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Does more schooling imply improved learning? Evidence from a Conditional Cash Transfer programme in India

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Abstract

Evaluation of Conditional Cash Transfer (CCT) programmes in a developing country context indicates a positive impact on increasing enrolment but finds mixed evidence on improving learning outcomes. Using representative rural household survey data, we evaluated one of the largest CCT programmes in India, the Kanyashree Prakalpa, implemented in the state of West Bengal from 2013. We examined the effect on adolescent female school enrolment and tested whether there were concomitant improvements in learning outcomes. Employing double difference, triple difference and synthetic control methods, we found significant positive effects on female school enrolment, even for children from villages without a secondary school. The enrolment increase in heterogeneous settings indicated that transfers from CCT programmes might outweigh supply side constraints like the travel costs of schooling. However, we found that enrolment gains, while associated with improvements in lower-order learning outcomes, were related to a significant decline in higher-order learning skills. Notably, improvements in higher-order learning were only found in schools with lower teacher absenteeism and better physical infrastructure. Our analysis suggests that, without complementary investments in learning amenities, CCT programmes might only redirect adolescent girls to school without greatly enhancing the learning skills that could have a significant impact on potential economic and social (in)security.

Keywords

Conditional Cash Transfer programme, learning outcomes, triple difference, synthetic control, educational amenities

JEL Codes

I21, I25, I28, O12

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1. Introduction

Conditional Cash Transfer (CCT) programmes are among the most widely adopted educational interventions for keeping adolescent girls in school. Evaluation exercises show that over 64 countries have adopted some form of CCT scheme in education, covering more than 380 million beneficiaries (Honorati et al, 2015). In their canonical form, CCT programmes involve a cash subsidy that is conditional on the school enrolment and continuation of education of eligible girl children. In the process, by increasing exposure to the schooling routine, they are expected to bring about improvements in learning abilities. However, the performance metric of CCT programmes is often highlighted in terms of enrolment, and the programmes' impact on learning abilities receives relatively less public attention.

An increase in female enrolment in school is a verifiable target and manifests in terms of delaying the age of marriage as well as helping girls avoid low paying informal jobs. In fact, CCT schemes for adolescent females have found wide acceptance, particularly in areas of Sub-Saharan Africa and South Asia, for instance in India and Bangladesh, where the practice of child marriage is pervasive. The extent of improvement in learning outcomes attributable to CCT, however, needs careful measurement and has a long-term impact on women's living standards. Evidence shows that higher learning outcomes for females, especially at the secondary level, lead to better job prospects, potentially higher life-time income and improved quality of life via enhanced bargaining power (Hanmer & Klugman, 2016; Wodon et al, 2018). Thus, even if female schooling increases as a result of CCT schemes, public agencies need to ensure concomitant increases in learning outcomes. In their absence, there will be a need for supportive policies in education to ensure effective realisation of improved educational attainment. For instance, Giordaano and Pugatch (2017) found that subsidising non-tuition costs reinforced the positive effect on female enrolment when implemented alongside another government programme that eliminated tuition fees for girls in The Gambia. Evaluation of cash transfer schemes thus underscores the need for more informed allocation of public finances, particularly in developing countries, where these programmes are more often implemented. Our aim in this paper is to investigate the extent to which CCT programmes succeed in realising multiple educational goals in a developing country setting, and the need for complementary investment where the objectives are not met adequately.

We analyse one of the most celebrated CCT programmes, the Kanyashree Prakalpa (KP), implemented for adolescent girls in West Bengal (WB) – a state in eastern India – in 2013, and assess its role in improving educational indicators, including schooling, and reading and mathematical abilities. To incentivise female schooling, KP includes an annual cash transfer to meet schooling expenses of Rs. 1000 (about US$13) and a lump-sum of Rs. 25,000 after the girls reach 18 years of age, provided they are unmarried and pursuing general or vocational courses.[1] The focus on KP's educational outcome is

[1] For more information on the programme, see https://wbkanyashree.gov.in/kp_4.0/index.php, accessed 14 July 2020.

