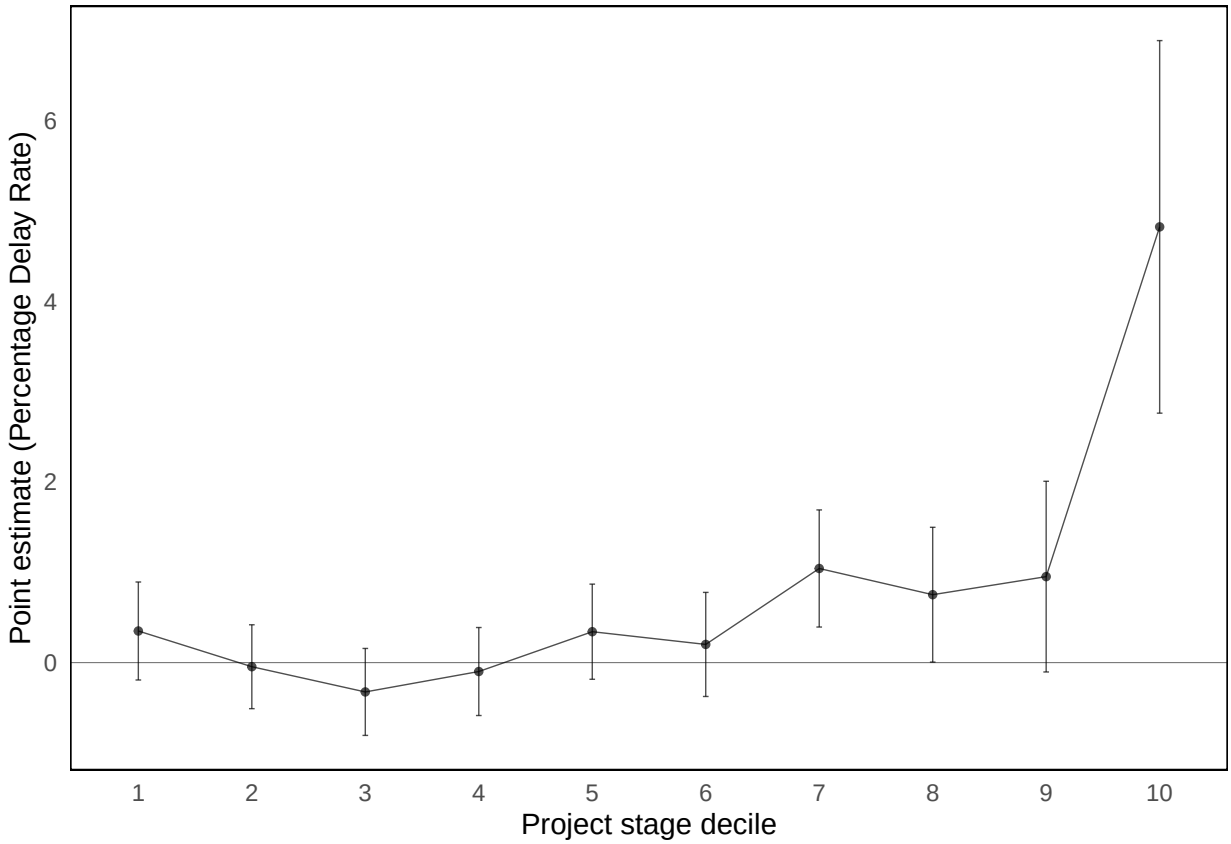

Medium stage projects
Density
0
2
4
0.00
0.25
0.50
0.75
1.00
Project stage
Business Type
O
S
Late stage projects
Density
0
1
2
3
4
0.00
0.25
0.50
0.75
1.00
Project stage
Business Type
O
S

Table 13: Project Stage and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-0.40^{***}	-1.21^{***}	-1.18^{***}	-0.89^{***}	-0.88^{***}
	(0.09)	(0.11)	(0.11)	(0.12)	(0.12)
Medium Stage	0.93^{***}	0.51^{***}	0.37^{***}	0.69^{***}	0.68^{***}
	(0.12)	(0.13)	(0.13)	(0.13)	(0.13)
Late Stage	16.99^{***}	11.96^{***}	11.81^{***}	11.46^{***}	11.45^{***}
	(0.28)	(0.23)	(0.23)	(0.23)	(0.23)
$Post_t$	-0.15	-6.51^{***}			
	(0.09)	(0.79)			
$Treat_i \times Post_t$	0.19^{*}	0.11	0.09	0.08	0.13
	(0.12)	(0.15)	(0.15)	(0.15)	(0.15)
$Treat_i\times$ Medium Stage	-0.46^{***}	0.33^{**}	0.31^{*}	0.25	0.25
	(0.15)	(0.16)	(0.16)	(0.16)	(0.16)
$Treat_i\times$ Late Stage	-4.98^{***}	-1.64^{***}	-1.71^{***}	-1.84^{***}	-1.93^{***}
	(0.36)	(0.31)	(0.31)	(0.30)	(0.30)
$Post_t\times$ Medium Stage	-0.81^{***}	0.38^{**}	0.26	-0.04	-0.05
	(0.15)	(0.16)	(0.16)	(0.16)	(0.16)
$Post_t\times$ Late Stage	-5.58^{***}	-2.00^{***}	-2.07^{***}	-2.51^{***}	-2.52^{***}
	(0.32)	(0.27)	(0.27)	(0.27)	(0.27)
$Treat_i \times Post_t\times$ Medium Stage	0.36^{**}	-0.03	-0.03	0.14	0.14
	(0.18)	(0.21)	(0.21)	(0.20)	(0.20)
$Treat_i \times Post_t\times$ Late Stage	3.77^{***}	2.76^{***}	2.81^{***}	3.00^{***}	3.05^{***}
	(0.41)	(0.37)	(0.37)	(0.36)	(0.36)
Constant	1.51^{***}	44.19^{***}			
	(0.07)	(0.59)			
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	260,000	235,960	235,960	235,960	235,960
R^2	0.11	0.24	0.24	0.27	0.27
Adjusted R^2	0.11	0.24	0.24	0.27	0.27

