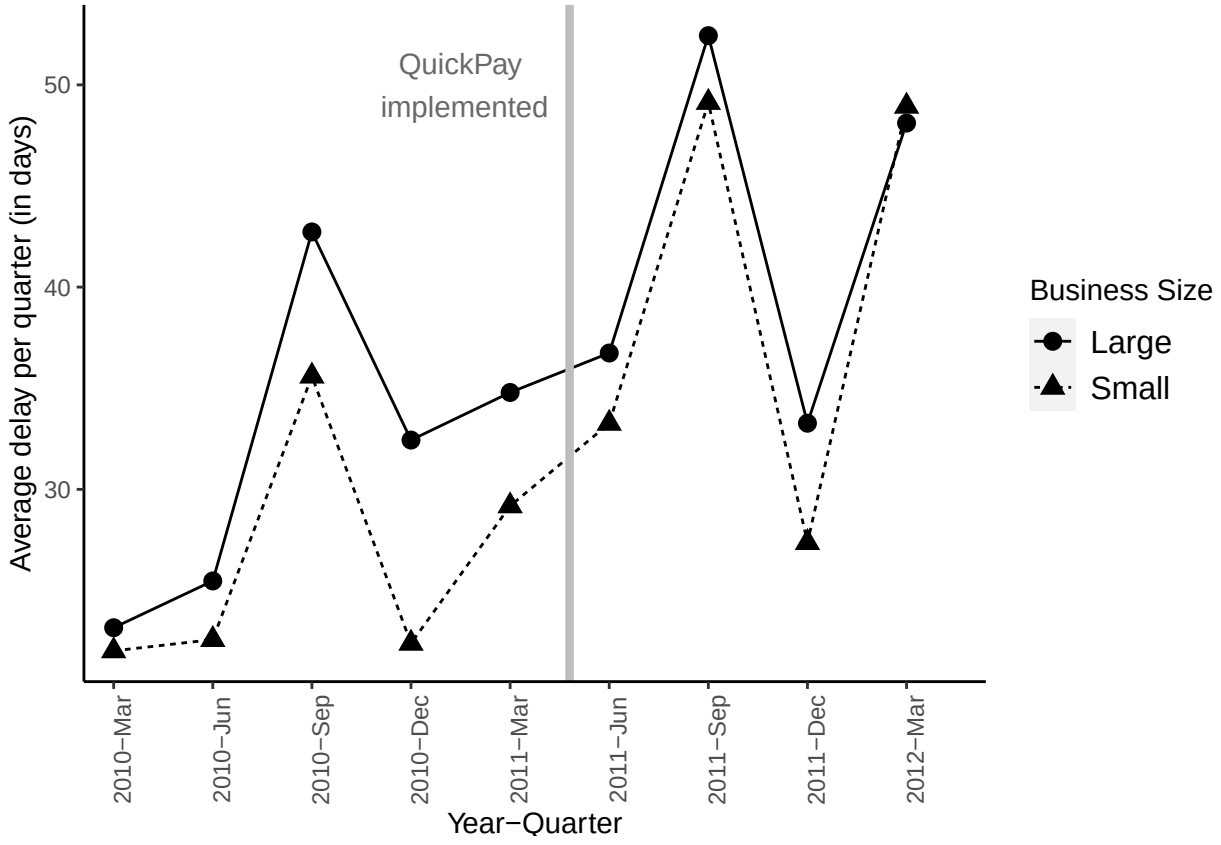
First Implementation of QuickPay (2009-2012)

Mar 01, 2021

1 Delays over Time



2 Notation

- Project i, Year-Quarter t
- X_i denotes project level controls: initial duration, initial budget, number of offers received
- $\mu_t, \theta_{firm}, \lambda_{task}$: Year-Quarter, Firm, and Product/Service code Fixed effects
- All continuous variables are winsorized at the 5% level

$$Treat_i = \begin{cases} 1, & \text{if project } i \text{ is a small business} \\ 0, & \text{otherwise} \end{cases}$$

$$Post_t = \begin{cases} 1, & \text{if year-quarter } t > \text{ April 27, 2011} \\ 0, & \text{otherwise} \end{cases}$$

3 Parallel Trends Test

Let $Time$ denote q-th quarter since the beginning of time horizon. For $Post_t = 0$, we run the following regression:

$$Delay_{it} = \alpha + \beta_0 Treat_i + \beta_1(Treat_i \times Time) + \beta_2 X_i + \mu_t + \theta_{firm} + \lambda_{task} + \epsilon_{it}$$

The coefficient of interest is β_1. If this is significant, we would find evidence of a linear time trend before quickpay implementation – violating the parallel trends assumption.