important for three reasons: first, the state of WB, where it was initiated, performs poorly in terms of most gender development indicators. For instance, only 20% of the eligible women in WB complete secondary schooling; this is much lower than in most states in the country. Second, the state has the highest incidence of child marriage and one of the lowest female workforce participation rates in India (25%).[2] Thus, the extent to which the scheme has been effective in improving female education needs careful investigation to justify the massive budget allocation of more than Rs. 56 billion (roughly $0.8 billion) for KP.[3] Third, secondary education in WB is characterised by a shortage of learning facilities both in terms of the quality of teachers and of physical infrastructure like laboratories and classrooms, something we highlight in the latter part of the paper. The extent to which KP's impact on educational attainment is conditioned by the state of learning facilities would, thus, be a pertinent area to explore. In view of the rural-urban disparity, we restrict our attention to educational outcomes for rural adolescent girls and boys.

The effect of CCTs on enrolment is straightforward. The literature has argued that households often underinvest in the human capital of their children, and do so disproportionately more severely for girls; a redistributive policy like CCT might correct this. Parents may make suboptimal decisions regarding their children's education if they have incomplete information regarding the returns from education, particularly for a female child (Fiszbein & Schady, 2009). The 'cash' part of a CCT introduces an income effect that overcomes the credit constraint, while the conditionality brings in a substitution effect by lowering the opportunity cost of schooling (Fiszbein & Schady, 2009; Rubio-Codina, 2010; Baird et al, 2013). By reducing the shadow wage in off-school activities, CCT programmes encourage school enrolment for girls who might otherwise be engaged in household chores or informal jobs. This has been well documented in various studies (Garcia & Saavedra, 2017; Parker & Todd, 2017).

However, whether increased schooling through enrolment translates into better learning may not be easy to answer. It is expected that attending school and taking classes translate into augmented literacy skills; additionally, the gain in disposable income from CCT is likely to induce families to invest in school supplies like learning materials (Baez & Camacho, 2011). From the beneficiary's side, compliance with programme conditionality reinforces the CCT income effect by lowering the marginal cost of a household's production of human capital (Garcia & Saavedra, 2017). On the other hand, in many developing countries, the paucity of nearby secondary schools might reduce the incentive content of CCTs (Lloyd et al, 2005; Zhao & Glewwe, 2010; Momo et al, 2019). In one such instance, Muralidharan and Prakash (2017) found that a Conditional Kind Transfer (CKT) in the form of a bicycle transfer in the state of Bihar proved more cost-effective in increasing enrolment and pass-out rates than CCT programmes. This would

[2] See http://documents.worldbank.org/curated/en/389611504251389371/West-Bengal-Gender, accessed 29 July 2020.

[3] To put things in perspective, the allocation for Beti Bachao-Beti Padao, a central scheme implemented across India is Rs6 billion ($0.085 billion). For more information on the programme, see https://wcd.nic.in/bbbp-schemes, accessed 28 July 2020.

also imply that CCT stipends disproportionately benefit those living in close proximity to schools with transport facilities enabling attendance (Odell, 2017). Further, the poor state of education inputs, like insufficient classroom space and teacher absenteeism often impedes educational attainment in developing countries (Chaudhury et al, 2006; Hanushek et al, 2008). In consonance with these facts, studies on the impact of CCT programmes, while largely unequivocal about the positive effects on enrolment, have reported mixed findings regarding educational attainment and learning outcomes (Behrman et al, 2005, 2009; Ponce & Bedi, 2010; Glewwe & Kassouf, 2012; Murnane & Ganimian, 2014).

So far, the extent to which the benefits of CCTs are outweighed by supply side bottlenecks remains debatable– particularly for cash-strapped policy makers in developing countries. Our study adds to this strand of literature by identifying the contribution of KP towards female schooling outcomes. It should be noted that, within half a decade of its initiation, KP was projected to have conferred educational benefits to six million eligible girls in the state. In keeping with its massive outreach, KP has received widespread attention, as well as national and international accolades.[4] Anecdotal evidence also suggests that it has been a game-changer in the field of female education and initiated social mobility for girls in terms of better employment prospects. However, to the best of our knowledge, these potential programme benefits are not backed up by rigorous assessment in terms of changes in enrolment and associated learning outcomes in the post-KP period.[5]