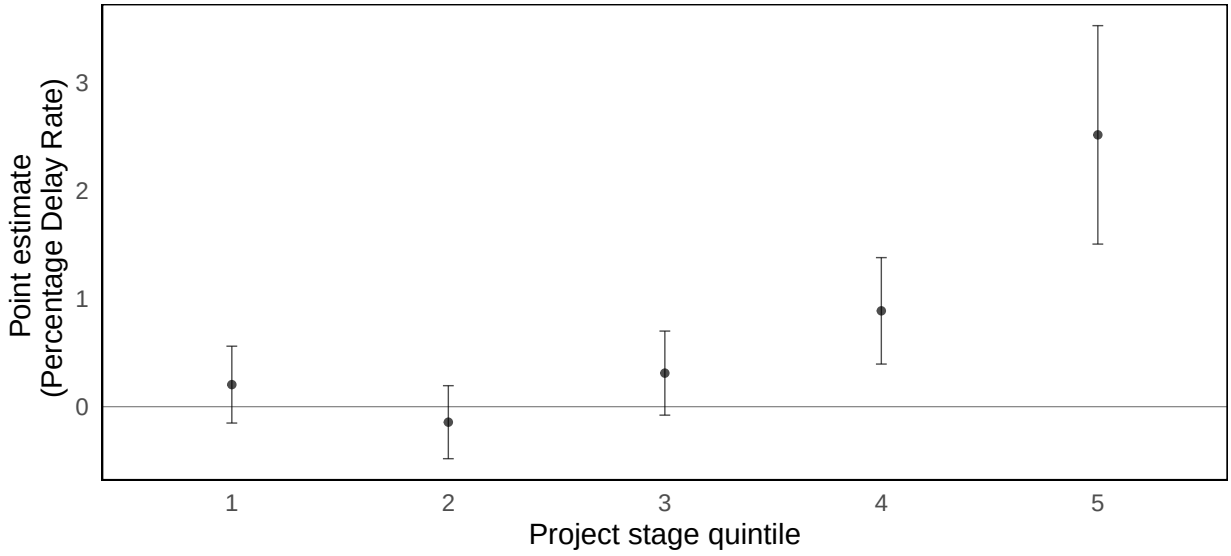
Note: *p<0.1; **p<0.05; ***p<0.01
Each observation is a project-quarter.
SEs are robust and clustered at the project level.

15.1 Stage decile Regression Plots



stage_decile Min stage Max stage 1: 1 0.00 0.04 2: 2 0.04 0.11 3: 3 0.11 0.19 4: 4 0.19 0.26 5: 5 0.26 0.35 6: 6 0.35 0.44 7: 7 0.44 0.52 8: 8 0.52 0.64 9: 9 0.64 0.78 10: 10 0.78 1.00

15.2 Stage Quintile



stage_quintile Min stage Max stage 1: 1 0.00 0.11 2: 2 0.11 0.26 3: 3 0.26 0.44 4: 4 0.44 0.64 5: 5 0.64 1.00

15.3 Logged Stage Regressions

Table 14: Project Stage and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-4.72^{***}	-2.45^{***}	-2.50^{***}	-2.14^{***}	-2.19^{***}
	(0.25)	(0.21)	(0.21)	(0.20)	(0.20)
Log(Stage)	4.50^{***}	3.17^{***}	3.12^{***}	3.14^{***}	3.14^{***}
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
$Post_t$	-2.20^{***}	-7.92^{***}			
	(0.23)	(0.83)			
$Treat_i \times Post_t$	2.88^{***}	2.10^{***}	2.14^{***}	2.25^{***}	2.33^{***}
	(0.30)	(0.26)	(0.26)	(0.25)	(0.25)
$Treat_i \times$ Log(Stage)	-1.65^{***}	-0.54^{***}	-0.55^{***}	-0.52^{***}	-0.55^{***}
	(0.11)	(0.09)	(0.09)	(0.09)	(0.09)
$Post_t \times$ Log(Stage)	-0.36^{***}	0.53^{***}	0.53^{***}	0.23^{***}	0.22^{**}
	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)
$Treat_i \times Post_t \times$ Log(Stage)	0.93^{***}	0.64^{***}	0.65^{***}	0.71^{***}	0.73^{***}
	(0.13)	(0.12)	(0.12)	(0.12)	(0.12)
Constant	13.35^{***}	53.91^{***}			
	(0.20)	(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	260,000	235,960	235,960	235,960	235,960
R^2	0.06	0.22	0.22	0.25	0.26
Adjusted R^2	0.06	0.22	0.22	0.25	0.25

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.

