

**ANALYSING THE IMPACT OF THE DELHI LADLI SCHEME ON ACADEMIC PERFORMANCE
AND ENROLMENT IN HIGHER EDUCATION**

KRISHNARAJ FELLOWSHIP PROJECT

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1. Abstract

The Government of India has launched various schemes to support and promote education of girl child as a measure to empower women and reduce the discrimination faced by them in a majorly patriarchal society. The Delhi Ladli Scheme, launched by Government of NCT of Delhi, is such an initiative to incentivize the parents of girls born in Delhi to enroll for schooling. This paper empirically tests the impact of the scheme on the academic performance of participating girls and enrolment in higher education which is an objective of this scheme. It is different from the literature as it extends to the Delhi Ladli Scheme. The scheme is unique as apart from the condition of passing up to 10th standard, which serves as a motivation for academic performance, it also has a time factor involved as the payment is locked-in and disbursed only at the conclusion of schooling thus incentivizing the continuity of schooling.

On the basis of a randomized survey in a locality of Delhi, we have attempted to capture the scheme's achievement by using various indicators of academic performance.

We have been able to establish a positive impact of the scheme on the indicators of academic performance but not on the academic score of the participating girls. The reason may lie in the level differences of academic performance.

Key words: Delhi Ladli Scheme, promote education, academic performance, higher education, level differences

2. Introduction

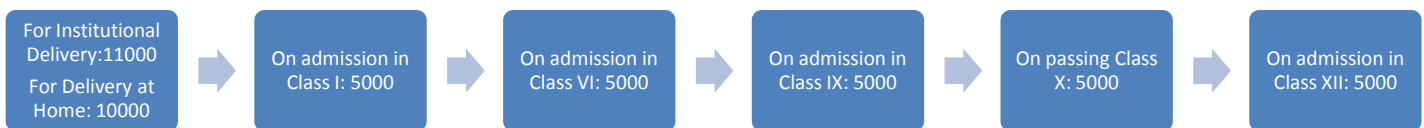
The Government of NCT of Delhi launched Ladli Scheme on 01.01.2008 for empowerment of girl children born in Delhi. Under the Scheme financial assistance is provided in the form of term deposits - Rs. 11,000/- if born in hospital or Rs. 10,000/- if born at home at the time of registration and Rs.5, 000/- each in further five milestones i.e., Class I, VI, IX, XI & XII. The Scheme is an initiative to empower girl child, promote birth registration, education and enrolment in higher education and control female foeticide and sex ratio.

For being eligible the girl should be born in Delhi as shown by the birth certificate issued by the Registrar (Births & Deaths), the family of the applicant must be a bonafide resident of the NCT of Delhi for at least three years preceding the date of birth of the girl child, Annual family income should not exceed Rs.1 lack and if girl is school going, her school must be recognized by Delhi Govt. / MCD / NDMC.

The scheme has been effective for the last decade with an approximate allocation of Rs 800 crores and around 8.5 lakh girls registered under it. This paper is an attempt to undertake impact analysis of the Scheme on the academic performance of the participants on basis of the data collected from a South-West Delhi locality. We would be considering various indicators of academic performance such as enrollment in higher studies, performance in academics, whether detained, number of hours spent studying, participation in co-curricular activities and enrolment in tuition classes. On the basis of these parameters we would compare and test the significance of the academic performance of girls enrolled in Ladli and those who aren't enrolled.

Although the scheme is targeted at the girl but all decisions related to the scheme are undertaken by her parents. From the enrollment in the scheme to the decision of putting efforts to ensure academic performance it would be the households' decision, not directly of the girl, on behalf of the girl. For convenience we would be referring to the decisions taken by households on behalf of the girl as the decision of the girl.

Pattern of Financial Assistance



Pattern of financial assistance is designed to create incentives for the girl to complete schooling without taking year gaps. The payment at the completion of schooling varies on the basis of the stage at which the girl registered in the scheme and the stage at which the girl concludes her schooling.

To claim the amount it is necessary to pass class 10th. If a girl is unable to pass matriculation or drops out of school before it then, she would not receive any amount irrespective of the stage at which she was enrolled in the scheme. This pattern of payment generates incentives for the girls to not only enrol in school but also put efforts to pass class X, as the scheme is conditional on the academic performance of the girls. Since it is the parents of the girl taking the decision on behalf of the girls, the scheme incentivises them to ensure that their girl performs well at school. To ensure this we expect them to motivate the child to put in additional efforts in their studies and spend more time studying rather than staying involved in household chores.

We would be conducting an in-depth analysis of the impact of the Scheme on the academic performance of the girls enrolled in the scheme. The next section (Section 3) of the paper will talk about the existing literature that serves as a benchmark of our analysis. It is followed by Section 4 on research question and hypothesis, Section 5 would be about data and methodology involved for carrying out the analysis, Section 6 on results that includes graphical analysis, summary statistics, modelling and regression analysis. Finally we conclude with Section 7.

3. Literature Review

With vast literature studying the impact of conditional cash transfers (CCTs) on the school enrolment and attendance very few papers talk about the impact of such CCTs on the academic performance of the recipients. And the ones that have tried to delve into this topic haven't been able to find evidence of any such impact on the academic performance. Pierre Dubois in their randomised experiment implemented under Progresa found that the program positively impacted school enrolment but the performance had positive impact at primary level and negative at secondary level due to the disincentives created by termination of program benefits after 3rd year of secondary school. The Ladli Scheme is devoid of such disincentives; in fact the amount is increasing at each stage of the Scheme and thus is expected to have a positive impact at all levels.

A number of papers have also explored the impact of CCT on dropout rates. Mo, Zhang, Yi and Luo through their RCT demonstrated that in Rural China such a program reduces dropout by 60%. They found that students with poor academic performance, girls and younger students were significantly impacted.

There is wide literature available that shows that cash transfers conditional on educational outcomes have been successful in increasing school enrolment and regularity in school attendance but very few papers have studied the impact of such schemes on academic performance. Given that the Ladli Scheme requires you to pass 10th standard and incentives students to complete schooling before 18 years it is expected to have a positive impact on student's academic performance. This paper would be an attempt to explore that angle in detail. In a similar attempt Juan Ponce and Arjun S. Bedi found the *Bono de Desarrollo Humano* of Ecuador to be ineffective. Similar were the findings of Duryea and Morrison, who examined the impact of Superémonos in Costa Rica. They found strong evidence that school attendance was improved but not on the school performance. Even Rawlings and Rubio found clear evidence of enhanced enrollment rates but the impact on performance of such programs launched in Brazil, Honduras, Jamaica, Mexico and Nicaragua still loom unanswered. Garcia and Hill have found a positive impact of *Familias en Acción* in Colombia on the school achievement for children but the impact is opposite for adolescents operating through the peer effects of classroom crowding effects.

International Initiative for Impact Evaluation's systematic review summary 7 finds that interventions can improve school participation and learning outcomes in Low & middle income countries. After studying over 20 such interventions they found that programs can either improve school participation or learning outcomes, but don't happen simultaneously; although some exceptions do exist. On comparison they found that different programs have different level of impact, cash transfers have a relatively large positive effect on school participation outcomes while structured pedagogy programs have the largest and most consistent positive effect on learning outcomes.

4. Research question and hypotheses testing

4.1 Research question

To test if the scheme has impacted the academic performance of the girls as desired by the monetary incentive scheme.

4.2 Hypotheses testing

Given the theoretical underpinning, the scheme supports a positive impact on academic performance of such an intervention but the available literature on conditional cash transfers offers mixed outcomes.

As the scheme is conditional on passing class X and theoretically this incentive would lead to higher attendance at school and increase the number of hours being spent on studying for school going girls, parents may enrol their children in tuition classes and would be willing to pay considerable share of their income as tuition fees keeping in view the future benefit. These factors are expected to lead to better academic performance for the school going girls enrolled in the scheme.

For the school passed out girls receiving the Ladli amount at the conclusion of class 12th will provide the sufficient resources to apply for higher studies, considerably reducing the burden on the family and thus we expect to obtain higher enrolment in higher studies and lesser dropout cases for the girls enrolled in Ladli.