In this paper, we used district representative data from India's Annual Status of Education Report (ASER) from 2009 to 2018 and employed double and triple difference methods, along with synthetic control methods, to identify the programme's impact on female enrolment. To estimate KP's effect on learning outcomes, we used data from the survey recording proficiency in vernacular reading and basic mathematical skills. We first compared female enrolment in the age cohort 13 to 16 years pre- and post-KP with that of females in the same cohort from a group of control states which had not been exposed to KP. The potential problem of using treatment and control groups from WB and other states, respectively, is that additional factors associated with a particular state's policy might have a greater effect on female education in that state. Accordingly, double difference estimation may over- or underestimate the effect of the programme. To test

[4] The scheme won the United Nation Public Service Award in 2017 out of 552 social sector schemes across 62 countries. See https://www.thehindubusinessline.com/news/national/bengal-govts-kanyashree-scheme-bags-un-award/article9736259.ece, accessed 29 July 2020. It also received the National E-governance Award 2014–15, conferred by the Department of Administrative Reforms and Public Grievances, Government of India, and was cited as a best practice model for women's empowerment in a number of national and international workshops and summits. See https://www.wbkanyashree.gov.in/kp_4.0/awards.php, accessed 29 July 2020.

[5] Sen and Dutta (2018) is the only other study we have found that assessed the impact of KP but did not use data across different time period or counterfactuals for comparison.

this, we looked at the pre-program outcomes (to test parallel trends) for females in WB and the set of control states, where we rejected the parallel trend assumptions for enrolment but were unable to reject the same for learning outcomes. Therefore triple difference regression was employed to estimate the impact on enrolment but double difference regression was used to estimate the impact on learning abilities. It must be noted that triple difference regressions estimate the time change in averages for female school goers in the treatment state (WB) with that for boys and then net out a similar change in means for the girls with respect to the boys in the control states. It is expected that this estimation will control for two potentially confounding factors: changes in enrolment for the girls across states and changes in enrolment for both boys and girls of the same age cohort residing in WB caused by state systematic factors other than the KP.

However, the choice of comparison state on the basis of geographic, cultural or socioeconomic proximity may be problematic if regions are substantially different, say, in terms of political environment or any other dimensions. To circumvent this problem, we employed a synthetic control methodology which creates a synthetic control state that looks similar to WB in terms of the weighted average of the outcome variables before the implementation of KP. One can then argue that any difference in the outcome variable between WB and the synthetic control state post-KP is attributable to the programme and not to other confounding factors.

Our findings suggest that, after controlling for household wealth and other amenities, as well as village-level infrastructure, KP has been able to increase female enrolment significantly over the programme period. Nevertheless, we found significant and negative impacts of the programme in terms of learning outcomes. The findings of our paper add to the existing pool of literature that has often reported a limited influence of CCTs on learning outcomes, eg. in terms of test scores (Baez & Camacho, 2011; Filmer & Schady, 2014).[6] We argue that CCT may even be counter-productive for learning outcomes if enrolment is not followed by concomitant improvements in school infrastructure. We expect this to have important policy implications regarding the need for public investments in complementary inputs towards realising fuller CCT benefits. In other words, without sufficient advances in school infrastructure and inputs, KP might succeed in increasing school enrolment and delaying a girl's marriage, but would probably not be effective when it comes towards increasing female empowerment.

The rest of the paper is organised in the following schema: section 2 provides details about the programme and in section 3 we discuss the data, variables and estimation strategy. In Section 4, the estimations from the regressions are presented, along with the set of robustness checks. Section 5 discusses some heterogeneous effects observed and section 6 presents some further analysis, including of the cost-effectiveness of the programme. Section 7 offers concluding observations.

[6] For a detailed review on CCT and learning outcomes, see Murnane and Ganimian (2014).

2 Kanyashree Prakalpa: programme description

KP had a universal roll-out in WB in October 2013. The programme targets school-going adolescent girls aged 13-18 and has two components: the first (K1) is a recurrent annual cash transfer fixed at Rs. 1000. The conditional part of the scheme involves a lump-sum payment of Rs. 25,000 at the age of 18 (K2), only given to unmarried girls pursuing general education or vocational courses. All the cash is transferred directly to the bank account opened in the name of the enrolled student.