15.4 Aliter: Stage definition

- t indicates the end of the quarter

$Stage_{it} = \frac{ActionDate_t - StartDate_i}{Duration_{i,t}}$ $Stage_{it} = \frac{t - StartDate_i}{Duration_{i,t}}$

Table 15: Project Stage and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.34^{***}	-0.64^{***}	-0.48^{**}	-0.60^{**}	-0.62^{***}
	(0.17)	(0.23)	(0.24)	(0.24)	(0.24)
Medium Stage	3.01^{***}	-2.26^{***}	-2.66^{***}	-1.80^{***}	-1.79^{***}
	(0.20)	(0.22)	(0.22)	(0.22)	(0.22)
Late Stage	6.37^{***}	-7.43^{***}	-8.25^{***}	-6.77^{***}	-6.70^{***}
	(0.24)	(0.27)	(0.28)	(0.27)	(0.27)
$Post_t$	-0.93^{***}	-25.05^{***}			
	(0.18)	(1.09)			
$Treat_i \times Post_t$	1.17^{***}	1.04^{***}	0.97^{***}	0.79^{***}	0.85^{***}
	(0.22)	(0.30)	(0.30)	(0.30)	(0.30)
$Treat_i \times$ Medium Stage	-0.89^{***}	-1.05^{***}	-1.26^{***}	-0.76^{***}	-0.74^{***}
	(0.24)	(0.28)	(0.28)	(0.28)	(0.28)
$Treat_i \times$ Late Stage	-2.19^{***}	-1.40^{***}	-1.43^{***}	-0.76^{***}	-0.81^{***}
	(0.28)	(0.29)	(0.29)	(0.29)	(0.29)
$Post_t \times$ Medium Stage	0.78^{***}	3.54^{***}	3.52^{***}	2.86^{***}	2.83^{***}
	(0.24)	(0.26)	(0.27)	(0.27)	(0.27)
$Post_t \times$ Late Stage	0.26	6.38^{***}	6.81^{***}	5.47^{***}	5.38^{***}
	(0.29)	(0.31)	(0.32)	(0.32)	(0.32)
$Treat_i \times Post_t \times$ Medium Stage	0.08	0.37	0.51	0.61^{*}	0.59^{*}
	(0.30)	(0.36)	(0.36)	(0.35)	(0.35)
$Treat_i \times Post_t \times$ Late Stage	0.19	-0.21	-0.28	-0.03	-0.01
	(0.35)	(0.37)	(0.37)	(0.37)	(0.37)
Constant	2.81^{***}	68.49^{***}			
	(0.15)	(0.93)			
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	260,056	236,016	236,016	236,016	236,016
R^2	0.02	0.18	0.19	0.23	0.23
Adjusted R^2	0.02	0.18	0.19	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.

16 Contract Financing

$$CF_i = \begin{cases} 1, \text{ if project } i \text{ receives contract financing} \\ 0, \text{ otherwise} \end{cases}$$

$$\begin{aligned} PercentDelay_{it} = & \quad \beta_0 + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 (Treat_i \times Post_t) \\ + & \quad \beta_4 CF_i + \beta_5 (CF_i \times Post_t) + \beta_6 (Treat_i \times Post_t \times CF_i) \\ + & \quad X_i + (Post_t \times X_i) + \mu_t + \theta_{firm} + \lambda_{task} + \epsilon_{it} \end{aligned}$$

Table 16: Financial constraints and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-2.45^{***}	-1.64^{***}	-1.67^{***}	-1.30^{***}	-1.31^{***}
	(0.12)	(0.10)	(0.10)	(0.10)	(0.10)
$Post_t$	-0.36^{***}	-8.19^{***}			
	(0.12)	(0.82)			
$Treat_i \times Post_t$	1.08^{***}	0.98^{***}	0.99^{***}	1.09^{***}	1.15^{***}
	(0.15)	(0.13)	(0.13)	(0.13)	(0.13)
CF_i	2.59^{***}	2.08^{***}	1.97^{***}	-0.59^{***}	-0.68^{***}
	(0.19)	(0.17)	(0.17)	(0.17)	(0.17)
$Post_t \times CF_i$	0.12	-0.63^{**}	-0.53^{**}	0.07	0.08
	(0.28)	(0.25)	(0.25)	(0.25)	(0.25)
$Post_t \times CF_i \times Treat_i$	1.95^{***}	1.05^{***}	1.09^{***}	0.55^{**}	0.49^{*}
	(0.30)	(0.24)	(0.24)	(0.25)	(0.26)
Constant	6.09^{***}	54.48^{***}			
	(0.10)	(0.62)			
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	260,056	235,960	235,960	235,960	235,960
R^2	0.01	0.22	0.22	0.25	0.26
Adjusted R^2	0.01	0.22	0.22	0.25	0.25

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.

16.1 With Treat x CF term

Table 17: Financial constraints and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-2.83^{***}	-1.86^{***}	-1.88^{***}	-1.43^{***}	-1.44^{***}
	(0.13)	(0.11)	(0.11)	(0.11)	(0.11)
$Post_t$	-0.57^{***}	-8.35^{***}			
	(0.13)	(0.82)			
CF_i	1.01^{***}	1.26^{***}	1.16^{***}	-1.08^{***}	-1.16^{***}
	(0.28)	(0.24)	(0.24)	(0.25)	(0.25)
$Treat_i \times Post_t$	1.45^{***}	1.19^{***}	1.21^{***}	1.21^{***}	1.27^{***}
	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)
$Post_t \times CF_i$	1.70^{***}	0.19	0.27	0.54^{*}	0.54^{*}
	(0.34)	(0.31)	(0.31)	(0.31)	(0.31)
$Treat_i \times CF_i$	2.90^{***}	1.53^{***}	1.52^{***}	0.92^{***}	0.90^{***}
	(0.38)	(0.31)	(0.31)	(0.31)	(0.31)
$Treat_i \times Post_t \times CF_i$	-0.96^{**}	-0.48	-0.43	-0.34	-0.37
	(0.47)	(0.41)	(0.41)	(0.41)	(0.41)
Constant	6.30^{***}	54.65^{***}			
	(0.11)	(0.62)			
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	260,056	235,960	235,960	235,960	235,960
R^2	0.01	0.22	0.22	0.25	0.26
Adjusted R^2	0.01	0.22	0.22	0.25	0.25

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.

