Fighting corruption to improve schooling: A replication plan of Reinikka and Svensson (2005) *

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Abstract

In developing nations, supply chain inefficiencies can hinder public service delivery. Resource capture via corruption is one such leakage. In the mid-1990s, only twenty cents to the dollar of capitation grants allocated for primary education actually arrived to schools in Uganda. Reinikka and Svensson (2005) show that bottom-up governance reforms improved head teachers' awareness of the grant program and substantially reduced grant capture. This replication study will examine the robustness of Reinikka and Svensson's two primary contributions: how an anti-corruption newspaper campaign improved the receipt of capitation grants and how this additional funding may have contributed to subsequent increases in enrollment.

Keywords: Replication, Uganda, Corruption, Public service delivery, Primary education

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1 Background

1.1 The original study

For developing country governments to be involved in the provision of educational services, such as school construction or school meals, is not uncommon. But the effectiveness of this service provision is another issue entirely. A program implemented by a government may have vastly different effectiveness when compared to the same program as implemented by a non-governmental organization. For example, Bold et al. (2013) investigate the impact of a successful scheme to increase educational attainment via the provision of contract teachers when it is implemented by both the Kenyan government and an international NGO. They find that the positive impact of the contract teacher program only arises under NGO implementation, while the government administered program produced no discernible effects.

If government service provision is indeed less effective, it is crucial to understand why. Bottlenecks and leakages in delivery chains may complicate trials after scale up to the country level. In many cases, resource capture plagues public service delivery. After relying on a public expenditure tracking survey (PETS) in Uganda, Reinikka and Svensson (2004) reported the infamous statistic that, in the mid-1990s, only about twenty cents to the dollar of government capitation grants for primary education actually made it to schools. The rest found its way into the pockets of local officials and politicians. Though they note that the Ugandan case might have been extreme, Reinikka and Svensson (2004) suggest that the bulk of evidence from other countries in Sub-Saharan Africa points to similar issues.

To counter such blatant rent-seeking, the Ugandan government introduced a newspaper campaign toward the end of 1997. Instead of tackling corruption from the top, the campaign took a grassroots approach: national newspapers published information on the monthly grant disbursements to school districts. By providing citizens with better access to information, officials hoped to curb capture of the capitation grants.

Reinikka and Svensson (2005) (henceforth RS2005) examine the impacts of this campaign using PETS taken in both 1996 and 2002. Their contributions are two-fold: First, RS2005 evaluate how the anti-corruption newspaper campaign improved the receipt of capitation grants targeted for primary schools. The authors then examine how the receipt of this additional funding may have contributed to subsequent increases in enrollment.

RS2005 measure grant receipts as the total grants received by a school out of the grants allocated to that school by the central government. They note that, while only 24% of grants arrived in their intended schools on average in 1995, this share had increased to 80% by 2001. Head teachers were questioned about both the grant allocation rule as well as their awareness of the timing of grant distributions. To evaluate the effects of the newspaper campaign on local capture, RS2005 use distance to the nearest newspaper distributor as an instrument for head teachers' knowledge about the information campaign. As expected, head teachers' grant-related knowledge decreases significantly as the distance to a newspaper outlet grows larger. A one standard deviation increase in awareness produces an increase in funding received by 44.2 percentage points.

Thus, the percentage of funding received by schools skyrocketed due to the government of Uganda's decision to initiate a newspaper campaign publishing the details of grant disbursements. But did this increase in funding result in the improvement of enrollment levels? To study this potential effect, RS2005 estimate a reduced form of their original model. More precisely, their first-stage instruments funding received by a school directly by the school's distance to the nearest newspaper distributor. Their second-stage then estimates the impact of the grant receipt on changes in enrollment of students in grades 1 through 7 across both surveys (using data from administrative records in 1995 and 2001). They find that an increase in funding received by one standard deviation results in an enrollment increase of 0.66 standard deviations, nearly 300 additional students per school.

RS2005 conclude by suggesting that reforms in public service delivery can produce huge returns. Their theory of change is clear: improving citizen voice and accountability with innovations that disseminate information on social services at the local level can greatly improve public service delivery on a country-wide scale. How better service delivery can indirectly bring about improvements in other outcomes, such as education, needs further study.