Table 1: Linear Time Trend Before QuickPay

	Dependent variable:
	$Delay_{it}$ (in days)
$Treat_i$	−1.10
	(2.98)
$Treat_i \times Time$	−0.01
	(0.49)
Fixed effects	Firm, Task, and Year-Quarter
Controls	Budget, Duration, Bids
Observations	74,677
R^2	0.14
Adjusted R^2	0.03
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.

4 Baseline Regressions

$$Delay_{it} = \alpha + \beta_0 Treat_i + \beta_1 Post_t + \beta_2(Treat_i \times Post_t) + \epsilon_{it}$$

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

Table 2: Quickpay 2009-2011

	$Delay_{it}$ (in days)		
	(1)	(2)	(3)
$Treat_i$	-6.19^{***}	-3.58^{**}	-3.09^{*}
	(0.50)	(1.55)	(1.59)
$Post_t$	13.04^{***}		
	(0.52)		
$Treat_i \times Post_t$	3.35^{***}	6.88^{***}	6.83^{***}
	(0.73)	(0.91)	(0.92)
Constant	33.00^{***}		
	(0.36)		
Year-Quarter Fixed Effects	No	Yes	Yes
Firm Fixed Effects	No	Yes	Yes
Task Fixed Effects	No	No	Yes
Duration, Budget, Bids	No	Yes	Yes
$Post_t \times$ (Duration, Budget, Bids)	No	Yes	Yes
Observations	173,900	155,638	155,638
R^2	0.01	0.11	0.12
Adjusted R^2	0.01	0.05	0.05

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 Contract Financing

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

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

Table 3: Effect of Contract Financing: Quickpay 2009-2011

	$Delay_{it}$ (in days)		
	(1)	(2)	(3)
$Treat_i$	-6.12^{***}	-3.37^{**}	-2.89^{*}
	(0.50)	(1.55)	(1.59)
$Post_t$	13.00^{***}		
	(0.57)		
$Treat_i \times Post_t$	1.53^{**}	5.89^{***}	5.90^{***}
	(0.78)	(1.00)	(1.01)
CF_i	-3.97^{***}	-4.68^{***}	-4.76^{***}
	(0.61)	(0.81)	(0.82)
$Post_t \times CF_i$	0.72	-0.20	-0.37
	(1.13)	(1.31)	(1.32)
$Post_t \times CF_i \times Treat_i$	9.24^{***}	3.94^{**}	3.70^{**}
	(1.38)	(1.65)	(1.67)
Constant	33.64^{***}		
	(0.38)		
Year-Quarter Fixed Effects	No	Yes	Yes
Firm Fixed Effects	No	Yes	Yes
Task Fixed Effects	No	No	Yes
Duration, Budget, Bids	No	Yes	Yes
$Post_t\times$ (Duration, Budget, Bids)	No	Yes	Yes
Observations	173,900	155,638	155,638
R^2	0.01	0.11	0.12
Adjusted R^2	0.01	0.05	0.05

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 Receives Financial Aid

$$FinancialAid = \begin{cases} 1, \text{ if firm receives grants or is a c8A participant} \\ 0, \text{ otherwise} \end{cases}$$

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

Table 4: Effect of Grants or C8A Participant: Quickpay 2009-2011

	$Delay_{it}$ (in days)		
	(1)	(2)	(3)
$Treat_i$	-6.96^{***}	-3.15^{**}	-2.63^{*}
	(0.51)	(1.55)	(1.59)
$Post_t$	12.89^{***}		
	(0.53)		
$Treat_i \times Post_t$	3.43^{***}	5.65^{***}	5.57^{***}
	(0.77)	(0.98)	(0.99)
$FinancialAid$	5.72^{***}	1.36	0.45
	(0.70)	(1.39)	(1.42)
$Post_t \times FinancialAid$	1.94	4.06^{*}	3.93^{*}
	(1.61)	(2.10)	(2.12)
$Post_t \times FinancialAid \times Treat_i$	-1.80	2.51	2.75
	(1.73)	(2.46)	(2.50)
Constant	32.42^{***}		
	(0.37)		
Year-Quarter Fixed Effects	No	Yes	Yes
Firm Fixed Effects	No	Yes	Yes
Task Fixed Effects	No	No	Yes
Duration, Budget, Bids	No	Yes	Yes
$Post_t \times$ (Duration, Budget, Bids)	No	Yes	Yes
Observations	173,900	155,638	155,638
R^2	0.01	0.11	0.12
Adjusted R^2	0.01	0.05	0.05

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.

