Designing the State*

Shan Aman-Rana[†] University of Virginia

Capt. Retd. Ikram-ul-Haq[‡] PLRA

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Abstract

How should governments organize bureaucracies to improve public service delivery? While existing studies often focuses on internal incentives, we study the market structure of the state by examining the impact of shifting from geographic monopolies to competing public providers. Using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025), we exploit the staggered rollout of new service centers that compete with incumbent offices within the same jurisdictions. Moving from monopoly to a multi-provider structure significantly improves state productivity: processing times at incumbent offices fall by approximately 15 percent. These gains are driven by within-officer productivity adjustments rather than changes in personnel composition. At the same time, competition expands the extensive margin of engagement, with total village transaction volume increasing by 11 percent, indicating that organizational restructuring increases formal participation rather than merely reallocating existing cases. Returns to additional fragmentation are sharply diminishing. While the transition from monopoly to duopoly generates large efficiency gains, a second entrant produces no further improvement in incumbent processing speed and yields substantially smaller increases in total transactions. The plateau is consistent with either demand saturation or binding production constraints in service delivery. These results show that how the state organizes service provision is a central determinant of public service delivery: competition can improve performance, but excessive fragmentation can undo those gains.

JEL codes: Keywords:

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[†]Department of Economics, University of Virginia. sa8ey@virginia.edu.

[‡]Punjab Land Records Authority, Government of Punjab.

1 Extended abstract

How does the internal organization of the state dictate frontline service delivery? While public service delivery is frequently characterized by geographic monopolies, an alternative organizational design introduces competition between government providers, allowing citizens to choose between multiple public offices. While the efficiency effects of competition are well-documented in private markets, we have limited empirical evidence regarding how such structural changes influence productivity within a bureaucratic hierarchy. This paper investigates how shifting the state's organizational structure from monopoly to duopoly or triopoly environments affects bureaucratic productivity and aggregate demand.

We analyze this question through the land administration system in Punjab, Pakistan. Since 2018, the provincial government has implemented a staggered rollout of new service centers (QARCs and DMMs) that compete with incumbent Arazi Record Centers (ARCs) within the same geographic jurisdictions (mauzas). This reform provides a unique organizational shock, creating variation in the number of government providers serving the same market.

Our focus is on land record service delivery—a frontline bureaucratic service that is not incentivized by the government. Officers delivering this service receive fixed wages with only occasional discretionary bonuses, and transfers and postings are determined centrally by the Punjab Land Records Authority (PLRA) headquarters. A related service, land record mutation (e.g., sales), operates under explicit piece-rate incentives per transaction. While we have administrative data on both services, the results reported in this draft focus on a service environment without performance-based incentives. Analysis of mutation activity, where officers face explicit piece-rate incentives, is part of ongoing work described below.

Our analysis centers on the incumbent ARC as the primary organizational unit to evaluate how its productivity responds to the introduction of competing state entities. Using administrative data on the universe of 14.5 million land transactions from 2018–2025, we estimate the following two-way fixed effects specification:

$$y_{avt} = \beta_1 \text{One Additional Center}_{vt} + \beta_2 \text{Two Additional Centers}_{vt} + \alpha_a + \gamma_t + \varepsilon_{avt}$$

where y_{avt} is the service duration (log processing time) for an incumbent ARC a in village v at time t. This design identifies changes in organizational performance by comparing villages served by the same ARC that experience staggered exposure

to different levels of competition. *One Additional Center* is a dummy variable equal to one if a transaction was completed in a village (mauza) that had exactly one new competing service provider (either a DMM or QARC) in addition to the incumbent ARC. The independent variable *Two Additional Centers* is a dummy variable equal to one if both a DMM and a QARC were set up in addition to the incumbent ARC. The omitted category is when the village is served only by the incumbent ARC (monopoly). In the main specification, we include incumbent ARC fixed effects (α_a) and transaction-date fixed effects (γ_t). We also report alternative specifications with bureaucrat fixed effects to compare the same officer over time and assess whether results reflect within-officer responses rather than changes in officer composition. Finally, we estimate specifications that include both incumbent ARC and bureaucrat fixed effects. Because officers rotate across centers, these models compare the same officer working within the same center across villages that experience different levels of competitive entry, isolating organizational responses from both officer quality and center-level heterogeneity. Standard errors are clustered at the mauza (village) level as that is the level of the treatment Abadie et al. (2023).