16.2 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 18: Financial constraints and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-3.07^{***}	-1.52^{***}	-1.59^{***}	-1.01^{***}	-1.08^{***}
	(0.17)	(0.15)	(0.14)	(0.15)	(0.15)
$Post_t$	1.43^{***}	-19.81^{***}			
	(0.28)	(2.41)			
CF_i	0.52	1.19^{***}	1.00^{***}	-1.35^{***}	-1.48^{***}
	(0.38)	(0.33)	(0.32)	(0.35)	(0.35)
$Treat_i \times Post_t$	-0.05	2.64^{***}	2.68^{***}	2.74^{***}	2.75^{***}
	(0.34)	(0.45)	(0.45)	(0.47)	(0.47)
$Post_t \times CF_i$	0.28	-1.15^{*}	-0.97	0.67	0.73
	(0.68)	(0.69)	(0.68)	(0.71)	(0.71)
$Treat_i \times CF_i$	2.96^{***}	1.41^{***}	1.39^{***}	1.08^{**}	1.07^{**}
	(0.51)	(0.44)	(0.43)	(0.45)	(0.45)
$Treat_i \times Post_t \times CF_i$	0.79	-1.55	-1.50	-1.04	-1.12
	(0.97)	(0.98)	(0.97)	(1.00)	(1.00)
Constant	6.74^{***}	58.27^{***}			
	(0.14)	(0.85)			
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	75,119	64,292	64,292	64,292	64,292
R^2	0.01	0.23	0.23	0.27	0.28
Adjusted R^2	0.01	0.23	0.23	0.26	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.

16.3 Firm level financial Constraints (on/before June 2010)

- $CF = 1$ if contractor was receiving financing on any project prior on or before June 2010
- Jobs act was launched in Sept 2010

Table 19: Financial constraints and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-0.38^{***}	-0.19	-0.24^{*}	-0.74^{***}	-0.75^{***}
	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)
$Post_t$	0.17	-8.13^{***}			
	(0.14)	(0.85)			
CF_i	4.74^{***}	3.57^{***}	3.47^{***}	1.07^{***}	1.07^{***}
	(0.20)	(0.15)	(0.15)	(0.16)	(0.16)
$Treat_i \times Post_t$	0.34^{*}	0.03	0.06	0.60^{***}	0.70^{***}
	(0.18)	(0.17)	(0.17)	(0.17)	(0.17)
$Post_t \times CF_i$	-1.17^{***}	-1.83^{***}	-1.74^{***}	-1.09^{***}	-1.04^{***}
	(0.24)	(0.20)	(0.20)	(0.20)	(0.20)
$Treat_i \times CF_i$	-4.17^{***}	-2.68^{***}	-2.60^{***}	-1.07^{***}	-1.09^{***}
	(0.24)	(0.20)	(0.20)	(0.20)	(0.20)
$Treat_i \times Post_t \times CF_i$	1.62^{***}	1.76^{***}	1.71^{***}	0.95^{***}	0.90^{***}
	(0.30)	(0.27)	(0.27)	(0.26)	(0.26)
Constant	4.00^{***}	51.77^{***}			
	(0.11)	(0.63)			
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	229,552	209,046	209,046	209,046	209,046
R^2	0.01	0.22	0.22	0.26	0.26
Adjusted R^2	0.01	0.22	0.22	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.

16.4 Plots

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## Warning: Removed 255008 rows containing non-finite values (stat_density).
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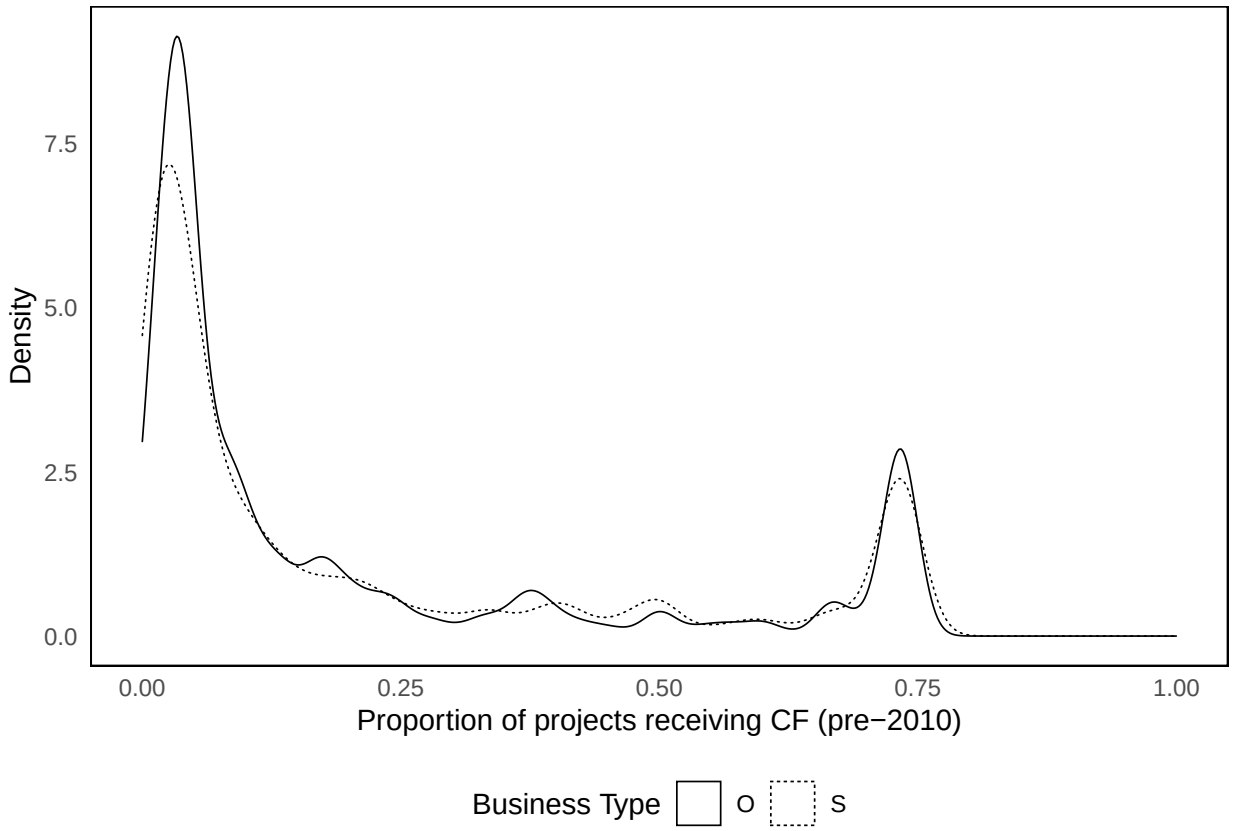