The design basis of the scheme is single-service window, with school authorities responsible for assisting and regulating programme enrolment.[7] It follows, then, that self-selection issues would be likely to be insignificant. Exploration of the sanction records of K1 and K2 from KP's management information system reveals that, over time, numbers claiming the stipend have shown a steadily increasing trend. These positive effects are also supported by Rapid Assessment Reports, although none of these gives an estimate of the programme's effects, ie the influence, if any, of KP on learning outcomes as a result of increased enrolment.[8] Our work estimates this effect along with that on enrolment using representative household-level data, controlling for institutional and village-level characteristics that might affect the delivery efficacy of the scheme.

3 Data, estimation strategy and variables

3.1 Data and variables

To assess the impact of KP on enrolment, we made use of pooled household data from the ASER, which is a district-representative independent household survey conducted to document the status of education among children in rural India. The goal of the survey is to assess the schooling status as well as the basic levels of learning among such children. Each year's survey is conducted from September to November and covers a random sample of 20 to 30 households from about 20 to 30 villages in each of 550 out of 720 rural districts in India. This totals to around 300,000 sampled households. For our analysis, we considered data from 2009 to 2018.[9] In each of the surveyed households, all children in the age group 3 to 16 were surveyed and learning outcomes of children in the age group 5 to 16 were tested, alongside collection of information on their school

[7] Application forms for KP were made available to the school and the authorities assisted students in completing these as well as connecting them to a nearby bank where they can open an account.
[8] These rapid assessments can be retrieved from https://wbkanyashree.gov.in/kp_4.0/index.php, accessed 29 July 2020.
[9] The survey used to be annual but is now biannual and has been conducted in 2009, 2010, 2011, 2012, 2013, 2014, 2016 and 2018.

enrolment, among other things.[10] In our study, we code school enrolment as a binary variable that takes the value of 1 if the child is enrolled in school and 0 otherwise.

The survey also gathered information on basic arithmetic and reading proficiency levels using well tested rigorous tools.[11] These tools are administered for all children across the districts and states and have been used extensively by other studies (Chakraborty & Jayaraman, 2018; Lahoti & Sahoo, 2020). Assessment of reading skills has four ordinal levels: recognition of letters, reading of words, reading a short paragraph (a grade 1 level text), and reading a short story (a grade 2 level text). Arithmetic skill assessment comprises four levels: recognition of single-digit numbers, recognition of double-digit numbers, subtraction of two-digit numbers with a carry over, and division of a three-digit number by one digit. In our analysis, reading and mathematical ability are coded as dichotomous variables: a child's ability to read a story and ability to do division, respectively. In other words, reading ability is taken as 1 if the child is able to read a story and 0 otherwise, and arithmetic ability is taken as 1 if s/he is able to do a 3-by-1 division successfully and 0 otherwise.

There are two important issues to note here. First, we did not use class detention rates or promotion rates as a measure of learning abilities because the standards for promotion depend on the standard of tests conducted at the school level. Therefore it is possible that schools with well performing students conduct grade promotion tests which are of a higher standard in comparison to other schools with supposedly low achievers. Because these school tests differ enormously across schools, they cannot be treated as standardised; therefore we used data from the learning skill tests conducted by ASER, which are the same across the whole of India. This has been pointed out in the literature pertaining to educational research (Anaya, 1999). Second, since the KP targets adolescent female children during their secondary education, we consider the highest order learning for reading and mathematics (ability to read a short story and solve a 3-by-1 division problem) because these skills are expected to be acquired at primary level by grade 4. In other words, an adolescent child of 13 years or more should already have developed these. Nevertheless, in section 6.2 below, we examine the impact on lower-order reading and mathematics skills as well.

Apart from the variables on learning, the survey also collects child-, household- and village-level information that can be used as independent variables in the regressions and are possible confounders of enrolment and learning outcomes. Household economic characteristics were controlled through a number of indicators: whether the house was cemented or not; whether it had electricity; possession of a toilet; possession of a mobile phone; and total members within the household. Child-level characteristics include the child's age. Village-level factors controlled for include whether the village has a private school, a private health clinic, a bank or a cemented road. Controlling for these

[10] More information on ASER can be obtained from http://www.asercentre.org/.