We find that the transition from monopoly to a multi-provider structure significantly improves state productivity: processing times at incumbent offices fall by roughly 15 percent (Table 1). Crucially, these gains persist after controlling for bureaucrat fixed effects, suggesting the response is driven by within-officer productivity adjustments rather than changes in personnel composition (Table 2). While the incumbent's market share declines (Table 3)—indicating a credible threat of exit by citizens—total village transaction volume increases by 11 percent (Table 4). This indicates that the organizational change expands the extensive margin of state engagement rather than simply reallocating existing cases.

However, disaggregated results reveal diminishing marginal returns to organizational fragmentation. Moving from monopoly to duopoly generates large efficiency gains, but adding a second entrant produces no additional improvement in the incumbent ARC's processing speed (Table 5). This stability in productivity occurs even as the incumbent continues to lose market share and experience a mechanical reduction in caseload (Table 6). If workload reduction were the primary mechanism, processing speed should continue to rise under triopoly. Its stabilization instead points to diminishing responsiveness to competitive pressure, saturation in local demand or binding production constraints in the delivery of land titles. Market size patterns reinforce this interpretation: the second entrant

generates substantially smaller increases in total village transactions than the first (Table 7).

Collectively, these findings show that the performance of public bureaucracies depends not only on incentives within offices but also on how the state structures competition across providers. Organizational design is a central determinant of bureaucratic performance, but its returns are sharply diminishing.

2 Ongoing Work and Extensions

2.1 Empirical Robustness and Identification

We are in the process of implementing several additional estimation strategies to strengthen identification and assess the sensitivity of our baseline results in a staggered rollout setting. First, we address dynamic treatment effects and potential pre-trends using the synthetic difference-in-differences estimator of Arkhangelsky et al. (2021), which constructs weighted counterfactuals that improve comparability when treatment timing varies across units. Second, we apply heterogeneous-treatment estimators designed for staggered adoption (Callaway and Sant'Anna, 2021; Rambachan and Roth, 2023) to ensure that the results are not driven by implicit weighting of early-treated cohorts under conventional two-way fixed effects.

We also estimate non-linear duration models to better capture the right-skewed distribution of bureaucratic processing times and reduce sensitivity to extreme outliers in administrative records. Finally, we exploit geographic discontinuities in center rollout at village boundaries to implement a regression discontinuity design in the districts of Multan and Faisalabad. Using high-resolution spatial shapefiles secured from the Punjab Urban Land Systems Enhancement project and the Punjab Land Records Authority, this design compares contiguous villages with similar geographic and socioeconomic characteristics that differ in access to competing service providers.

2.2 Downstream Economic Effects

A second set of extensions studies downstream economic effects using administrative land records that contain the full universe of land title requests and muta-

tion transactions (formal transfers of ownership, including sales). We first examine land market activity, using sales, leases, and other ownership transfers to test whether expanded access reduces land market frictions and increases formal participation. We then study financial market activity by analyzing financing-linked transactions, such as mortgage registrations and related contractual arrangements, to assess whether organizational restructuring facilitates collateralized credit. Finally, we analyze tax-related outcomes recorded in the same administrative system to evaluate whether these changes strengthen local fiscal capacity. Together, these analyses connect bureaucratic design to land markets, financial formalization, and state revenue.

2.3 Heterogeneity and Mechanisms

Finally, we explore heterogeneity in the marginal effect of the second entrant to distinguish demand saturation from production constraints as drivers of diminishing returns. If the plateau reflects exhausted local demand, the transition from duopoly to triopoly should generate smaller gains in low-activity villages but remain productive in larger markets where unmet demand persists. In contrast, if bureaucratic production is technologically constrained, the marginal effect of the second entrant should be uniformly limited across administrative environments. These tests clarify whether the observed performance ceiling arises from market saturation or internal production limits within bureaucratic offices.

3 Tables

Table 1: Effects of an additional land record center in a village on time duration of land record processing

Dependent Variable:	Service Duration (1)	Log Service Duration (2)
Additional Centers	-2.308***	-0.164***
	(0.331)	(0.0168)
Control mean of outcome	46.98	46.98
Service center FE	Yes	Yes
Date FE	Yes	Yes
Observations	14561842	14561842

Notes: This table reports the effects of organizational restructuring on bureaucratic productivity using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025). The unit of observation is an individual transaction within an incumbent service center-date panel. The dependent variable in column (1) is Service Duration, defined as the time in minutes from when a citizen enters the center until the next stage of the land record process ; column (2) uses the log of this duration. The independent variable, "Additional Centers," is a dummy variable equal to one if a transaction was completed in a village (mauza) that had at least one new competing service provider (QARC or DMM) in addition to the incumbent ARC. All specifications include service center fixed effects and date fixed effects. Standard errors are clustered at the mauza (village) level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Bureaucrat FE: The effects of an additional land record center in a village on time duration of land record processing