1.2 Motivation for replication

Widely cited in the development literature as evidence on the success of transparency and accountability reform, RS2005 constitutes an important study for replication. Compared to traditional approaches which look within or across schools for answers to education policy

questions, RS2005 draw attention to the operation of the service delivery system. RS2005 focus on the governance of social services on a country-wide scale and, moreover, are able to detail a specific causal chain from the information campaign to head teacher knowledge of capitation grants to grant receipt. Their findings hold important implications for the scale-up of other service delivery interventions as well as how lessons from the Ugandan experience might be applied in other contexts.

Additionally, the authors report enrollment gains from increased grant receipt that are relatively large when compared to the recent literature. To be sure, RS2005 note that their evidence on schooling outcomes is preliminary. Schools could make use of capitation grants however they saw fit, which prevents an investigation of the precise mechanisms at work. The provision of additional resources due to the grant may contribute to an enrollment increase. On the other hand, larger class sizes might mean that teaching quality suffers, or an influx of lower-achieving students could depress attainment on average. RS2005 therefore avoid making definitive conclusions about the mechanism behind the estimated enrollment gains. However, a follow-up study in 2011 asserts a positive relationship between grant receipt and educational attainment. While the literature upholds the validity of the sign of RS's findings[1], additional attention should be paid to the magnitude and whether such impacts can be considered robust in the Uganda context.

1.3 Overview of proposed replication

A replication of RS2005 should seek to address their two primary contributions: an analysis of governance reform on public service delivery (the newspaper information campaign) and the impact of this reform on educational outcomes (via increased capitation grant receipt). It is important, first, to verify that the original results of RS2005 are robust to pure replication by another researcher. As described in detail in Section 2.1, RS2005 report on preliminary results for their educational outcomes, results that were later published in 2011. Moreover, RS2005 often refer the reader to a secondary paper for both sample construction and robustness checks regarding their newspaper distribution outlet instrument. It is therefore

[1]Of relevance to RS2005's findings are two conclusions from Kremer et al.'s (2013) guidance on best-practices from a summary of education-oriented RCTs: (1) reducing the costs of school attendance tends to increase enrollment but has little to no impact on learning gains and (2) the provision of resources themselves, unless augmented by additional reforms, does not improve average achievement outcomes.

necessary to rely on these additional sources in order to document any significant deviations in methodology as well as test the robustness of the original RS2005 results.

We also aim to see if the results of RS2005 are internally valid - that is, if they are robust to minor changes in assumptions as well as falsification tests. Of particular concern for measurement and estimation analysis is the fact that universal primary education (UPE) was implemented in January of 1997, just before the start of the anti-corruption newspaper campaign at the end of the same year. In light of this event, discussion of the falsification tests and assumptions supporting RS2005's choice of specification is crucial for gauging the internal validity of their results. Issues of sample construction, standard errors decisions, and comparisons with secondary data sources can also be addressed.

Finally, we intend to examine the degree to which an explanation exists for the theory of change behind enrollment and learning gains. In the context of the existing literature, the enrollment gains reported by RS2005 have the proper sign but are quite large in magnitude. Without specific information on how grant money is spent, further illumination of the mechanism(s) supporting enrollment increases is difficult. We propose that including additional data sources into the reduced-form specification may be a feasible strategy to examine these mechanisms.

Our replication plan proceeds as follows: First, we discuss the stage of pure replication in which we place particular emphasis on the disambiguation of RS2005 and related works. We then move to measurement and estimation analysis (MEA). Here, we describe key falsification tests designed to examine the internal validity of RS2005's results. Finally, we discuss the scope for theory of change analysis (TCA) by speculating about methods to reveal greater detail on the mechanisms driving the results.

2 Pure replication

2.1 Paper disambiguation

For the bulk of their paper, RS2005 rely on two sources. First, for their examination of the relationship between distance to newspaper distributors and knowledge of capitation grants, RS2005 frequently cite a working paper (RS2004b, later updated in 2006 but unpublished). RS2005 refer to RS2004b for robustness checks. For example, Table 2 of RS2005 is similar

to Table 8 of RS2006 (tables shown in Figure A.1 of the Appendix for comparison) as both report the two-stage relationship between distance, information, and grant receipt, but the latter reports additional information and slightly different point estimates.