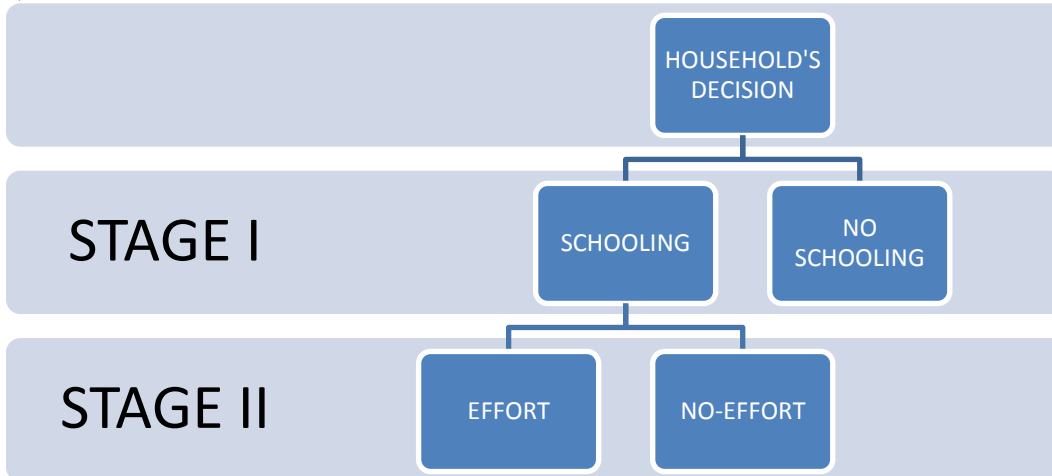
We start with the null hypothesis that the Scheme has no impact on academic performance. Then using summary statistics and mean differences we would try to infer the various impacts of the scheme on the academic performance of the girls enrolled for the scheme.

5. Theoretical model

We model the household's decision of enrolling/ not enrolling in the Scheme as a game theoretic model. With this model as our base, we would try to predict the conditions under which the scheme will generate sufficient incentives for improving the academic performance of the girls benefitting from the scheme. We would also be looking for possible changes in the scheme that would give a pareto-improved solution.

There are two sequential stages of decision making for the households (in absence of any CCT scheme):

- 1) Schooling or no-schooling
- 2) Effort or no-effort



In this paper we will primarily pay focus on the second stage of the game and analyse how the Ladli scheme leads to changes in the incentives of this two stage game. We would restrict attention to girls who are already enrolled in schools and thus the decision making of the households is sub-divided into two simultaneous decisions:

- 1) Decision to enrol in the Ladli Scheme
- 2) Decision to put efforts

Efforts can't be observed thus we would rely on proxy variables that can capture efforts put in by the households. We would look into hours spent studying at home in a day, enrollment in tuition classes and monthly fees paid for tuition classes as proxies for effort level. The choice of these proxies is based on the opportunity cost analysis. We need to understand that these girls come from households with economic instability and when the households decide to allow them to spend more number of hours for studying they are losing onto those hours of a day which could have been utilized to help in the household chores or in the daily piece-work that is being carried out by the ladies in most of these households. Thus, spending more hours in study translates into loss of pay from working part-time. Similarly deciding to send girl to tuition classes entails tuition fees and also the time spent in tuition classes. Hence, we observe that these proxies represent a tradeoff parallel to the one in decision of putting efforts. This enables us to use these observables to gauge for the unobservable effort undertaken by a household. It's the household's decision of enrollment in the scheme as well as the decision to put efforts. Thus, it is effectively the household's decision making on behalf of the girl child. Efforts may not directly translate to better academic performance but will surely increase the probability of performing better. Similarly, from existing literature we find that tuition's and the hours spent studying at home translate into a higher likelihood of passing the exams. Thus academic performance is an increasing function of these parameters.

Since we are considering girls enrolled in schools we would not be taking into consideration the direct costs to schooling. This is also justified as our sample primarily consists of girls going to government schools where the direct cost of schooling is minimal and zero in most of the cases. And those going to private schools are enrolled under the Economically Weaker Section (EWS) category and don't have to pay school fees. In empirics we treat both types of school separately so as to take into consideration the inherent differences in the households on the basis of school they opted for the schooling of their girl.

The cost is instead associated with the efforts in terms of attending school and tuitions

$$\text{Cost of effort} = C(t(x), a, h)$$

where t = tuitions, x = highest standard passed, a = attendance in school, h = hours spent studying at home

$$C'_{t(x)} > 0, C'_a > 0, C'_h > 0 \text{ and } t'_x > 0$$

For a simplified model we would restrict ourselves to the gain from the scheme and putting efforts as the scheme participation doesn't lead to any advantage in terms of job market opportunities.

Thus, returns to schooling = $R = A(x)$ where A represents the benefits from schooling and is increasing in the highest standard passed.

With the introduction of the scheme there are additional incentives associated with schooling = $S(x, e)$, where S represents the Scheme benefits received by the girl which is a function of the highest standard passed and the stage at which she enrolled for the scheme (represented by e).

$$S = \begin{cases} S(x, e) & \text{if } x \geq 10 \\ 0 & \text{otherwise} \end{cases}$$

The scheme adds lump sum amount at each stage of the milestone but to take benefit of the scheme the household has to apply for renewal as each of these milestones. Thus, in the decision to enrol for the scheme costs associated with the Ladli scheme also need to be considered. Although the girls in government school can apply for renewals from the school premises itself but for the girls from private schools things are a bit different. They have to visit the main headquarters, incurring the shoe and leather cost for each renewal associated with enrolment in the scheme as the renewal form has to be filled at each milestone and at the maturity of the scheme withdrawal form has to be submitted and bank account need to be opened. All these require time and travel cost on part of the households. Thus for them, this cost may create disincentives to enrol.

For government school going girls, Cost of scheme (Gvt) = $C_1 = C_1(x, e, t)$

$$C'_x > 0, C'_e > 0 \text{ and } C'_t > 0$$

where e = stage at which enrolled for the scheme, t = time spent in the scheme procedures

While for private school going girls the cost will be an increasing function of the highest standard passed and time spent for the scheme procedure and a decreasing function of the stage at which enrolled in the scheme

$$\text{Cost of scheme (Pvt)} = C_2 = C_2(x, e, t)$$

$$C'_x > 0, C'_e > 0 \text{ and } C'_t > 0$$

Now, with the benefit and cost analysis at hand the households decision would be one that maximises their payoffs. This gives us a game structure represented by the following game (different for different type of schools):

Govt. school	Ladli	Non-Ladli	Pvt. school	Ladli	Non-Ladli
Efforts	$q * RLG + (1 - q) * R'(x')$	$q * R(y) + (1 - q) * R'(y')$	Efforts	$q * RLP + (1 - q) * R'(x')$	$q * R(y) + (1 - q) * R'(y')$
No-efforts	$p * RLG + (1 - p) * R''(x')$	$p * R(y) + (1 - p) * R''(y')$	No-efforts	$p * RLP + (1 - p) * R''(x')$	$p * R(y) + (1 - p) * R''(y')$

where, q (probability of passing 10th standard when effort put) $>p$ (probability of passing 10th standard when effort not put). We are assuming here that effort only leads to changes in the probability of passing class tenth.

$$RLG = RLG(x, a, h, e, t) = (A - C(t(x), a, h)) + S(x, e) - C1(e, t)$$

$$RLP = RLP(x, a, h, e, t) = (A - C(t(x), a, h)) + S(x, e) - C2(x, e, t)$$

$$R(z) = R(z, a, h) = (A - C(t(z), a, h)) \text{ is return from passing 'z' standard}$$

$$R'(z) = R'(z, a, h) < R(z, a, h) = R(z), R'(\cdot) \text{ is return from not passing 'z' standard}$$

$$R''(z) = A > R'(z)$$

$R''(\cdot)$ is return from not passing 'z' standard when effort not put

Thus, we have a game involving decision making of whether to enrol in the Ladli Scheme and whether to put efforts with both the actions bearing a benefit and an associated cost. Hence, the households would take decisions depending on their respective incentive constraints.

For a girl in government school to put effort, the following participation constraint has to be satisfied,

- If the girl is a Ladli:

$$q * RLG + (1 - q) * R'(x') \geq p * RLG + (1 - p) * R''(x') \quad (1)$$

- If the girl is not a Ladli:

$$q * R(y) + (1 - q) * R'(y') \geq p * R(y) + (1 - p) * R''(y') \quad (2)$$

For a girl in private school to put effort, the following participation constraint has to be satisfied,

- If the girl is a Ladli:

$$q * RLP + (1 - q) * R'(x') \geq p * RLP + (1 - p) * R''(x') \quad (3)$$

- If the girl is not a Ladli:

$$q * R(y) + (1 - q) * R'(y') \geq p * R(y) + (1 - p) * R''(y') \quad (4)$$

From (1), (2), (3) and (4) we find that girls enrolled in the scheme will put in effort as the benefit is larger than the costs incurred. If a girl is not enrolled in the scheme then she will take decision on effort on the basis of her incentive constraints. If putting effort has higher net returns she would choose to do so, otherwise not.

We observe that Ladli girls enjoy marginal return benefit over non-Ladli and are better-off in the cumulative return.

Also, paying attention to the fact that the households need to incur the cost of enrolling in the Ladli scheme today and the payments would be received only after the girl completes 18 years or passes twelfth standard. This introduces a time factor in our analysis. This may hinder the participation in the Scheme of girls coming from very poor families who can't afford this cost. We would test this conjecture in the analysis part.