Dependent Variable:	Service Duration		Log Service Duration	
	(1)	(2)	(3)	(4)
Additional Centers	-1.239***	-1.170***	-0.0848***	-0.0844***
	(0.269)	(0.244)	(0.0134)	(0.0131)
Control mean of outcome	46.98	46.98	46.98	46.98
Service center FE	No	Yes	No	Yes
Bureaucrat FE	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes
Observations	14573659	14561484	14573659	14561484

Notes: This table reports the effects of organizational restructuring on bureaucratic productivity using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025). The unit of observation is an individual transaction within an incumbent service center-date panel. The dependent variable in columns (1)-(2) is Service Duration, defined as the time in minutes from when a citizen enters the center until the next stage of the land record process ; columns (3)-(4) uses the log of this duration. The independent variable, "Additional Centers," is a dummy variable equal to one if a transaction was completed in a village (mauza) that had at least one new competing service provider (QARC or DMM) in addition to the incumbent ARC. Columns (1) and (3) include bureaucrat and date fixed effects, while Columns (2) and (4) include incumbent service center fixed effects as well. Standard errors are clustered at the mauza (village) level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3: Effect of additional centers on the incumbent service provider's (ARC) market share of village land transactions

Dependent Variable:	ARC Market Share	Log(Number of ARC Transactions)
	(1)	(2)
Additional Centers	-0.110***	-0.0583***
	(0.00182)	(0.00438)
Control mean of outcome	1.00	9.69
Mauza FE	Yes	Yes
Month-year FE	Yes	Yes
Observations	1504241	1504241

Notes: This table reports the effects of organizational restructuring on incumbent service center's (ARC) market share using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025). The unit of observation is a village - month year panel. The dependent variable in column (1) is "ARC Market Share" defined as the total number of transactions carried out in the incumbent service center (ARC) as a fraction of total number of transactions in the village. Column (2) reports the log of the total number of transactions by the incumbent center. The independent variable, "Additional Centers," is a dummy variable equal to one if a village had at least one new competing service provider (QARC or DMM) delivering land record services in addition to the incumbent ARC. All specifications include village (mauza) fixed effects and month-year fixed effects. Standard errors are clustered at the village (mauza) level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4: Effects of additional land record center on total number of transactions in a village

Dependent Variable:	Number of Transactions (1)	Log(Number of Transactions) (2)
Additional Centers	0.633***	0.114***
	(0.0661)	(0.00321)
Control mean of outcome	9.71	9.71
Mauza FE	Yes	Yes
Month-year FE	Yes	Yes
Observations	1504241	1504241

Notes: This table reports the effects of organizational restructuring on the total number of land record transactions in a village using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025). The unit of observation is a village - month year panel. The dependent variable in column (1) is the total number of land record transactions in a village ; column (2) uses the log of this. The independent variable, "Additional Centers," is a dummy variable equal to one if a village had at least one new competing service provider (QARC or DMM) delivering land record services in addition to the incumbent ARC. All specifications include village (mauza) fixed effects and month-year fixed effects. Standard errors are clustered at the village (mauza) level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5: Effects of additional land record centers in a village on time duration of land record processing

Dependent Variable:	Service Duration			Log Service Duration		
	(1)	(2)	(3)	(4)	(5)	(6)
One Additional Center	-2.285***	-1.235***	-1.158***	-0.164***	-0.0848***	-0.0840***
	(0.324)	(0.268)	(0.242)	(0.0166)	(0.0133)	(0.0130)
Two Additional Centers	-2.787***	-1.323***	-1.451***	-0.163***	-0.0848***	-0.0923***
	(0.567)	(0.351)	(0.368)	(0.0266)	(0.0202)	(0.0207)
Control mean of outcome	46.98	46.98	46.98	46.98	46.98	46.98
F-test P-value	0.16	0.67	0.20	0.93	1.00	0.55
Service center FE	Yes	No	Yes	Yes	No	Yes
Bureaucrat FE	No	Yes	Yes	No	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14561842	14573659	14561484	14561842	14573659	14561484