17 Receives Grants/Financial Assistance

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

17.1 All projects

Table 20: Financial constraints and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.98^{***}	-1.45^{***}	-1.46^{***}	-1.11^{***}	-1.13^{***}
	(0.12)	(0.11)	(0.11)	(0.10)	(0.10)
$Post_t$	-0.04	-8.70^{***}			
	(0.12)	(0.85)			
CF_i	12.86^{***}	6.26^{***}	6.16^{***}	4.84^{***}	4.86^{***}
	(0.74)	(0.44)	(0.44)	(0.44)	(0.44)
$Treat_i \times Post_t$	0.76^{***}	0.79^{***}	0.79^{***}	0.92^{***}	1.00^{***}
	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)
$Post_t \times CF_i$	-8.21^{***}	-4.36^{***}	-4.28^{***}	-3.99^{***}	-3.85^{***}
	(0.79)	(0.55)	(0.55)	(0.55)	(0.55)
$Treat_i \times CF_i$	-9.13^{***}	-2.65^{***}	-2.55^{***}	-2.64^{***}	-2.69^{***}
	(0.90)	(0.63)	(0.63)	(0.64)	(0.64)
$Treat_i \times Post_t \times CF_i$	7.42^{***}	3.37^{***}	3.27^{***}	3.50^{***}	3.35^{***}
	(1.01)	(0.81)	(0.81)	(0.81)	(0.81)
Constant	5.70^{***}	52.96^{***}			
	(0.10)	(0.63)			
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	229,552	209,046	209,046	209,046	209,046
R^2	0.01	0.22	0.22	0.26	0.26
Adjusted R^2	0.01	0.22	0.22	0.25	0.26

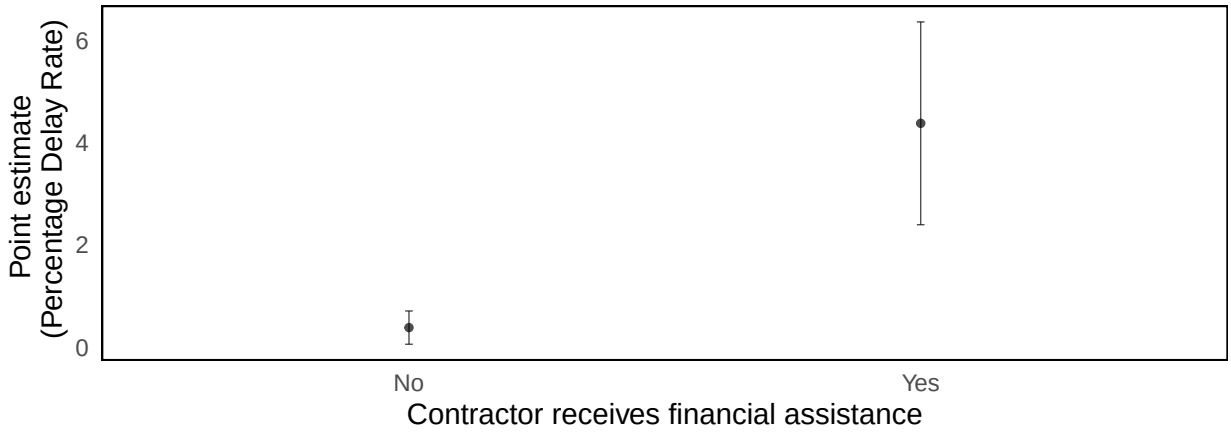
Note: *p<0.1; **p<0.05; ***p<0.01
Each observation is a project-quarter.
SEs are robust and clustered at the project level.

17.2 Projects active on/before June 2010

Table 21: Financial constraints and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-2.14^{***}	-1.08^{***}	-1.17^{***}	-0.67^{***}	-0.75^{***}
	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)
$Post_t$	1.93^{***}	-17.54^{***}			
	(0.26)	(2.37)			
CF_i	13.75^{***}	6.69^{***}	6.18^{***}	4.61^{***}	4.67^{***}
	(1.00)	(0.58)	(0.58)	(0.59)	(0.59)
$Treat_i \times Post_t$	-0.30	1.93^{***}	2.01^{***}	2.14^{***}	2.11^{***}
	(0.33)	(0.41)	(0.41)	(0.42)	(0.42)
$Post_t \times CF_i$	-9.62^{***}	-7.54^{***}	-6.96^{***}	-5.34^{***}	-5.29^{***}
	(1.30)	(1.30)	(1.29)	(1.30)	(1.30)
$Treat_i \times CF_i$	-10.12^{***}	-2.92^{***}	-2.53^{***}	-2.86^{***}	-2.95^{***}
	(1.18)	(0.81)	(0.80)	(0.80)	(0.80)
$Treat_i \times Post_t \times CF_i$	8.03^{***}	5.29^{***}	4.92^{***}	5.05^{***}	5.27^{***}
	(1.63)	(1.84)	(1.83)	(1.85)	(1.84)
Constant	6.03^{***}	56.30^{***}			
	(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	74,942	64,129	64,129	64,129	64,129
R^2	0.02	0.23	0.23	0.27	0.28
Adjusted R^2	0.02	0.23	0.23	0.27	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.