Second, RS2005 report preliminary results on the relationship between capitation grant receipt and schooling outcomes, results that were further developed and published in the *Journal of Public Economics* in 2011 (henceforth RS2011). Though the approach of RS2005 is naturally similar to that of the more recently published study, choices on the econometric specification, sample, and presentation of results differ between the two. For example, Table 3 of RS2005 could be comparable with Table 7 of RS2011 as both report the estimated impacts of the newspaper reform campaign on student enrollment. (Tables shown in Figure A.2 for comparison.) However, the sample sizes, methods of standard error calculation, and results differ.

Because RS2005 relies on a working paper as well as preliminary results, documenting the changes between RS2005, RS2006, and RS2011 must serve as a main step in the pure replication.

2.2 Execution

Every effort will be made to reconstruct the final dataset from the raw data using RS2005, RS2006, and RS2011 as benchmarks and making careful comparisons between the different versions. RS2005 refer the reader to RS2006 for information on the dataset construction.

We will pay careful attention to choices in how RS2006 treat outlying points, typically due to schools that were dropped from the survey due to security concerns or missing data.[2] A final point should be made about differences between standard error decisions: For instance, RS2005 report OLS or bootstrapped standard errors, RS2006 use robust standard errors, and RS2011 report robust standard errors clustered at the school level. We will make note of decisions such as these and put all standard error choices to the test.

[2]For example, RS2006 indicate that "not all schools in the original sample could be resurveyed in 2002 because of security concerns." Specifically, "[t]wo districts (Moroto and Bundibugyo) were dropped, reducing the sample by 20 schools. One district (Gulu) experienced a major insurgency during the data collection phase, and an additional 11 schools had to be dropped." Moreover, RS2006 report that "[a] handful of schools had missing financial data in 1995 but had data for 1994. To increase the sample size, [RS] use the 1994 observations for these schools. The results reported remain basically intact if we restrict attention to the sample of schools with the 1995 data."

3 Measurement and estimation analysis (MEA)

3.1 Distance to newspaper outlets as an IV

RS2005 use the distance in kilometers (logged) between a school and newspaper distributor as an instrument for grant funding.[3] More specifically, they rely on distance to a newspaper outlet as an exogenous instrument for the head teachers' awareness of disbursements and, therefore, subsequent grant receipt. They argue that, prior to the newspaper reform campaign which began after 1997, distance to a newspaper distributor has no impact on capitation grant receipt. After the campaign, RS2005 assume that distance to the nearest newspaper distributor affects grant receipt only through head teacher or parent knowledge.

Robustness checks are not presented in RS2005 but, rather, the authors refer the reader to a secondary working paper (RS2006) for a host of tests to justify their IV strategy. We will rely on this paper to verify the robustness of the IV strategy and, additionally, examine whether distance is correlated to pre-campaign characteristics.

The fact that Björkman's (2004, now 2007) results appear in the RS2005 study, coupled with the fact that she uses newspaper circulation at a district level instead of distance to a newspaper distributor, present an opportunity to use newspaper circulation as an IV instead of distance in order to test the robustness of the RS2005 results. Indeed, Björkman (2004, 2006) examines only the impact of the newspaper campaign on achievement, not enrollment.

As RS2005 define a newspaper distributor "as an outlet/shop where newspapers are sold regularly," it is possible to compare variation of this instrument using alternate surveys, namely the Southern and Eastern African Consortium for Monitoring Education Quality (SACMEQ) survey rounds I or II from 1995 and 2000 respectively. For example, in the SACMEQ II survey from Uganda, 1,959 of the 2,642 schools are considered rural. Of these rural schools, the average distance to a bookshop is $33.67km$ while the average distance to a library is $47.23km$. These averages contrast significantly with the average distance of $15.3km$ to a newspaper distributor in RS2006. (Note that the average distance is not reported in RS2005.) We could also estimate the RS2005 specification at the regional level by substituting the distance variable constructed from the SACMEQ.[4] Such comparisons

[3]Note that it is unclear from any paper if this distance is calculated according to road limitations or "as the crow flies." This issue will be clarified with the authors.

[4]Because SACMEQ is not a panel, it is impossible to do this at the school level.

may yield additional understanding about the internal validity of the original results within the Ugandan context.