Notes: This table reports the effects of organizational restructuring on bureaucratic productivity using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025). The unit of observation is an individual transaction within an incumbent service center-date panel. The dependent variable in columns (1)–(3) is Service Duration, defined as the time in minutes from when a citizen enters the center until the next stage of the land record title getting process; columns (4)–(6) use the log of this duration. The independent variable "One Additional Center" is a dummy variable equal to one if a transaction was completed in a village (mauza) that had exactly one new competing service provider (either a DMM or QARC) in addition to the incumbent ARC. The independent variable "Two Additional Centers" is a dummy variable equal to one if both a DMM and a QARC were set up in addition to the incumbent ARC. The omitted category is when the village is served only by the incumbent ARC (monopoly). Standard errors are clustered at the mauza (village) level. Columns (1) and (4) include incumbent service center (ARC) and date fixed effects; Columns (2) and (5) include bureaucrat and date fixed effects; and Columns (3) and (6) include all three sets of fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Effects of additional centers on the incumbent service provider's (ARC) market share of village land transactions

Dependent Variable:	ARC Market Share	Log(Number of ARC Transactions)
	(1)	(2)
One Additional Center	-0.110***	-0.0591***
	(0.00177)	(0.00436)
Two Additional Centers	-0.217***	-0.239***
	(0.00311)	(0.00751)
Control mean of outcome	1.00	9.69
F-test P-value	0.00	0.00
Mauza FE	Yes	Yes
Month-year FE	Yes	Yes
Observations	1504241	1504241

Notes: This table reports the effects of organizational restructuring on the incumbent service center's (ARC) market share using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025). The unit of observation is a village - month year panel. The dependent variable in column (1) is "ARC Market Share" defined as the total number of transactions carried out in the incumbent service center (ARC) as a fraction of total number of transactions in the village. Column (2) reports the log of the total number of transactions by the incumbent center. The independent variable "One Additional Center" is a dummy variable equal to one if a village had exactly one new competing service provider (either a DMM or QARC) in addition to the incumbent ARC. The independent variable "Two Additional Centers" is a dummy variable equal to one if both a DMM and a QARC were set up in addition to the incumbent ARC. The omitted category is when the village is served only by the incumbent ARC (monopoly). Standard errors are clustered at the village (mauza) level, and all specifications include village (mauza) fixed effects and month-year fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

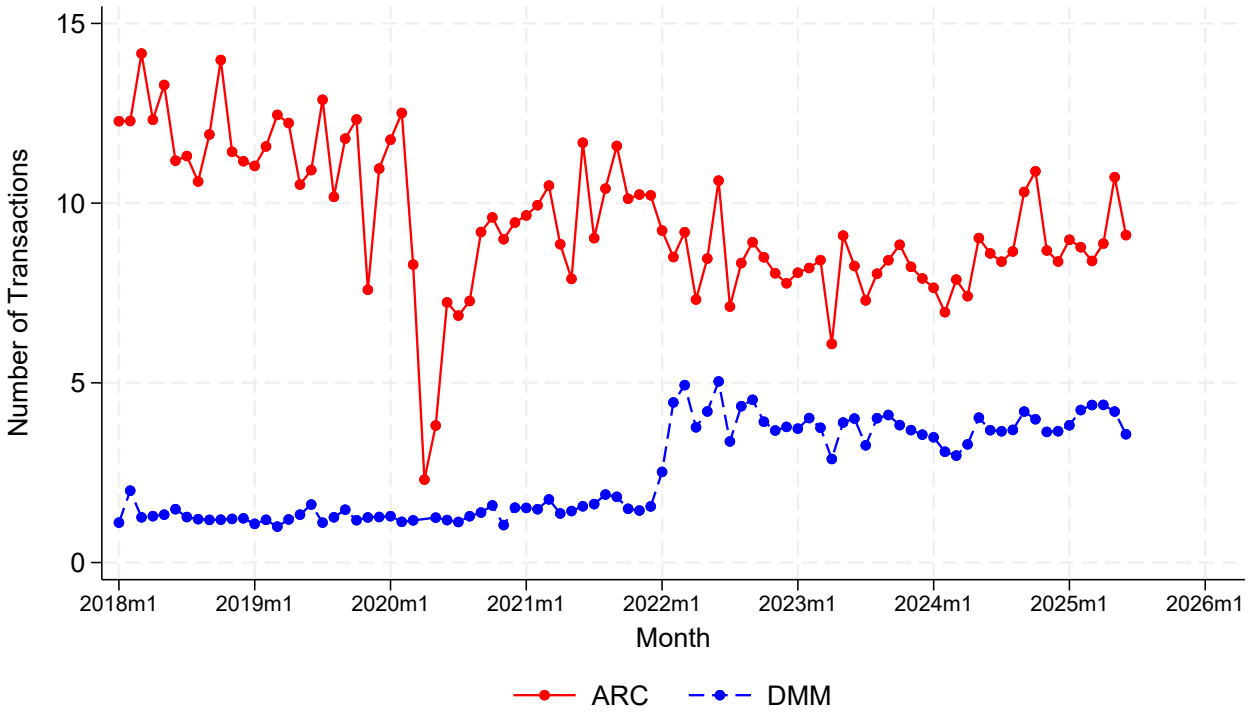
Table 7: Effects of additional land record center on total number of transactions in a village