As Ladli girls conclude their schooling with a higher return. They are also expected to face lesser financial constraints in making the decision of going for higher education. And thus, we expect them to have a higher enrolment in higher education.

With these theoretical underpinnings, we would try to test for these predicted results using primary data collected under the Krishna Raj Fellowship.

6. Data and Methodology

The locality of Bharat Vihar, South-West Delhi was the area under study. Sample for the survey was selected on the basis of a random selection of households from the electoral list. From each of the seven blocks of the area a random sample of household was picked and on the basis of eligibility for the scheme only the households who are eligible for the Ladli Scheme and have girls in the age group 6-30 years were surveyed. The choice of age group is based on the fact that the Scheme was started in 2008 and the maximum age of a girl who would have been eligible to apply would be up to 30 years. Lower bound is to ensure comparison across type of schools as government schools admission starts from first standard with the eligible age being six years.

Before the final survey, a pilot survey of sample size 20 was conducted to test the consistency and reliability of the questionnaire formed. After the pilot survey, the **Cronbach alpha test**¹ was performed on the two categories of interest. The value of the standardised Cronbach's alpha turned out to be 0.84 for school-going students and 0.87 for school pass out/dropout category. Hence, none of the domains are dropped for the final survey.

A random sample of 93 households, which are eligible for the scheme, was covered for the purpose of this study. The sample includes 112 girls who are currently/previously enrolled in Ladli and 76 girls who didn't enrol for the Scheme. The girls who are eligible but not enrolled in the scheme (henceforth referred as non-Ladli) serve as a control group for the girls receiving the scheme (referred as Ladli).

For the purpose of comparison the analysis was carried out for two categories. The first comparison was of girls who have dropped out or had passed out from school while the second was of girls currently enrolled in school. For the first category we use details of enrolment in higher studies, performance in the last and second last exam and dropout details. For the second category of girls currently enrolled in school, academic performance was mapped using details of their performance in the last and second last exam, school attendance in the last working month, hours spent studying at home, detainment, participation in co-curricular activities, enrolment in tuition classes and the fees being paid for tuitions. Along with academic performance we are using these additional proxies to capture different aspects of academic performance.

Existing literature provides evidence that the proxies being used here to capture academic performance are significant contributors to the academic performance of an individual. A panel data study by Vincenzo Andrietti & Carlos Velasco in a public university of Spain found a positive and significant effect of attendance and study time. Muhammad Daniyal, Tahir Nawaz, Ali Hassan and Iqra Mubeen provide evidence of the positive impact of co-curricular activities on academics in Islamia University. The research by Qaiser Suleman and Ishtiaq Hussain reveals that private or home tuition after school time plays a crucial role in strengthening and improving student's academic achievement. Casillas et al in Predicting early academic failure in high school from prior academic achievement found that prior grades are indeed the strongest predictors of performance in higher grades.

1. Cronbach's alpha is a measure of internal consistency measuring how closely related a set of items are as a group. It increases with the correlation between the items. A reliability score of 0.70 or higher is used as a cut-off.

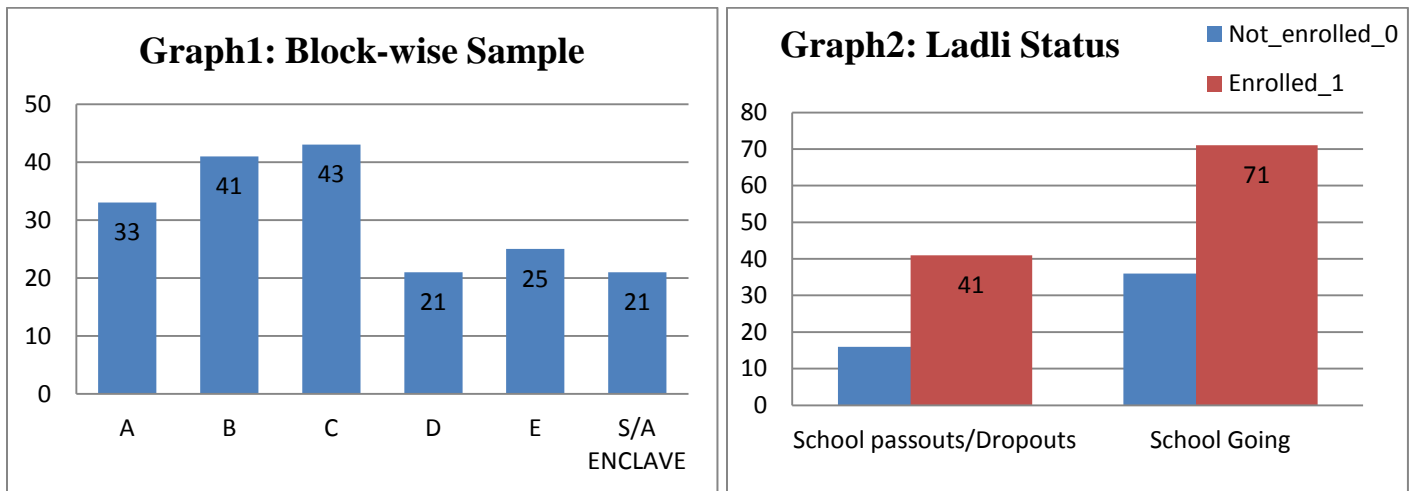
In this paper we would be analysing the Ladli Scheme based on graphs and statistics. Inferences would be drawn on basis of graphical, mean-difference and regression analysis.

I would be carrying out the analysis at four stages to take into consideration the various parameters involved in the Scheme, which are as follows:

- a) Analysing academic performance by the status of enrolment in Ladli
- b) Analysing academic performance by the stage at which enrolled in Ladli
- c) Analysing academic performance by age cohort
- d) Analysing academic performance by type of school currently/previously enrolled

7. Results

In this section we would discuss the findings of the survey using graphical, mean difference and regression analysis. We begin with the description of the sample collected. Graph 1 depicts the share of the various blocks in the total girls surveyed. The variation in number of sampled girls from different blocks is coming from the fact that not all blocks have equal share of girls eligible for the scheme.



Source: Data collected by author for Krishna Raj Fellowship, 2017

Graph 2 depicts the distribution of status of Ladli across the two disjoint categories of girls, schooling going and school pass outs/dropouts. Our sample has larger share of school going girls. We find that the proportion of Ladli girls enrolled in the scheme is higher for school-going compared to its counterpart.

Table 1: Descriptive Household Statistics

Variables	Obs.	Mean for Ladli	Mean for Non-Ladli	Difference
Household size	188	5.4018	5.5658	-0.1640
PC Household Income	188	11640.36	10339.32	1301.034**
School type	188	1.8482	1.8947	-0.04652
Type of house	188	1.7679	1.5789	0.18891***
Financial savings	188	0.1696	0.0658	0.1039**
Land asset owned	188	0.8571	0.6974	0.15978***
Mother's education	188	3.0625	2.8289	0.2336
Head's years of schooling	188	7.1607	6.0921	1.0686

***=1%, **=5%, *=10%

Source: Data collected by author for Krishna Raj Fellowship, 2017

Table 1 lists the household characteristics. We observe that for the Ladli and non-Ladli recipients' household size, school type, mother's education attained and the family heads education attained are statistically insignificant. This indicates that there aren't significant differences between the two groups when we are considering non-monetary factors that may influence their academic performance. They not only have significantly higher per capita household income but other indicators of wellbeing captured by possession of land asset and pakka housing and financial savings are also significantly higher. This reinforces that it's the comparatively better-off households that are taking advantage of the scheme. It remains to be tested whether it's due to the financial constraints or there are other reasons leading to these results. One might suspect that the girls who are working and economically contributing to the household's income might be driving these economic indicators. The results are robust to excluding the girls who are working.

2. A value of 2 represents pakka housing (plastered and physically maintained), while value of 1 represents non-pakka housing

Table 2(a): Correlation coefficients for School going students

Variables	Ladli enrolled (School going)
Last exam result	-0.068
Second last exam result	0.054
Tuitions enrolment	0.281
Co-curricular participation	0.034
Ever detained	0.048
Type of school	0.048
Log per-capita annual income	0.364
Land asset owned	0.235
Financial assets owned	0.065
Type of house	0.310
Household size	-0.214

Source: Data collected by author for Krishna Raj Fellowship, 2017

All our proxies (tuitions, ever detained, co-curricular participation) have positive correlation indicating the tendency of Ladli girls to have better academic performance. The positive correlation with economic wellbeing indicators reinforce the tendency of Ladli girls to have better economic standing compared to their counterparts. There is a negative correlation between Ladli enrolments and last exam results and household size. We expect Ladli scheme to have a positive impact on the academic performance of the participating girls but a weak negative correlation is counter-intuitive. Thus it becomes important to understand the underlying reasons for such observation.