3.2 Falsification tests

Of paramount importance is to convince the reader that distance to newspaper distributors had no impact on the uptake and ramifications of universal primary education (UPE). Uganda established UPE in 1997, just before the initiation of the anti-corruption newspaper campaign. The Ugandan government lowered the marginal cost of enrollment for families by covering the expenses of tuition, fees, and textbooks for at most four children per household. The sheer size of the enrollment increase after UPE was established suggests that increases in enrollment are not unrelated to UPE. Using DHS survey data, Lincove (2012) uses the establishment of UPE to show that enrollment in Uganda for poorer households is more dependent on wealth than it is for better-off households. Because rural areas were under-enrolled prior to UPE, rural enrollment increased more than urban enrollment. Thus, a sample consisting only of rural schools should see correspondingly large increases in enrollment after UPE.

RS2011 demonstrate that the distance from newspaper distributors remains relatively constant before and after UPE reform. Because they use a rural-only sample, RS2011 argue that the option between switching from public to private schools is not available.[5] Additionally, they argue that "[c]hanges in the outcome in 1997, or between 1995 and 1997, cannot be attributed to the newspaper campaign but should be affected by the UPE reform." (See Figure A.3.) Hence, the increase in enrollment is entirely attributable, the authors argue, to the increase in grant receipt that followed the newspaper campaign.

Yet, this interpretation should be taken with caution. It is reasonable to believe that this interpretation does not capture the full impact of UPE (since UPE was initiated only in 1997). Using an regression discontinuity approach based on year of birth, Grogan (2009) shows that the introduction of UPE in 1997 increased disproportionately the probability of enrolling in school before the age of nine in rural areas relative to urban areas. More

[5]In Kenya, Bol et al. (2011) document a switching phenomenon from public to private schools after the introduction of UPE in 2003. They attribute this shift to the exit of relatively better-off students who switch to private schooling as public schools are flooded by the entry of poorer students. We do not consider this to be a concern for RS since they use an all-rural sample and, in rural areas of Uganda, the penetration of private schooling is extremely low.

precisely, the introduction of UPE was associated with a 3.4% increase in the probability of enrollment. If substantially more students were enrolled as a result of UPE, then a larger number of households may have an incentive to follow news about education reforms. Due to timing, it is indeed impossible to disentangle the effects of UPE and the newspaper campaign. However, we propose to examine changes in other educational indicators as well as enrollment of younger cohorts (who are presumably most impacted by UPE) in an attempt to shed additional light on structural changes pertaining to UPE.

RS2005 assume that unobserved traits at the school level are constant over time. Adding a school fixed effect should therefore control for unobservable school characteristics. However, if unobservables change over time, this assumption is no longer valid as school characteristics cannot be differenced out of the specification. Put differently, if a wide-reaching reform such as UPE were to drastically impact schools over time[6], a first-difference approach would be unable to completely eliminate the endogeneity bias from the estimation. We propose to add contemporary falsification tests to see whether other local outcomes that should not be affected by the information campaign change differentially over time with respect to distance from the nearest newspaper outlet.

3.3 Definition of education indicators

The focus of RS2005 is on the enrollment of all students, while RS2011 examine only the outcomes for students in grade 7. RS2011 justify their choice of P7 pupils by explaining that they can compare enrollment figures to testing on primary school leaving exams in order to verify that the enrollment has not been artificially inflated for grant reasons. What is of more importance is that P7 students were able to start school before the UPE reform of 1997, thus reducing the risk for rejection of the exclusion restriction. (Without grade repetition, this cohort would have been in P3 at the time the newspaper program began.) This distinction is far from trivial. Indeed, enrollment is likely to be particularly responsive to UPE at earlier grade levels.

However, the general quality of education may have degraded from the strain on resources caused by UPE. Because such a large number of students drop out before reaching grade 7,

[6]Indeed, Hubbard (2007) posits that several differences were concomitant with the introduction of UPE: restructuring capitation grants from block to conditional grants, removing parental fees, and growing attention on education overall.

one might also suspect those students who remain to be academically more advanced than the cohorts which abandoned school.[7] Comparison of the results and specifications between RS2005 (grades 1 through 7) and RS2011 (only grade 7) is thus necessary in the replication process.

3.4 Country case studies

The practice of providing capitation grants is not a phenomenon unique to the Ugandan context. It is frequently applied in other countries. For example, when Tanzania abolished school fees in 2002, the government also enacted a capitation grant program as part of the Primary Education Development Program (PEDP). The amount of the grant was originally pegged at 10USD per student. Yet this program has faced similar issues to the capitation grants in Uganda. Recent reports based on information from PETS suggest that schools received significantly less than their intended allocations. Though a similar policy of creating awareness by reporting disbursement information in the media exists, this practice is often not followed.[8] We will explore the possibility of applying the RS2005 approach to other contexts, specifically the Tanzanian case, in order to test the external validity of their results.