Dependent Variable:	Number of Transactions (1)	Log(Number of Transactions) (2)
One Additional Center	0.629***	0.114***
	(0.0661)	(0.00321)
Two Additional Centers	-0.280*	0.127***
	(0.145)	(0.00501)
Control mean of outcome	9.71	9.71
F-test P-value	0.00	0.00
Mauza FE	Yes	Yes
Month-year FE	Yes	Yes
Observations	1504241	1504241

Notes: This table reports the effects of organizational restructuring on the total number of land record transactions in a village (mauza) using administrative data on the universe of 14.5 million land transactions from Punjab, Pakistan (2018–2025). The unit of observation is a village (mauza) - month year panel. The dependent variable in column (1) is the total number of land record transactions in a village (mauza); column (2) uses the log of this. The independent variable "One Additional Center" is a dummy variable equal to one if a village (mauza) had exactly one new competing service provider (either a DMM or QARC) in addition to the incumbent ARC. The independent variable "Two Additional Centers" is a dummy variable equal to one if both a DMM and a QARC were set up in addition to the incumbent ARC. The omitted category is when the village (mauza) is served only by the incumbent ARC (monopoly). Standard errors are clustered at the village (mauza) level, and all specifications include village (mauza) fixed effects and month-year fixed effects. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

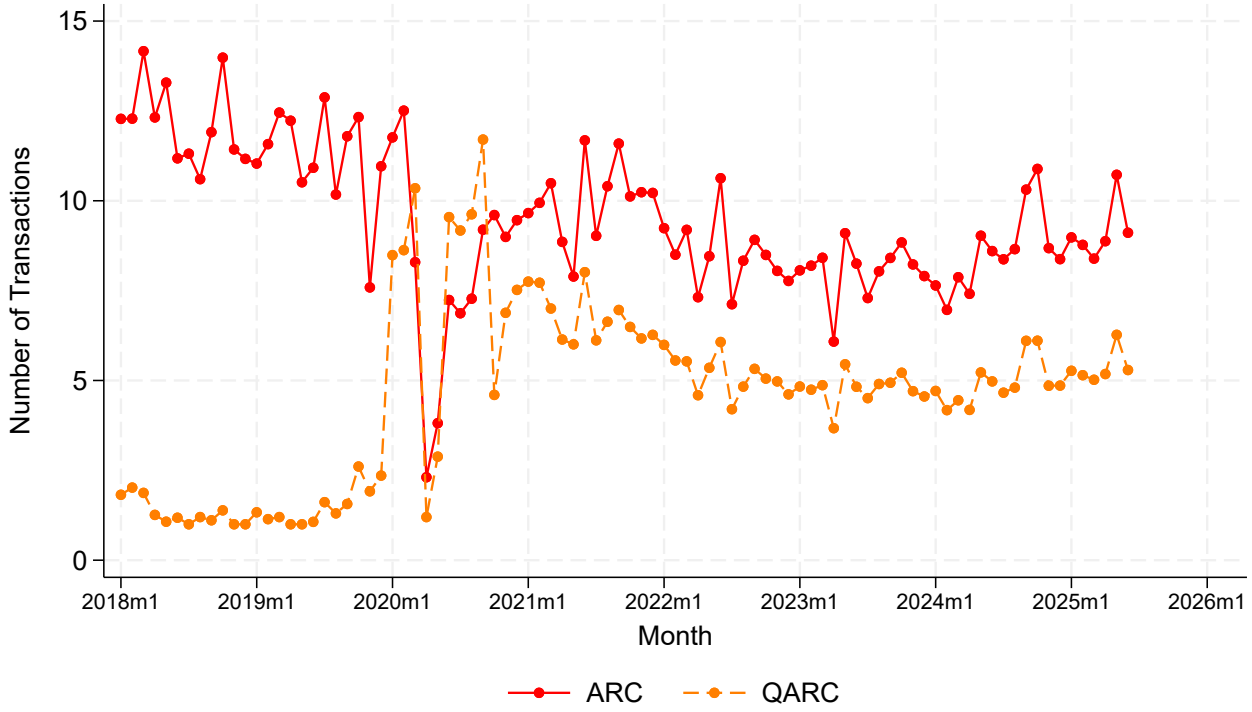
4 Figures

Figure 1: Number of land transactions by incumbent ARC and new center, Dehi Markaz Maal (DMM)