Table 2(b): Correlation coefficients for girls enrolled in higher education

Variables	Ladli enrolled (Enrolled in higher education)
Log per-capita annual income	0.285
Land asset owned	-
Financial assets owned	0.210
Type of house	0.300
Household size	-0.205

Source: Data collected by author for Krishna Raj Fellowship, 2017

We find there to be a positive correlation between Ladli enrolments and economic wellbeing that is being captured by log per capita income, possession of financial assets, monthly expenditure and pakka housing. In fact all girls enrolled for higher education possess land assets. There is a negative correlation between Ladli enrolments and household size. This suggests that it is better-off section of the locality that is taking advantage of the Scheme.

Table 2(c): Correlation coefficients for girls who dropped out

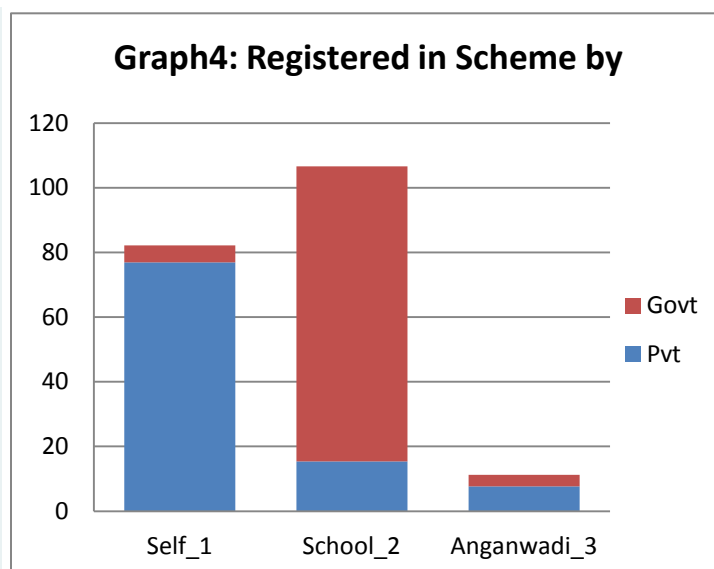
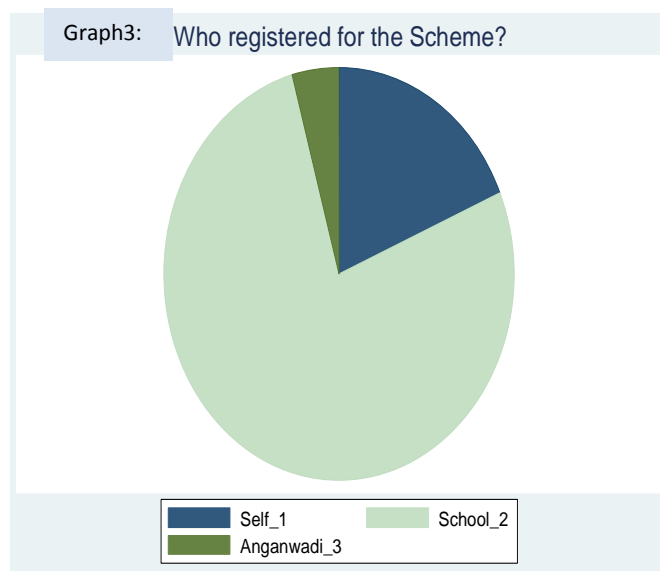
Variables	Ladli enrolled (dropouts)
Currently Employed	0.027
Log per-capita annual income	-0.223
Land asset owned	-0.091
Financial assets owned	0.247
Type of house	-0.096
Household size	-0.133

Source: Data collected by author for Krishna Raj Fellowship, 2017

Looking at girls who had dropped out we find there to be a positive correlation between Ladli enrolments and employment and possession of financial assets. There is a negative correlation between Ladli enrolments and land ownership, log per capita income, type of house and household size. This suggests that the girls from financially weaker background who have dropout have a higher tendency of enrolment in the scheme.

With these correlations supporting our conjecture that the Scheme benefits are reaped by the relatively better-off eligible households we would like to explore in greater depth the impact of the scheme on its recipients’.

The first step of the Delhi Ladli Scheme is registration for the scheme. Registration can be done through various channels made available by the government. Paying attention to the medium followed by the girl for registration into the Scheme provides us with an insight about initiation of their involvement in the scheme.

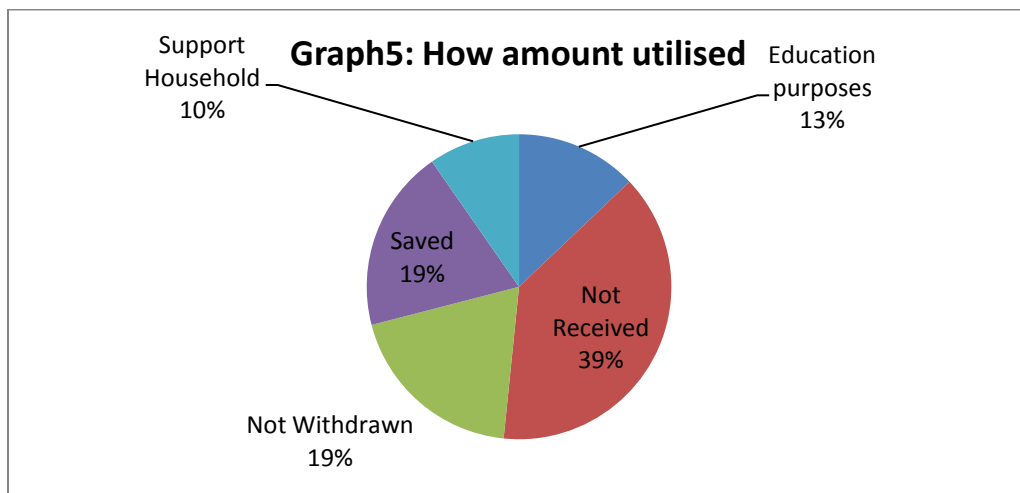


Source: Data collected by author for Krishna Raj Fellowship, 2017

We find that majority of the girls are enrolled by their schools (Graph 3). These girls, on reaching the applicable milestone stage, get access to the application form in the school premises and can submit them within a stipulated time to their respective schools. Then are registrations by self wherein the girl/her family takes the initiative of filling the form and submits it to the Ministry’s office. It s followed by Anganwadi registrations

similar to the school process. On bifurcating the girls enrolled in the scheme on the basis of the type of schools (Graph 4) we are able to observe considerable differences. We find that most of the Ladli girls were enrolled by their respective government schools while those going to private schools were enrolled on their own/parents. The primary source of information for the private school girls was through word of mouth from relative and neighbours.

On registration and successful renewals the Ladli girls receive a lump-sum transfer in their bank accounts. There is no restriction on the usage of this transfer. Ideally, it's expected to be a financial-aid to reduce the financial constraint faced by these girls, coming from economically weaker section of the society, for pursuing higher studies. Observing the utilisation of the Ladli amount (Graph 5) by the recipient girls provides an idea regarding the success of the scheme in meeting the objective of promoting enrolment in higher education.



We find that a large proportion of the girls have not received their Ladli amount. The main reason behind this is failure to apply for renewals. Among the girls who have received their Ladli amount, many of them haven't withdrawn it as they are not aware about the withdrawal procedure. The girls who have withdrawn their amount have used it for higher education, to support their families or saved it as a future insurance.

With these insights into the data outcomes we would now move on to mean-difference approach. In the following section we would be carrying forward the analysis on the basis of sample averages for the various parameters under study. This technique of comparison on the basis of averages would enable us to further strengthen our understanding of the impact of the Scheme which is carried out in the four stages as mentioned.

a) Analysing academic performance by the status of enrolment in Ladli

Table 3				
Category	Variable	Ladli	Non-Ladli	Difference
SCHOOL PASSED OUT/ DROPOUT STUDENTS	Higher Education	0.63	0.19	0.45*
	Dropout	0.37	0.81	-0.45***
	Class in which dropped out	11.69	10.00	1.69**
	Employed, if dropped	0.33	0.31	-0.03
SCHOOL GOING STUDENTS	Passed last exam	0.99	1.00	-0.01
	Passed second last exam	0.99	0.97	0.01
	Ever detained	0.15	0.11	0.04
	Hours spent studying	2.37	1.63	0.74***
	Tuitions	0.86	0.57	0.29***
	Co-curricular participation	0.24	0.19	0.04
	Awareness Inverse Index ³	11.49	13.61	-2.12***

***=1%, **=5%, *=10%

Source: Data collected by author for Krishna Raj Fellowship, 2017

School passed out/ dropout students

Among the passed out/dropout students, on the basis of the sample average we find that Ladli are performing significantly better in terms of pursuing higher education, lower dropouts and even for the dropouts cases we observe that the class is higher compared to the non-Ladli. But one must be careful in interpreting these results as there might be other unobservable factors such as motivation that may cause endogeneity problem.