7 Receives Contracts and Financial Aid

$$CFA = \begin{cases} 1, \text{ if firm receives "contracts and grants"} \\ \text{or grants or is a c8A participant} \\ 0, \text{ otherwise} \end{cases}$$

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

Table 5: Effect of Contracts, Grants, or C8A Participant: Quickpay 2009-2011

	$Delay_{it}$ (in days)		
	(1)	(2)	(3)
$Treat_i$	-6.68^{***}	-3.19^{**}	-2.71^{*}
	(0.51)	(1.55)	(1.59)
$Post_t$	12.17^{***}		
	(0.55)		
$Treat_i \times Post_t$	4.19^{***}	5.71^{***}	5.84^{***}
	(0.79)	(1.02)	(1.03)
CFA	4.90^{***}	-5.44^{***}	-5.92^{***}
	(0.62)	(1.78)	(1.80)
$Post_t \times CFA$	3.91^{***}	5.00^{***}	5.83^{***}
	(1.21)	(1.60)	(1.64)
$Post_t \times CFA \times Treat_i$	-4.04^{***}	2.60	1.61
	(1.38)	(2.12)	(2.16)
Constant	32.18^{***}		
	(0.37)		
Year-Quarter Fixed Effects	No	Yes	Yes
Firm Fixed Effects	No	Yes	Yes
Task Fixed Effects	No	No	Yes
Duration, Budget, Bids	No	Yes	Yes
$Post_t \times$ (Duration, Budget, Bids)	No	Yes	Yes
Observations	173,900	155,638	155,638
R^2	0.01	0.11	0.12
Adjusted R^2	0.01	0.05	0.05
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 Firm share of small projects

For project i of firm f in quarter t, define $\rho_f = \sum_{t \in FY2010, i \in S} \text{FAO}_{ift} / Sales_f^{FY2010}$.

Define $\alpha_f = rank(\rho_f)/N$ where $rank(\rho_f)$ is the rank statistic of ρ_f and N = number of firms. For example, $rank(\rho_f) = 1$ if $\rho_f = \min(\rho_1, \rho_2, \ldots, \rho_N)$.

Put simply, α_f is a firm's rank order based on the fraction of revenue it earned from small government projects in FY 2010.

Hypothesis: Firms that relied more on the government experienced greater delays on their projects after QuickPay was implemented.

$$Delay_{it} = \beta_0 + \beta_1 \alpha_f + \beta_2 Post_t + \beta_3 (\alpha_f \times Post_t) + \epsilon_{it}$$

$$Delay_{it} = \beta_0 + \beta_1 (\alpha_f \times Post_t) + \beta_2 X_i + \beta_3 (X_i \times Post_t) + \mu_t + \theta_{firm} + \lambda_{task} + \epsilon_{it}$$

Table 6: Effect of Treatment Intensity: Quickpay 2009-2011

	$Delay_{it}$ (in days)		
	(1)	(2)	(3)
α_f	−0.85		
	(1.07)		
$Post_t$	13.54***		
	(1.13)		
$\alpha_f \times Post_t$	6.49***	7.39***	7.46***
	(1.62)	(2.00)	(2.04)
Constant	27.74***		
	(0.75)		
Year-Quarter Fixed Effects	No	Yes	Yes
Firm Fixed Effects	No	Yes	Yes
Task Fixed Effects	No	No	Yes
Duration, Budget, Bids	No	Yes	Yes
$Post_t \times$ (Duration, Budget, Bids)	No	Yes	Yes
Observations	71,753	63,216	63,216
R^2	0.01	0.11	0.12
Adjusted R^2	0.01	0.04	0.04
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 Terciles of Alpha

Define $\alpha_f^{(k)}$ = k-th tercile of α_f.