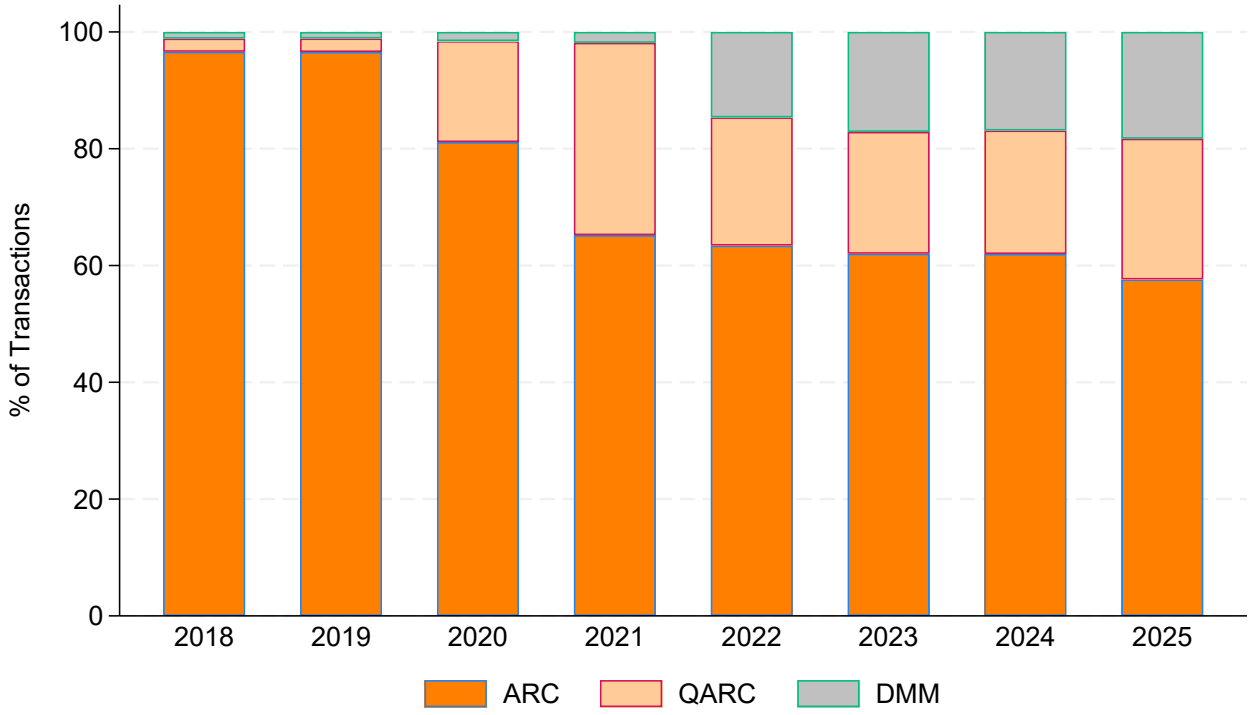
Notes: Monthly average numbers of land transactions at the mauza level are shown separately for ARC and DMM. The unit of observation is a mauza-month.

Figure 2: Number of land transactions by incumbent ARC and new center Qanungoi Arazi Record Center (QARC)



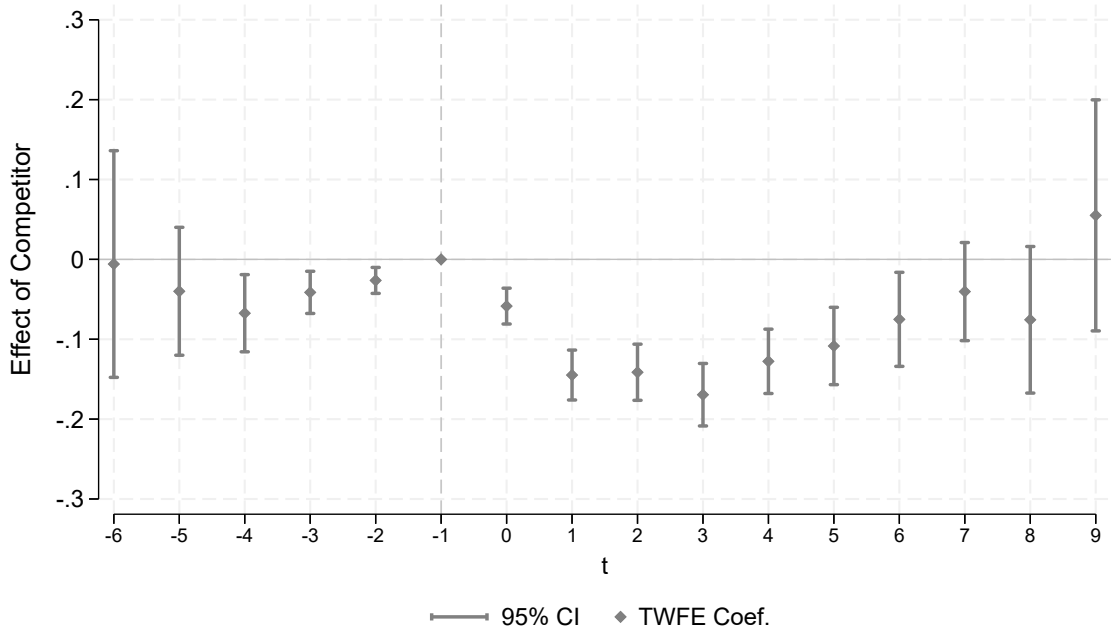
Notes: Monthly average numbers of land transactions at the mauza level are shown separately for ARC and QARC. The unit of observation is a mauza-month.