We find that “Employed if dropped” variable is not significant. In looking at the reasons that might be at work we can think of two possible scenarios. One where girl might had to dropout from school to financially support their families by taking up whatever job options are available for their qualifications(the push factor) and the other wherein girls on acquiring some threshold education level had access to better job opportunities and thus dropped out (the pull factor). Mean estimation (Table B.1) shows that the mean per capita household income is actually lower for families with girls who dropped out for employment. Thus, it may probably be the push factor at work rather than the better job prospects.

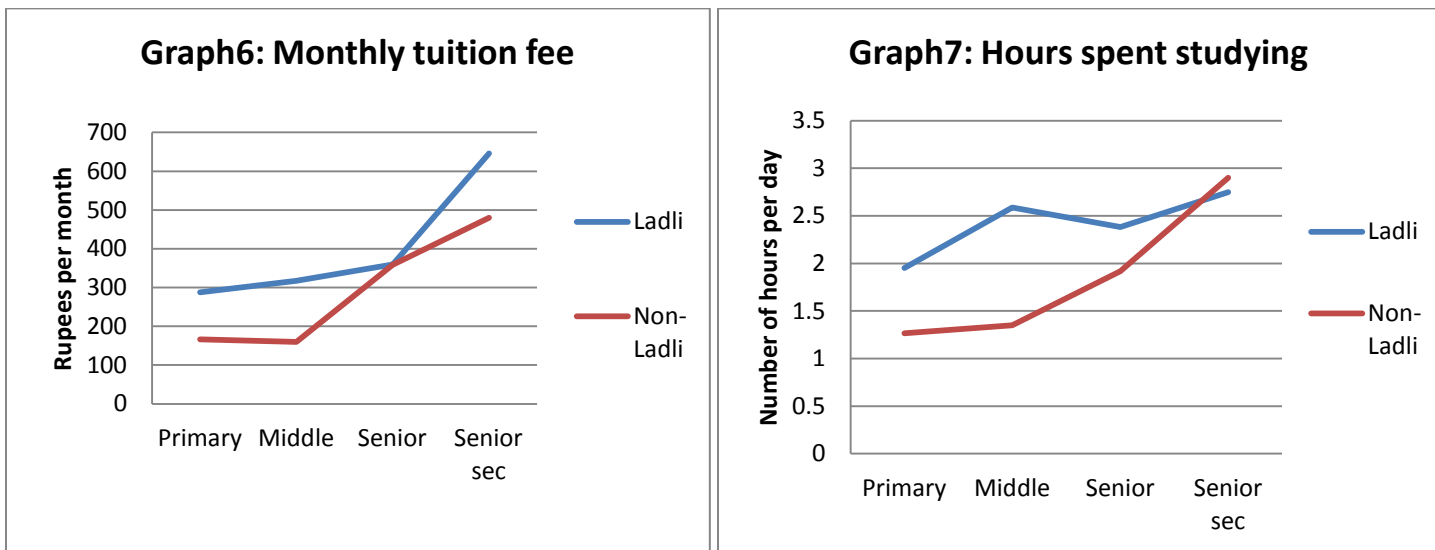
3. Awareness Inverse Index= (Registration+Renewal+Payment)/3; Registration, Renewal and Payment were rated on scale 1-5 {fully (all conditions) =1, Partial (word of mouth) =2, Moderate (From peers) =3, Bleak (Done by school) =4, Not at all=5}

School going students

We observe that there is no significant impact of the scheme on the results of the school going girls for last as well as the second last exam and the ever detained cases. This indicates that despite the incentive to performance there appears to be no difference between Ladli and Non-Ladli. And had we restricted to academic performance only we would conclude there to be no significant impact of the scheme.

On further analysis of data on hours spent studying at home and attending tuition classes we find that Ladli girls spend significantly larger number of hours and are also enrolled for tuitions to complement school teaching. Keeping all other parameters same, these factors are expected to lead to improvement in the performance. Thus we expect Ladli girls to have higher score, which is not so. This might be due to the differences in innate capabilities. If the initial performance of Ladli girls is lower and even though they have improved after enrolling in the scheme it might not be sufficient to match non-Ladli girls. This is also consistent with the existing literature⁴.

Attention must also be paid to the fact that both of these factors lead to higher cost. Thus, a household will decide to invest in effort only if there are positive returns. Graph 6 and Graph 7 represents the proxies for effort. On analysing tuition fees and hours spent studying at home a pattern is observed. The Ladli girls at each level are putting more effort compared to the Non-Ladli. Although for senior secondary the hours spent by Non-Ladli exceed that of the Ladli. But, this is consistent with the scheme incentive requiring Ladli enrolled girls to compulsorily pass up to the senior school to claim the matured amount.



This shows higher investment in effort by Ladli girls at each of these stages. This suggests that the scheme incentives are indeed generating the expected behaviour of the households acting on behalf of the girl child.

As the scheme incentives are dependent on the stage at which a girl enrolls in it, it becomes essential to see impact of stage of enrolment on behaviour of the participating girls.

b) Analysing academic performance by the stage at which enrolled in Ladli

We observe that the maximum enrolments by girls currently enrolled in school (only this subset taken to avoid dropout cases) are made on reaching sixth standard. This seems puzzling as most of the girls who enrolled in sixth standard were eligible for enrolment in 1st standard⁵ and would thereby have gained a lump sum of 5000 rupees each. The solution to this puzzle lies in the observation that many parents had a misconception that joining the senior school is an eligibility criterion to enrol for the Scheme. Table 5 provides us insight into the average behaviour of girls enrolled at different milestones.

Category	Variable	Ladli- Birth	Ladli- I	Ladli- VI	Ladli- IX	Ladli- XI	Ladli -XII
SCHOOL PASSED OUT/ DROPOUT STUDENTS	Higher Education	-	-	0.611	0.650	0.667	-
	Dropout	-	-	0.389	0.350	0.333	-
	Class in which dropped out	-	-	11.250	12.000	13.000	-
	Employed if dropped	-	-	0.286	0.375	1.000	-
SCHOOL GOING STUDENTS	Passed last exam	1	1	0.968	1	-	-
	Passed second last exam	1	1	0.968	1	-	-
	Ever Detained(9 th onwards)	-	0.167	0.227	0.6	-	-
	Hours spent studying	1.846	2.227	2.710	2.2	-	-
	Enrolled in Tuitions	0.846	0.952	0.806	0.8	-	-
	Co-curricular participation	0.231	0.182	0.290	0.2	-	-
	Awareness Inverse Index	3.145	3.967	3.967	4.2	-	-

Source: Data collected by author for Krishna Raj Fellowship, 2017

School passed out/ dropout students

We find that the girls enrolled in eleventh standard are performing better than the previous stages despite the fact that they are not bound by the eligibility requirement of the scheme to claim the amount as they already meet the criterion of passing class tenth. A possible reasoning lies in the motivation to enrol for higher education. Ladli girls on completion of twelfth standard get a lump-sum of 10,000 rupees which can be utilised for enrolling for higher education while non-Ladli girls have to completely rely on their family for financial assistance. This will increase the chances of Ladli girls of enrolling for higher education and would thus push them to perform to grab seats in institutes of higher education of their choice. Another plausible explanation follows the wage gain expected in the labour market accruing to the completion of senior secondary schooling level, which applies to both Ladli and Non-Ladli alike.