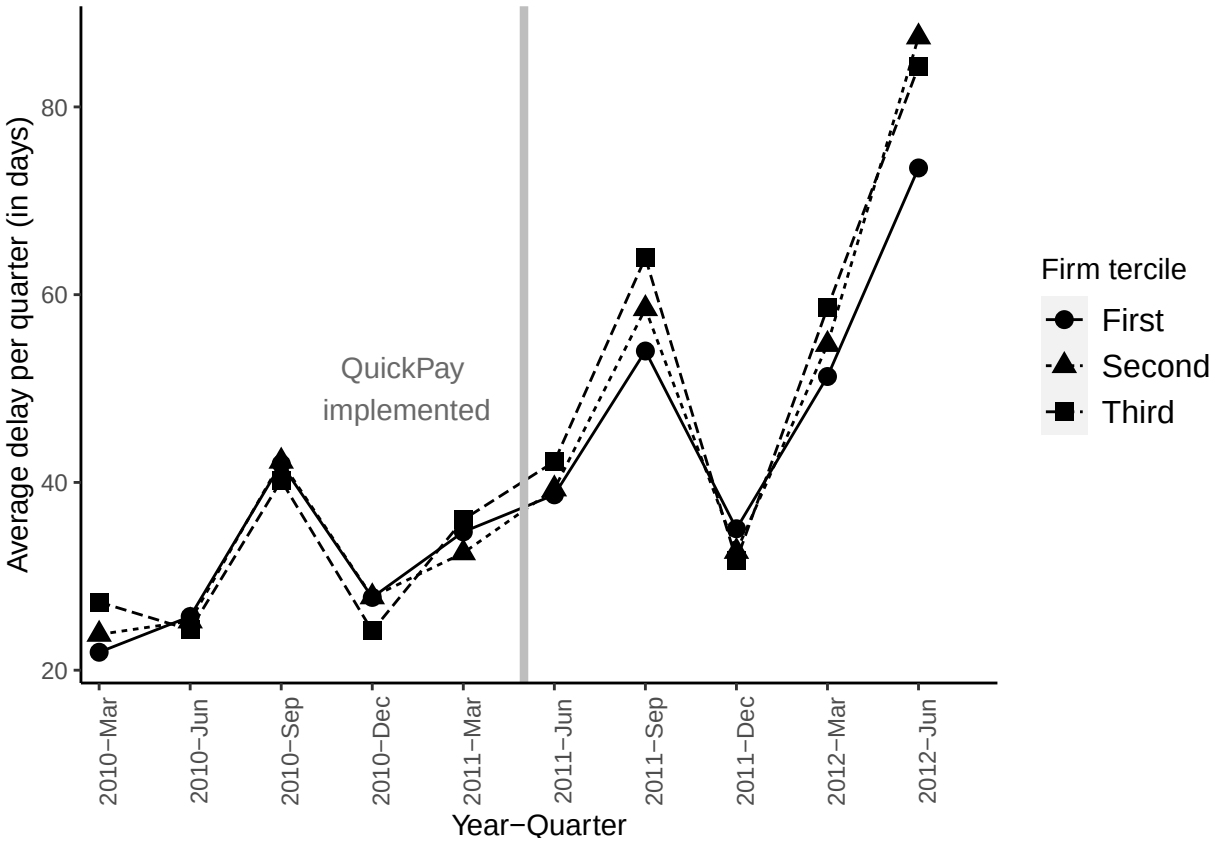

Average delay per quarter (in days)
80
60
40
20
QuickPay
implemented
2010−Mar
2010−Jun
2010−Sep
2010−Dec
2011−Mar
2011−Jun
2011−Sep
2011−Dec
2012−Mar
2012−Jun
Year−Quarter
Firm tercile
First
Second
Third

Table 7: Effect of Treatment Intensity: Quickpay 2009-2011

	$Delay_{it}$ (in days)		
	(1)	(2)	(3)
$\alpha_f^{(2)}$	−1.21		
	(0.97)		
$\alpha_f^{(3)}$	−1.07		
	(0.85)		
$Post_t$	14.68***		
	(0.93)		
$\alpha_f^{(2)} \times Post_t$	3.09**	5.75***	6.00***
	(1.45)	(1.88)	(1.93)
$\alpha_f^{(3)} \times Post_t$	5.24***	4.79***	4.79***
	(1.29)	(1.61)	(1.65)
Constant	27.93***		
	(0.62)		
Year-Quarter Fixed Effects	No	Yes	Yes
Firm Fixed Effects	No	Yes	Yes
Task Fixed Effects	No	No	Yes
Duration, Budget, Bids	No	Yes	Yes
$Post_t \times$ (Duration, Budget, Bids)	No	Yes	Yes
Observations	71,753	63,216	63,216
R^2	0.01	0.11	0.12
Adjusted R^2	0.01	0.04	0.04

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.

10 Treatment Intensity

Define $\theta_i = Treat_i \times \alpha_f$