Figure 3: Fraction of land transactions by service centers



Notes: Annual mauza-level shares of land transactions by service center (ARC, QARC, and DMM) for the time period January 2018 - June 2025.

Figure 4: Event study of the effects of any additional center on log of service duration



Notes: Event study estimates of the effect of any additional service center on log of service duration defined as the time in minutes from when a citizen enters the center until the next stage of the land record process. The independent variable, "Additional Centers," is a dummy variable equal to one if a transaction was completed in a village (mauza) that had at least one new competing service provider (QARC or DMM) in addition to the incumbent ARC. Estimates are from a TWFE specification with service center fixed effect, bureaucrat fixed effects, and date fixed effects. 95% confidence intervals are presented. Standard errors are clustered at village (mauza) level.

Appendix

A Appendix Tables

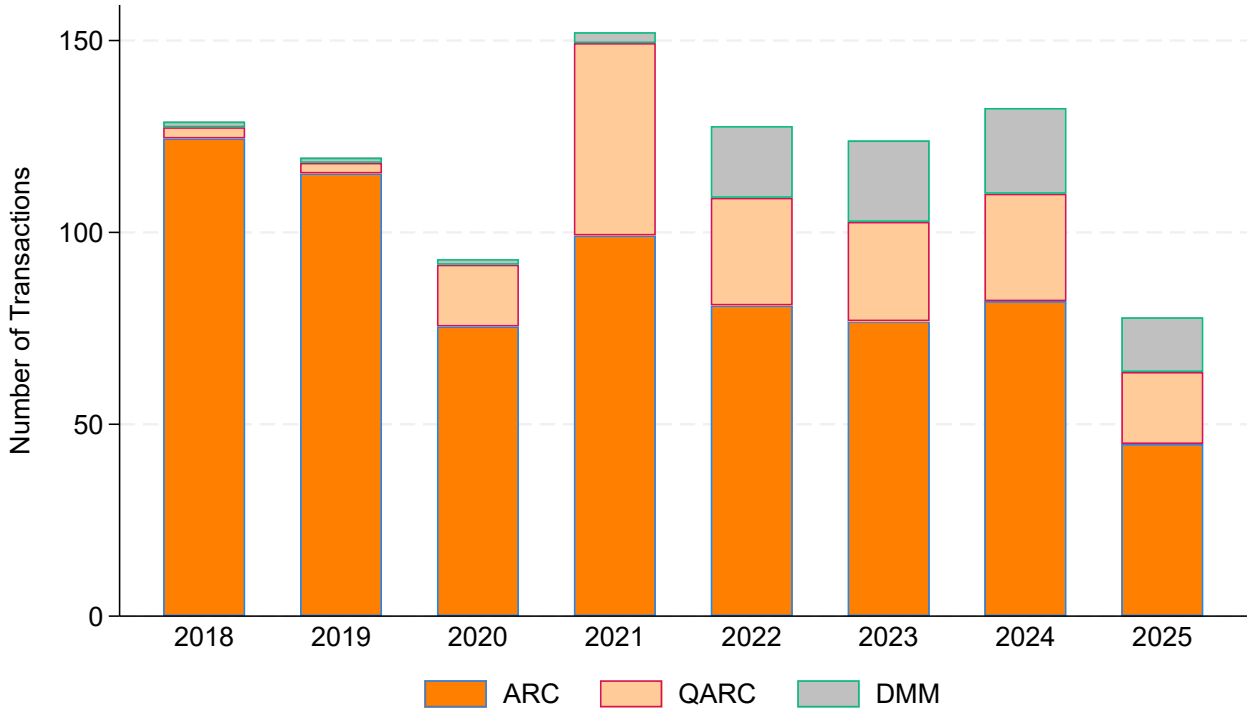
Table A.1: Number of different types of Service Providers over time in a village (mauza)