School going students

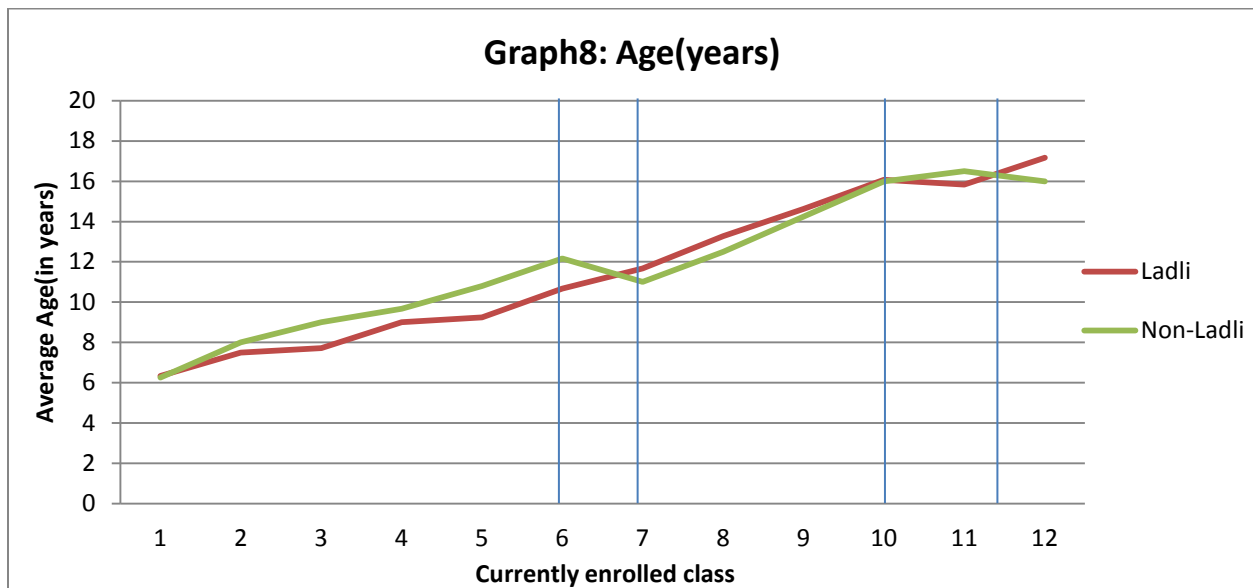
The maturity amount is inversely related to the stage of enrolment i.e. registering early pays higher. Thus, the incentives are stronger for the girls enrolled at stages earlier than others. Hence, we expect to see a larger impact on academic performance of girls registered at early stages relative to their counterparts.

Looking at last and second exam result we find that girls enrolled in sixth standard passed all classes but 10th. The girls who failed also turn out to be the ones who lack awareness about the passing criterion of the scheme.

As no detention policy up to eighth standard is followed, we are only looking at girls enrolled in ninth onwards. Detained variable seems to be consistent with the theoretical underpinning.

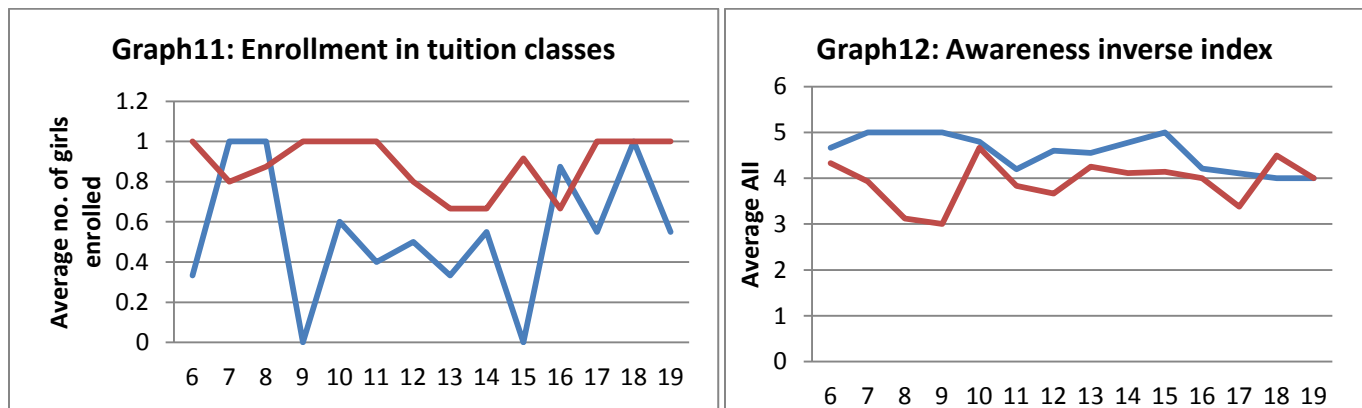
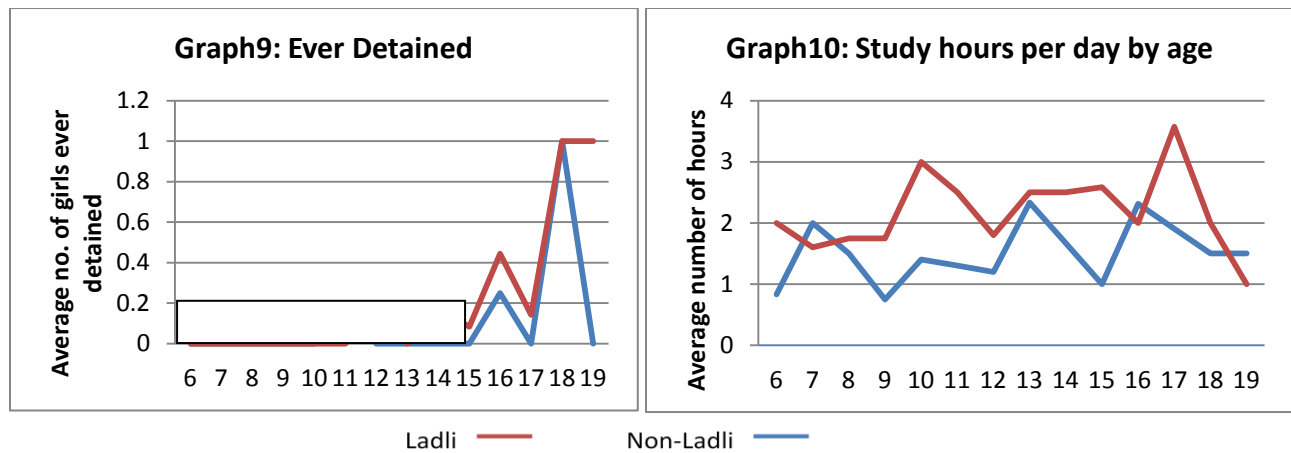
Awareness Inverse Index can explain the reason for girls not enrolling at early stages. We find that the Index value is low, indicating that girls registering early have better awareness about the scheme.

c) Analysing academic performance by age cohort



Source: Data collected by author for Krishna Raj Fellowship, 2017

The analysis of the age of girls over the currently enrolled classes provides a better insight into the impact of the scheme. There doesn't appear to be much difference between the two. Paying attention to the stages of enrolment into the scheme we observe that with 45% girls enrolling for the scheme in 6th class. Their average age is lower than that of Non-Ladli as well as the age of six years that is required for a sixth standard. Psychological studies prove that age impacts mental ability and thus academic performance. This suggests that the lack of difference in academic performance of Ladli-girls might be due the age-factor.



We find that on average, for a given age the Ladli girls have higher detained cases than Non-ladli. The number of hours spent by Ladli girls are higher for almost all age groups. Ladli girls are on average enrolling more for tuitions. These are consistent with the incentives that the scheme generates. Also the Awareness inverse index of households with girls enrolled for Ladli is lower than non-Ladli households. Thus suggesting that increasing the awareness may lead to higher participation. These findings show that Ladli girls put more efforts and their academic score is lower than Non-Ladli.

d) Analysing academic performance by the type of school

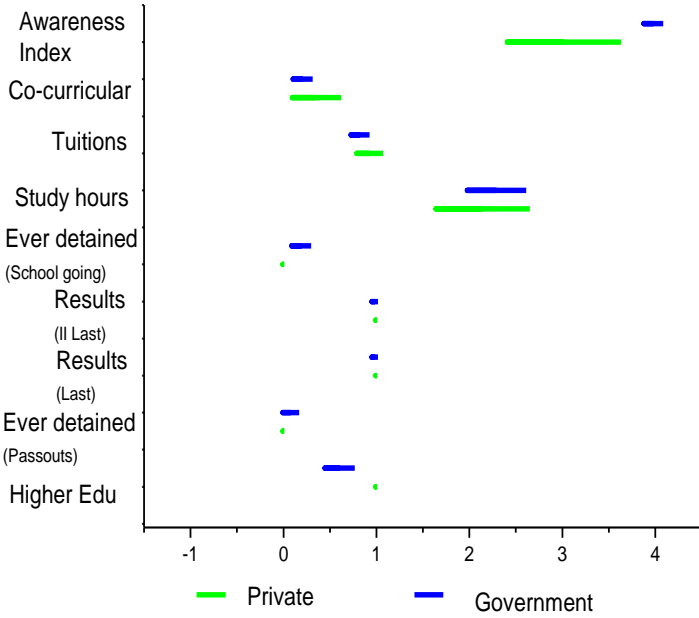
The incentives differ on basis of type of school. Thus we carry out comparison on basis of school type to observe how the households react to these incentives.