Firm level financial constraints (on/before June 2010)

Table 22: Financial constraints and QuickPay reform

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-1.43^{***}	-1.14^{***}	-1.15^{***}	-0.82^{***}	-0.84^{***}
	(0.12)	(0.11)	(0.11)	(0.11)	(0.11)
$Post_t$	-0.13	-8.94^{***}			
	(0.12)	(0.85)			
CF_i	8.43^{***}	4.12^{***}	4.04^{***}	3.30^{***}	3.34^{***}
	(0.40)	(0.25)	(0.25)	(0.25)	(0.25)
$Treat_i \times Post_t$	0.86^{***}	0.78^{***}	0.79^{***}	0.89^{***}	0.98^{***}
	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)
$Post_t \times CF_i$	-2.79^{***}	-1.85^{***}	-1.77^{***}	-1.90^{***}	-1.77^{***}
	(0.46)	(0.32)	(0.32)	(0.32)	(0.32)
$Treat_i \times CF_i$	-6.93^{***}	-2.88^{***}	-2.82^{***}	-2.47^{***}	-2.45^{***}
	(0.51)	(0.38)	(0.38)	(0.37)	(0.37)
$Treat_i \times Post_t \times CF_i$	2.37^{***}	1.20^{**}	1.14^{**}	1.30^{***}	1.14^{**}
	(0.61)	(0.50)	(0.50)	(0.49)	(0.49)
Constant	5.18^{***}	52.53^{***}			
	(0.10)	(0.63)			
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	229,552	209,046	209,046	209,046	209,046
R^2	0.01	0.22	0.22	0.26	0.26
Adjusted R^2	0.01	0.22	0.22	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.

17.3 Plots

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## Warning: Removed 394825 rows containing non-finite values (stat_density).
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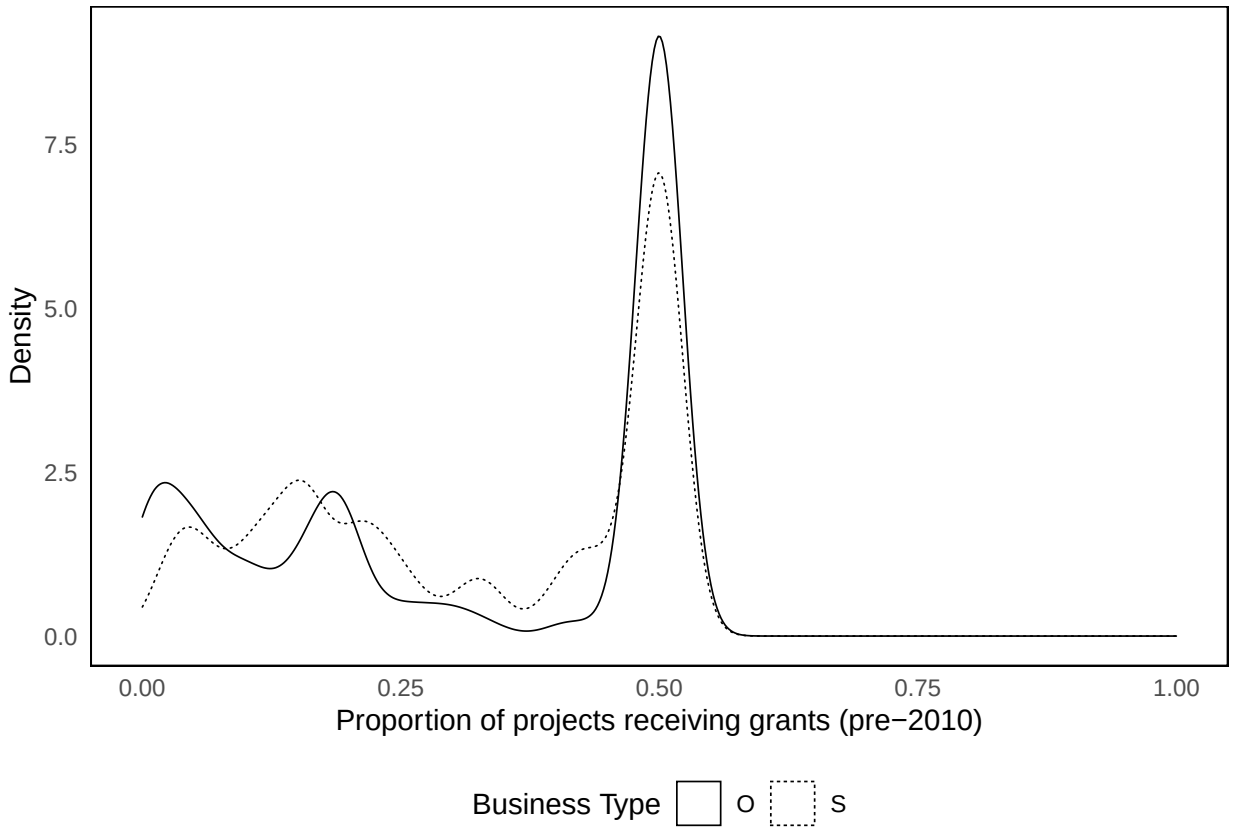


18 Competition

18.1 Impact on bidding metrics

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

	$NumberOfBids_{it}$	$InitialDuration_{it}$	$InitialBudget_{it}$
	(1)	(2)	(3)
$Treat_i$	0.88^{***}	-7.27^{***}	$-15{,}055.20^{***}$
	(0.09)	(0.72)	(1,586.13)
$Treat_i \times Post_t$	0.27^{**}	-3.38^{***}	$-29{,}491.30^{***}$
	(0.12)	(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	0.25	0.20	0.24
Adjusted R^2	0.24	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.