4 Theory of change analysis (TCA)

RS2005 propose a straightforward theory of change for the impact of the newspaper campaign on grant receipt: increased information availability increases the voice of head teachers and parents. But neither RS2005 nor RS2011 present a theory of change regarding educational improvements. RS2011 report that "[e]nrollment has been increasing over time in Uganda...Average PLE scores, however, show little improvement over time." This overall trend is consistent with their results but does little to broach the question of how precisely additional capitation grant funding impacts educational outcomes. More funds are reaching schools, but no information is available as to how schools use this additional income. For example, can a school purchase additional textbooks for students? Do teachers receive higher

[7] From government documents, Grogan (2009) reports that, in 2003, only 22% of the original UPE cohort had actually reached the terminal grade of primary school.

[8] For more information, we refer the reader to Uwazi at Twaweza's policy brief (2013) on capitation grants in Tanzanian primary education system.

salaries or bonuses and thus improve the quality of their teaching?

The study's aggregation at the school level provides policymakers with little insight as to how the purported positive impacts of additional funding are occurring. Unfortunately, this level of aggregation also impedes many additional tests that might otherwise be able to shed light on the theory of change at work. Without specific information on how grant money is spent, further illumination of the mechanism(s) supporting enrollment increases is unlikely. It may be possible to estimate the reduced form of RS2005's specification at the regional level using SACMEQ surveys from 1995 and 2000. Because SACMEQ includes a wealth of school-specific information, such a specification could control for key school characteristics in an attempt to shed light on the mechanisms involved. We will investigate the feasibility of this strategy.

5 Conclusion

Due to RS2005's use of a country-wide policy experiment in Uganda, they are able to approach the study of public service delivery from a unique angle. In their analysis, RS2005 demonstrate the fundamental importance of the delivery chain in determining the effectiveness of social service provision. The extent to which a simple newspaper information campaign averts corrupt rent-seeking and improves receipt of primary school capitation grants is massive. Such a finding holds important implications for the scale-up of other service delivery interventions. Examining the robustness of these results to replication is thus a crucial exercise, one that can help to inform investments and possible returns in undertaking similar studies in the future.

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6 Appendix

Figure A.1

TABLE 2. Linking distance, information, and capture.

Specification	1	2
Regression dependent variable	1st stage info	2nd stage Δs
Distance to nearest newspaper outlet	−0.103*** (.029)	
2001		2.30 (21.1)
Info		65.9*** (23.5) [23.6]
Schools	388	199

Notes: Income is included as control.
OLS standard errors in parenthesis and bootstrapped standard errors in square brackets.
*** [**] (*) denote statistically significant at 1, [5], and (10) percent levels, respectively.
Source: Reinikka and Svensson (2004b).

Table 8. Linking Distance, Information, and Capture

	Specification		
	1	2	3
	2nd stage[a]	1st stage	2nd stage
Dependent variable	Δs_j	$info_j$	Δs_j
Constant	2.30		0.03
	(21.1)		(15.7)
Info	65.9***		71.6***
	(23.5)		(18.0)
	[23.6]		[18.3]
Distance to nearest newspaper outlet		−0.060**	
		(.034)	
Distance to nearest newspaper outlet (average)		−0.308***	
		(.070)	
Controls, including income	Yes	Yes	Yes
F-test of instruments[b]	11.8		15.9
	{.000}		{.000}
Hansen J-statistic[c]			0.004
			{0.947}
Number of schools	199	388	199

** Significant at the 5 percent level. *** Significant at the 1 percent level.
Note: Numbers in parentheses are OLS standard errors; numbers in brackets are bootstrapped standard errors. See appendix for definition of variables.
a. First-stage regression is reported in table 7, column 2.
b. The test statistic on the F-test of the joint significance of the instruments in the first-stage regression, with p-values in braces.
c. The test statistic on the overidentification test of the instruments, with p-values in braces.

Figure A.2

TABLE 3. Impact of the newspaper campaign on school enrollment.