Table 6: Type of school

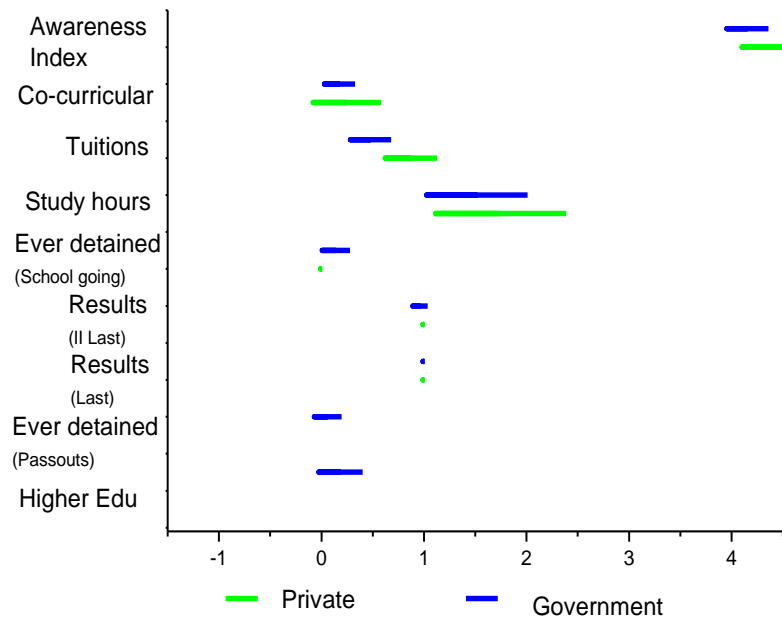
Type of School	Pvt	Govt	Total
Notenrolled_0	5.44	25.85	31.29
Enrolled_1	11.56	57.14	68.71
Total	17.01	82.99	100

We find that most of the sampled girls are/were enrolled in government schools (83%) while only 17% are from private schools. We should note that girls in private schools are EWS category. Below is a graphical depiction for comparison on basis of school type.

Graph13:
Sample average(with 95% CI) for Ladli enrolled girls



Graph14:
Sample average(with 95% CI) for Non-Ladli girls

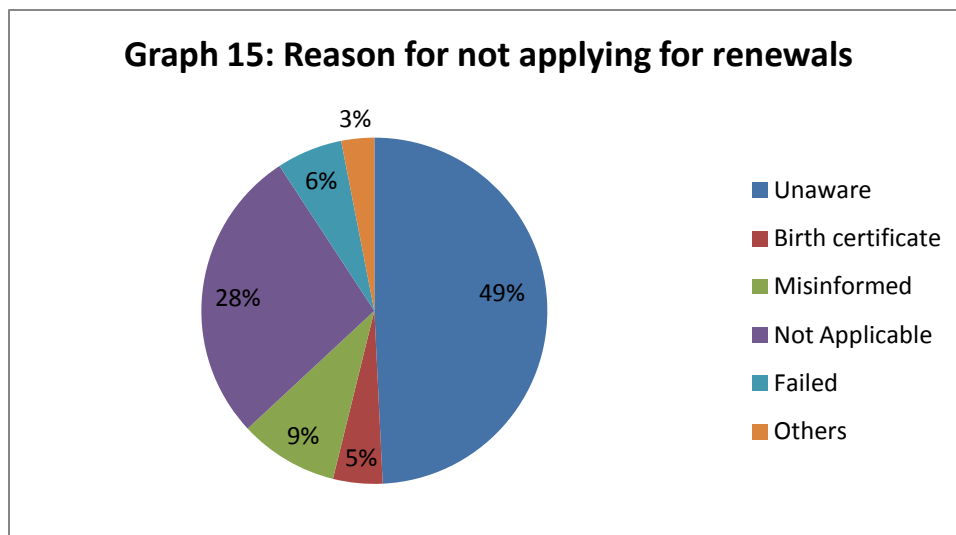


We find that Ladli girls from private schools enrol more for higher education, lower detainment and better awareness than government schools. All non-Ladli girls going for higher education are from government schools. There is no difference in academic performance as there is an overlap of the confidence intervals (CIs). As precautionary measure we would be keeping type of school as a control in our regression analysis to avoid the bias driven by the differences in type of school.

Scheme Awareness Analysis

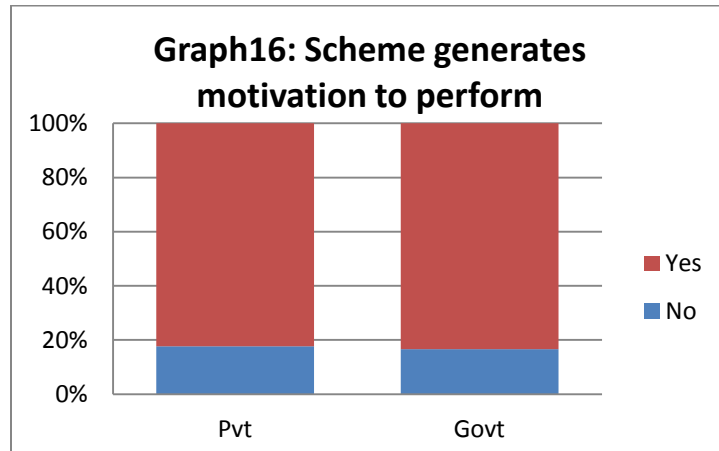
We find that a majority of the government school enrolled girls renew their Ladli scheme but not the private school girls. This stresses the policy change wherein allowing girls enrolled in private schools to do renewals from school premises like the government schools would significantly increase the share of girls applying for renewal. In both cases non-renewal arises due to lack of information about the renewal procedure.

Graph 15: Reason for not applying for renewals



We find that the majority of girls not applying for renewal are unaware about the process. Still a significant proportion, as large as 37% of girls aren't renewing for reasons that can easily be avoided by slight modifications in the scheme. Providing detailed information to participants at the time of registration would be one such move.

Looking at the awareness about the registration, renewal and payment procedure on basis of the enrolment status we find a disappointing picture. Despite being enrolled in the scheme the girl's households lack information about the scheme procedures. This plays a vital role in our analysis as the incentives won't be effective if the households aren't aware about the scheme and this may lead to no impact of the scheme at all. In fact the households would incur the cost of enrolling in the scheme but won't be able to reap its benefits leading to loss in payoff. They would have been better-off without the scheme. This indeed reinforces as to why parents are sceptical about enrolling their girls into the scheme.



But the picture somewhat improves on observing that, although the households lack intricate details about the scheme they are aware of the monetary incentives and also agree that the scheme generates the motivation to perform in academics (Graph 16).

We have so far relied on correlation and mean difference measures for analysis. To establish a causation relation between Ladli enrolment and academic performance we now move to the regression analysis. Academic performance and other indicators of academic performance were regressed on Ladli enrolment dummy, individual characteristics and household characteristics. The coefficient on 'Ladli enrolled' variable will represent the partial impact of the Scheme after controlling for other variables. Table 7 represents the coefficients of interest.

Table 7				
Variables	ladli_enrolled	Observations	Adjusted R-squared	Pseudo R-squared
Higher Studies	3.978***	56		0.4
Tuitions	1.491**	94		0.302
Tuitions fees	86.43*	105	0.184	
Hours spent studying	0.701***	105	0.243	
Awareness Index	-1.849***	105	0.407	

***=1%, **=5%, *=10%

Source: Calculated by Author on basis of data collected, 2017

Controls used: Age, school type, native state, household head employment, household size, assets (physical and financial) and household head's education

After controlling for other parameters, Ladli enrolment is found to have a significant positive impact on higher studies. This indicates that the scheme is effective in increasing enrolment in higher studies and thus empowering girls. For the girls currently enrolled in school we find that girls with Ladli enrolment are significantly more likely of taking tuition classes and paying higher fee. This indicates that their parents are willing to incur additional costs to ensure their performance in academics. Ladli girls spend 0.9 additional hours at home in studying compared to Non-Ladli girls. There could be two possible driving this. One, they are motivated to perform and ensure they receive their Scheme amount and second they have to put in more hard work compared to their counterparts. From literature we derive that the recipients of such schemes have lower performance and enrol in schooling due to the added return to schooling incentive. Assuming it to be the case here, we find that they are trying to cover it up with tuitions and hard work. Thus the scheme is indeed generating the right incentives.

There is no significant impact on the academic score of last as well as the second last exam. This is in line with the findings of impact of many CCTs in different parts of the world as discussed in literature.

The girls who were detained at any stage in their schooling are also the ones spending lower number of hours at home in studying. This also justifies our claim of including hours spent studying at home as an indicator of academic performance.

We find that if the household's head is employed in a private job or runs his/her businesses then, they are more likely to send their girls for higher education compared to those who are unemployed. This indicates that financial stability plays a vital role in the decision making process for higher studies. Almost 38% of the girls in the sample who dropped out did so due to financial issues, while 24% were married and thus had to discontinue and 19% weren't able to continue due to failure in exams.