Year	ARC Only	ARC and DMM	ARC and QARC	ARC, DMM and QARC
2018	20993	797	405	8
2019	19872	1701	502	14
2020	18582	2296	1287	158
2021	16692	10590	3132	2586
2022	6135	15910	1240	7758
2023	685	12690	171	9429
2024	431	11570	54	10488
2025	423	10686	37	10503

Notes: This table reports the number of mauzas by year, classified by the set of land record service providers available in the village. ”ARC Only” indicates mauzas with only ARC but no DMM or QARC. ”ARC and DMM” indicates mauzas with both ARC and DMM centers but no QARC center. ”ARC and QARC” indicates mauzas with ARC and QARC but no DMM centers. ”ARC, DMM and QARC” indicates mauzas with all three service providers present.

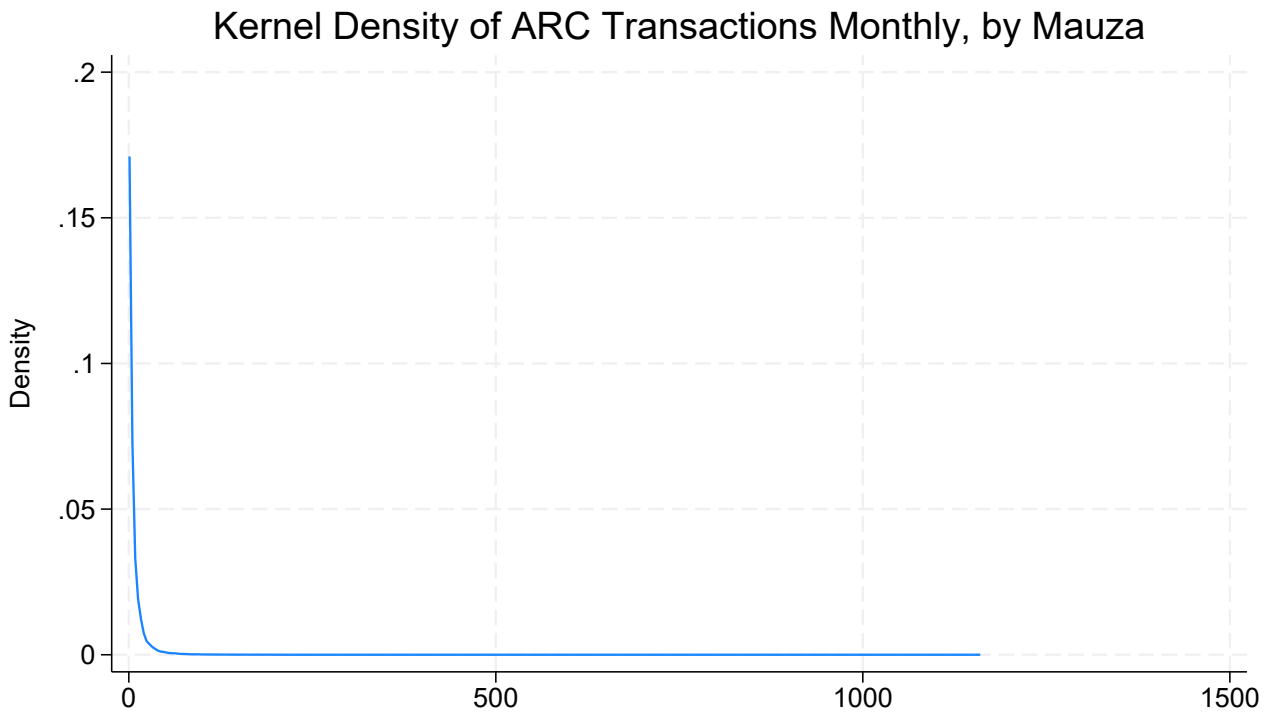
B Appendix Figures

Figure B.1: Total number of land transactions by service center types (ARC, QARC, and DMM), aggregated at the mauza-year level, 2018 - June2025.



Notes: Annual mauza-level total numbers of land transactions by service center (ARC, QARC,and DMM). Records available through June 2025.

Figure B.2: Kernel density of monthly number of land transactions



Notes: Kernel density of monthly number of ARC land transactions at the mauza level.

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