18.2 Impact on delays

Define

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

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

18.2.1 Subsample model

For a subsample of competitive or noncompetitive projects:

$$\begin{aligned} PercentDelay_{it} = & \quad \beta_0 + \beta_1 Treat_i + \beta_2 SA_i + \beta_3 Post_t \\ + & \quad \beta_4 (Treat_i \times Post_t \times SA_i) + \beta_5 (Treat_i \times Post_t \times SB_i) + e_{it} \end{aligned}$$

- According to our hypothesis, β_4 should be positive and significant for competitive projects, and insignificant for non-competitive projects.
- In the following regressions, we also control for the project's age. Project's age is defined as the number of quarters since it first showed up in the sample. We include the terciles of project's age as a control variable.

Table 24: Effect of QuickPay on competitively awarded projects

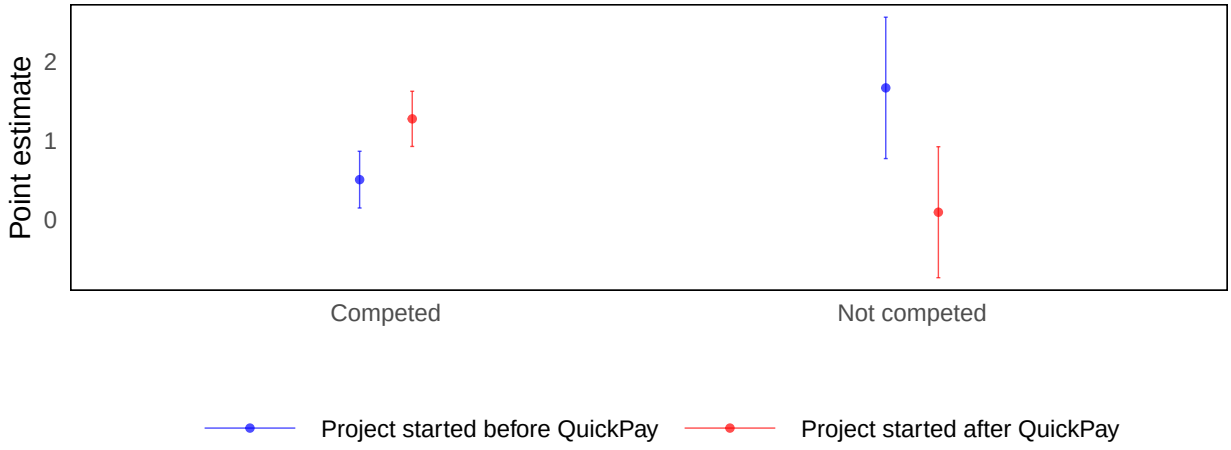
	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-3.26^{***}	-2.81^{***}	-2.80^{***}	-1.48^{***}	-1.49^{***}
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
SA_i	-2.26^{***}	1.10^{***}	1.99^{***}	2.26^{***}	2.21^{***}
	(0.18)	(0.17)	(0.19)	(0.18)	(0.18)
$Post_t$	1.08^{***}	-1.77^{***}			
	(0.16)	(0.16)			
$Treat_i \times SB_i \times Post_t$	0.19	0.25	0.26	0.49^{***}	0.51^{***}
	(0.20)	(0.19)	(0.19)	(0.18)	(0.18)
$Treat_i \times SA_i \times Post_t$	1.41^{***}	1.08^{***}	1.07^{***}	1.25^{***}	1.28^{***}
	(0.20)	(0.19)	(0.19)	(0.18)	(0.18)
Constant	6.78^{***}	12.46^{***}			
	(0.12)	(0.14)			
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	189,977	189,933	189,933	189,933	189,933
R^2	0.01	0.07	0.07	0.14	0.15
Adjusted R^2	0.01	0.07	0.07	0.14	0.15

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 25: Effect of QuickPay on non-competitively awarded projects

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	1.40***	1.16***	1.09***	−0.39	−0.22
	(0.31)	(0.30)	(0.30)	(0.32)	(0.31)
SA_i	−0.73***	2.13***	3.55***	2.97***	2.98***
	(0.23)	(0.23)	(0.28)	(0.29)	(0.29)
$Post_t$	−0.66***	−3.22***			
	(0.25)	(0.25)			
$Treat_i \times SB_i \times Post_t$	2.53***	2.25***	2.14***	1.77***	1.67***
	(0.47)	(0.45)	(0.46)	(0.45)	(0.46)
$Treat_i \times SA_i \times Post_t$	0.51	0.56	0.50	0.11	0.09
	(0.45)	(0.42)	(0.43)	(0.42)	(0.42)
Constant	4.91***	10.90***			
	(0.20)	(0.26)			
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	39,432	39,424	39,424	39,424	39,424
R^2	0.01	0.07	0.07	0.14	0.15
Adjusted R^2	0.01	0.07	0.07	0.12	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.