Another important finding comes from school type. Government school girls are less likely of taking tuitions and have a significantly higher awareness inverse index about the Scheme. It might appear contradictory as in the

government schools girls fill forms in school itself and can obtain all the details from their teachers while private school students need to visit the Ministry's office and thus incur cost in obtaining information. The contradiction is solved on observing the awareness level of government school girls. They have no other source of information and sadly there are miscommunications also leading to non-renewal of their Ladli forms. On observing the trend of awareness level we observe a discontinuity. Awareness falls over classes in primary school and then is boosted on joining the middle school. Here I would like to reiterate a previously stated fact that girls are enrolled in Ladli scheme in sixth standard on moving to the middle school from their primary school. And then awareness level again falls for senior classes. This behaviour is potentially explained by the active communication and encouragement at middle school to enrol in the Scheme. Thus this provides a potential area of improvement in the scheme.

A note of caution is required in interpreting these results as the sample although conducted by random selection from electoral roll may suffer from non-randomness as enrolment in the scheme might be influenced by other non observables, for example motivation and capability. Keeping in view these shortcomings we have been able to observe significant impact of the scheme on school pass out / dropout as well as school going girls. Although the scheme suffers from some informational flaws and has still not been able to benefit the poorer section it has empowered many girls to complete their higher education and has created the right incentives for parents and students to devote more time to their education and thus perform better in academics as well as their life as an empowered Ladli.

8 Conclusions

We have been able to establish the positive impact of the Delhi Ladli scheme on the indicators of academic performance (enrolment in higher education, enrolment in tuition classes, tuition fees, hours spent studying per day and awareness inverse index) of the enrolled girls on the basis of mean difference comparisons and regression analysis. The predictions based on the game theoretic model developed to understand the household's simultaneous decisions of enrolling in the scheme and putting efforts are found to be consistent with data. The cash transfer scheme is ensuring that girls dedicate more time to their studies and their households are incentivised for the same. These are costs associated with enrolment in the scheme and efforts. Despite these Ladli girls are putting efforts is testimony to the generation of right incentives by the scheme.

The lack of significance of academic score of last and second last exam can be based on the findings that Ladli girls have higher detainment ratios, higher enrolment in tuition classes, pay higher fees and spend more hours per day on studies. Despite all these additional efforts still is no difference in performance potentially due to the differences in the innate capabilities of Ladli girls and non-Ladli girls. This difference can be caused by the presence of age differences as found in our survey. A further study would be required to test this. Assuming it to be the case solves the puzzle of lack of difference in academic score despite more efforts. Thus, we can conclude that the scheme is indeed successful in improving the academic performance of the girls.

We found it's the relatively better-off households that are benefitting from the scheme. Most of these girls are from government schools and are registered by their schools. Girls, whether Ladli or non-Ladli, lack understanding of the procedure of the Scheme. It is essential to ensure scheme awareness for better outcomes and achieving the targets of the scheme. Clarity on the renewal procedure during the registration process itself would help a long way to reduce the frequency of non-renewals which leads to loss of Ladli amount despite incurring the participation shoe-leather costs. From our game theoretic model we find that these costs play a vital role in

decision to enroll in the scheme. Creating an online portal for the Ladli Scheme process, in line with the governments Digital India campaign, would eliminate the cost and thus incentivize larger participation. The involvement of private schools in the loop of registration and renewal would be another step in this direction.

Our results have certain limitations. The survey was restricted to a specific area of Delhi and thus for drawing general inferences for the Scheme as a whole a wider study is required. The results may suffer from endogeneity problem as unobservable factors such as motivation and inherent ability to perform may impact results.

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APPENDIX A

1. Cronbach alpha test (School going category)

Item	Obs	Sign	item-test	item-rest	interitem	alpha	Label
			corr.	corr.	corr.		
educationa~d	11	+	0.6353	0.5611	0.2231	0.8213	EDUCATION ATTAINED
age_head	11	+	0.7676	0.7152	0.2132	0.8126	
edu_head	11	+	0.2463	0.1374	0.2521	0.8436	
edu_Mother	11	+	0.3977	0.2974	0.2408	0.8354	
ln_pc_income	11	+	0.5939	0.5139	0.2262	0.8238	
pc_hh_income	11	+	0.5279	0.4399	0.2311	0.8278	
annual_hh_~e	11	+	0.8439	0.8065	0.2076	0.8074	RECODE of annual_income
hhs	11	+	0.0120	-0.0994	0.2695	0.8551	
type_of_ho~e	11	+	0.4321	0.3346	0.2382	0.8334	
monthly_ex~e	11	+	0.6603	0.5898	0.2212	0.8197	
land_owed	11	+	0.2369	0.1276	0.2528	0.8441	
mot~_perform	11	+	0.7258	0.6658	0.2164	0.8154	
girls_enro~d	11	+	0.7953	0.7481	0.2112	0.8107	
tuitions_N_Y	11	+	0.4672	0.3729	0.2356	0.8314	RECODE of tuitionsyl (Tuitions (Y=1/)
cocurricul~n	11	+	0.6094	0.5316	0.2250	0.8229	RECODE of cocurricularactivities (Co-curricular activities)
tuitionfee~y	11	+	0.6636	0.5936	0.2210	0.8195	Tuition fees(Monthly)
ladli_enro~d	11	+	0.3236	0.2183	0.2463	0.8395	
Test scale					0.2313	0.8364	mean(standardized items)

2. Cronbach alpha test (School Pass-out/dropout category)

Item	Obs	Sign	item-test	item-rest	interitem	alpha	Label
			corr.	corr.	corr.		
educationa~d	10	+	0.8409	0.7973	0.3043	0.8400	EDUCATION ATTAINED
age_head	10	+	0.3525	0.2362	0.3643	0.8731	
edu_head	10	+	0.7889	0.7306	0.3100	0.8435	
edu_Mother	10	+	0.6180	0.5306	0.3317	0.8562	
ln_pc_income	10	+	0.7936	0.7395	0.3102	0.8437	
pc_hh_income	10	+	0.7639	0.7034	0.3138	0.8459	
annual_hh_~e	10	+	0.8927	0.8624	0.2979	0.8359	RECODE of annual_income
hhs	10	+	0.0936	-0.0317	0.3962	0.8873	
type_of_ho~e	10	+	0.8558	0.8159	0.3025	0.8388	
monthly_ex~e	10	+	0.2396	0.1121	0.3789	0.8798	
land_owed	10	+	0.7992	0.7463	0.3094	0.8432	
higer_stud~s	9	+	0.5331	0.4405	0.3396	0.8605	RECODE of pursuinghighereducationy1 (Pursuing higher education? (Y=1/)
ladli_enro~d	10	+	0.4575	0.3489	0.3512	0.8666	
Test scale					0.3316	0.8657	mean(standardized items)

APPENDIX B

Table B.1

Ladli					Non-Ladli				
Mean estimation		Number of obs = 15			Mean estimation		Number of obs = 13		
NO_0: employed = NO_0 YES_1: employed = YES_1					NO_0: employed = NO_0 YES_1: employed = YES_1				
Over	Mean	Std. Err.	[95% Conf. Interval]		Over	Mean	Std. Err.	[95% Conf. Interval]	
pc_hh_income					pc_hh_income				
NO_0	10473.21	1422.859	7421.486	13524.94	NO_0	11097.88	913.9975	9106.454	13089.31
YES_1	8107.143	1252.039	5421.786	10792.5	YES_1	9821.428	892.8572	7876.06	11766.8

Table B.2

Tuitions fee monthly	Ladli	Non-Ladli	Difference
Primary	288.10	166.67	121.43
Middle	317.65	160.00	157.65
Senior	359.52	358.33	1.19
Senior-Secondary	645.83	480.00	165.83

Table B.3

Hours spent studying at home	Ladli	Non-Ladli	Difference
Primary	1.95	1.27	0.69
Middle	2.59	1.35	1.24
Senior	2.38	1.92	0.46
Senior-Secondary	2.75	2.90	-0.15

Table B.4

Age/Class	1	2	3	4	5	6	7	8	9	10	11	12
Ladli	6.33	7.50	7.71	9.00	9.25	10.67	11.67	13.27	14.63	16.08	15.83	17.17
Non-Ladli	6.25	8.00	9.00	9.67	10.80	12.17	11.00	12.50	14.25	16.00	16.50	16.00

Current class	When enrolled in Ladli				
	Birth	1	6	9	Total
1	2.82	1.41	0	0	4.23
2	7.04	1.41	0	0	8.45
3	7.04	2.82	0	0	9.86
4	1.41	0	0	0	1.41
5	0	5.63	0	0	5.63
6	0	2.82	1.41	0	4.23
7	0	2.82	1.41	0	4.23
8	0	5.63	9.86	0	15.49
9	0	8.45	2.82	0	11.27
10	0	0	12.68	5.63	18.31
11	0	0	7.04	1.41	8.45
12	0	0	8.45	0	8.45
Total	18.31	30.99	43.66	7.04	100