Specification	1	2	3	4	5
Dependent variable	Δstudents	Δs	Δstudents	Δstudents	Δstudents
Period	95-01	95-01	95-01	95-01	91-95
Constant	450***	74.1***	29.7	574***	68.4**
	(20.3)	(6.77)	(286)	(49.3)	(33.6)
Distance to nearest		−5.74**		−37.7**	−4.7
newspaper outlet		(2.45)		(17.9)	(12.1)
Share of funding			7.55*		
reaching school			(4.62)		
Schools	202	188	188	202	153

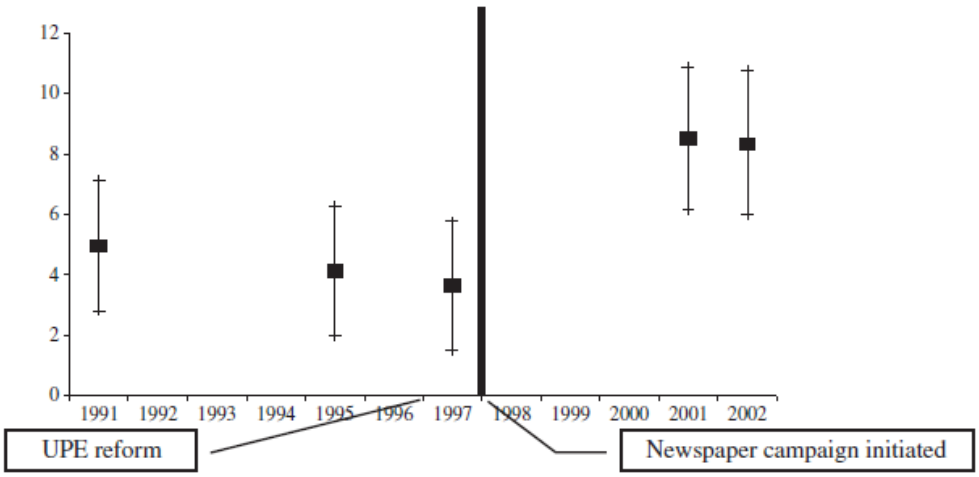
Notes: Income is included as control.
OLS standard errors in parenthesis.
*** [**] (*) denote statistically significant at 1, [5], and (10) percent levels, respectively.

Table 7
Estimates of the effects of the newspaper campaign on grade 7 enrollment.

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	First stage		Reduced form (small sample)	IV	Reduced form (large sample)		
Dep. variable	Share of funding reaching school	Share of funding reaching school	Grade 7 enrollment	Grade 7 enrollment	Grade 7 enrollment	Grade 7 enrollment	Grade 7 enrollment
Sample	1995, 2001	1995, 2001	1995, 2001	1995, 2001	1995, 1997 2001, 2002	1997 2001, 2002	1995, 1997 2001, 2002
Method	FD	FD	FD	FD-IV	FE	FE	FE
Distance × $\sigma_{post\text{-}campaign}$	−7.99**	−5.38*	−4.53**		−3.43**	−3.31**	−2.66*
	(3.05)	(2.98)	(1.81)		(1.40)	(1.57)	(1.41)
					[0.43]	[0.41]	[0.33]
Share of grants received				0.72**			
				(.30)			
Income	−0.004	−0.001*	−0.0002	0.003	−0.0003	−0.0005	−0.002
	(.002)	(.002)	(.001)	(.001)	(.0009)	(.001)	(.001)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-by-time effects	–	Yes	–	–	–	–	Yes
Observations	166	166	179	166	1303	1017	1303
Schools	166	166	179	166	372	372	372

Notes: (i) robust standard errors (in cols. 1–4) clustered by school (in cols. 5–7) in parenthesis. Imputed Wald/IV estimate in brackets. FD is first differencing, FE is fixed effects, and IV is instrumental variables.
*** Denotes statistically significant at 1% level.
** Denotes statistically significant at 5% level.
* Denotes statistically significant at 10% level.

Figure A.3



Note: Estimated impact (■) on number of grade 7 students of being 1 std closer to a newspaper outlet and 95 confidence intervals (vertikal lines), derived from regressions of *grade 7 students* on *distance* in (1991, 1995, 1997, 2001, 2002). Bold vertikal line indicates the year when the newspaper campaign began.

Fig. 1. Estimated impact on number of grade 7 students of being 1 std closer to a newspaper outlet.