18.2.2 Subsample model II

Table 26: Effect of QuickPay on competitively awarded projects

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	-3.26^{***}	-2.81^{***}	-2.80^{***}	-1.48^{***}	-1.49^{***}
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
SA_i	-2.26^{***}	1.10^{***}	1.99^{***}	2.26^{***}	2.21^{***}
	(0.18)	(0.17)	(0.19)	(0.18)	(0.18)
$Post_t$	1.08^{***}	-1.77^{***}			
	(0.16)	(0.16)			
$Treat_i \times Post_t$	0.19	0.25	0.26	0.49^{***}	0.51^{***}
	(0.20)	(0.19)	(0.19)	(0.18)	(0.18)
$Treat_i \times Post_t \times SA_i$	1.22^{***}	0.83^{***}	0.82^{***}	0.76^{***}	0.77^{***}
	(0.22)	(0.20)	(0.20)	(0.20)	(0.20)
Constant	6.78^{***}	12.46^{***}			
	(0.12)	(0.14)			
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	189,977	189,933	189,933	189,933	189,933
R^2	0.01	0.07	0.07	0.14	0.15
Adjusted R^2	0.01	0.07	0.07	0.14	0.15

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 27: Effect of QuickPay on non-competitively awarded projects

	$PercentDelay_{it}$				
	(1)	(2)	(3)	(4)	(5)
$Treat_i$	1.40^{***}	1.16^{***}	1.09^{***}	-0.39	-0.22
	(0.31)	(0.30)	(0.30)	(0.32)	(0.31)
SA_i	-0.73^{***}	2.13^{***}	3.55^{***}	2.97^{***}	2.98^{***}
	(0.23)	(0.23)	(0.28)	(0.29)	(0.29)
$Post_t$	-0.66^{***}	-3.22^{***}			
	(0.25)	(0.25)			
$Treat_i \times Post_t$	2.53^{***}	2.25^{***}	2.14^{***}	1.77^{***}	1.67^{***}
	(0.47)	(0.45)	(0.46)	(0.45)	(0.46)
$Treat_i \times Post_t \times SA_i$	-2.01^{***}	-1.70^{***}	-1.64^{***}	-1.66^{***}	-1.58^{***}
	(0.49)	(0.46)	(0.46)	(0.46)	(0.46)
Constant	4.91^{***}	10.90^{***}			
	(0.20)	(0.26)			
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	39,432	39,424	39,424	39,424	39,424
R^2	0.01	0.07	0.07	0.14	0.15
Adjusted R^2	0.01	0.07	0.07	0.12	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.

18.2.3 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 28: Effect of Competition After QuickPay: Quickpay 2009-2011

	$PercentDelay_{it}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$Treat_i$	1.40^{***}	1.40^{***}	1.16^{***}	1.09^{***}	-0.63^{**}	-0.73^{**}
	(0.31)	(0.31)	(0.30)	(0.30)	(0.30)	(0.30)
SA_i	-0.73^{***}	-0.73^{***}	2.12^{***}	3.11^{***}	2.95^{***}	2.91^{***}
	(0.23)	(0.23)	(0.22)	(0.23)	(0.23)	(0.23)
$Competitive_i$	1.87^{***}	1.87^{***}	1.60^{***}	1.55^{***}	-0.16	-0.07
	(0.23)	(0.23)	(0.21)	(0.21)	(0.22)	(0.22)
$Post_t$	-0.66^{***}	-0.66^{***}	-3.21^{***}			
	(0.25)	(0.25)	(0.24)			
$Treat_i \times Competitive_i$	-4.65^{***}	-4.65^{***}	-3.97^{***}	-3.89^{***}	-0.89^{***}	-0.80^{**}
	(0.34)	(0.34)	(0.32)	(0.32)	(0.32)	(0.32)
$Post_t \times Competitive_i$	1.74^{***}	1.74^{***}	1.43^{***}	1.40^{***}	0.28	0.20
	(0.30)	(0.30)	(0.29)	(0.29)	(0.29)	(0.29)
$SA_i \times Competitive_i$	-1.53^{***}	-1.53^{***}	-1.01^{***}	-1.02^{***}	-0.66^{**}	-0.66^{**}
	(0.29)	(0.29)	(0.27)	(0.27)	(0.27)	(0.27)
$Treat_i \times Post_t$	2.53^{***}	2.53^{***}	2.25^{***}	2.21^{***}	1.67^{***}	1.66^{***}
	(0.47)	(0.47)	(0.45)	(0.45)	(0.45)	(0.45)
$Treat_i \times Post_t \times Competitive_i$	-2.33^{***}	-2.33^{***}	-2.01^{***}	-1.95^{***}	-1.16^{**}	-1.13^{**}
	(0.51)	(0.51)	(0.49)	(0.49)	(0.49)	(0.49)
$Treat_i \times Post_t \times SA_i$	-2.01^{***}	-2.01^{***}	-1.70^{***}	-1.69^{***}	-1.37^{***}	-1.37^{***}
	(0.49)	(0.49)	(0.46)	(0.46)	(0.45)	(0.45)
$Treat_i \times Post_t \times SA_i \times Competitive_i$	3.23^{***}	3.23^{***}	2.53^{***}	2.51^{***}	2.12^{***}	2.13^{***}
	(0.53)	(0.53)	(0.50)	(0.50)	(0.49)	(0.49)
Constant	4.91^{***}	4.91^{***}	10.87^{***}			
	(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	229,409	229,409	229,357	229,357	229,357	229,357
R^2	0.01	0.01	0.07	0.07	0.14	0.14
Adjusted R^2	0.01	0.01	0.07	0.07	0.13	0.14

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.