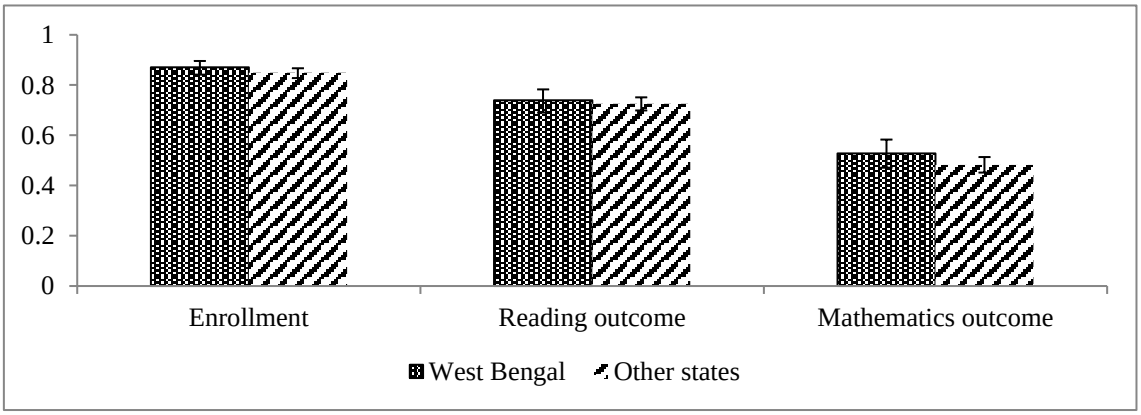
[11] These tools can be accessed at http://www.asercentre.org/p/141.html.

characteristics enabled us to get an unbiased estimate of the impact of KP. Robust standard errors clustered at the district level were used for estimation.

3.2 Estimation strategy

The timeline of the survey allowed us to look at the conditions before and after the implementation of the KP and compare the same with a set of other neighbouring states as well. For this purpose, we took Assam, Orissa and Tripura as the comparison group with WB, since they share substantial similarities in terms of social, cultural and economic conditions. While Assam and Orissa share a border with WB, Tripura has over 65% Bengali-speaking inhabitants, according to the 2011 census. The social connections between Assam, Orissa and Bengal arise from their adherence to epics and *puranas*, their linguistic proximity to Sanskrit and their adoption of familial norms based on tradition and religious sanction (Gupta, 2009). As is well known, the decision to educate a girl child in India, especially in rural areas, is heavily influenced by such socio-cultural norms and practices. Further, it must be noted that the average outcomes in terms of female enrolment, and reading and mathematics skills in WB before the implementation of KP (2008 to 2013) and in the other states were very close (Figure 1). We left out of the control Bihar, Jharkhand and Sikkim, WB's other neighbouring states. However, as a robustness exercise, we examined the main results adding these states separately in our main specification, but the qualitative results did not show a change. Further, because of this supposedly arbitrary choice of control states, we applied a synthetic control estimation (section 4.2.1) and also compared only those districts of WB that share boundaries with other states with the neighbouring districts of these states (section 4.2.4). Again, qualitatively, our results remain robust.

Figure 1: Pre KP comparison of enrolment rates and learning outcomes in WB and other control states



Note: Other states include Assam, Orissa and Tripura. ASER data from 2009 to 2013 were used to calculate the pre-KP proportions. Reading outcome indicates ability to read a second standard story and mathematics outcome indicates the ability to solve a 3-by-1 division.

To begin, we considered girls aged 13 to 16 years in WB as the treated group and girls of a similar age from the other states as the control group, who would not be exposed to the KP. Likewise, we made use of the Difference-in-Difference (DID) regression

methodology first to get the Intent-to-Treat (ITT) estimate of the programme in increasing female enrolment among 13-to-16 year-olds and then estimated the impact on learning outcomes as well.[12] Here, the main challenge of identification arose from the universal implementation of the programme across WB, where female enrolment was already increasing monotonically in the pre-KP period.[13] The DID estimate can tease out the secular systematic difference in enrolment rates in the treated state over and above the increasing trend potentially resulting from KP. Accordingly, we estimated the following baseline model:

$$(1) \quad Y_{ist} = \beta_0 + \beta_1.WestBengal + \beta_2.post + \beta_3.(WestBengal * post) + \beta_4.C_i + \delta_s + \lambda_t + \varepsilon_{ist}$$

Here Y_{ist} is the outcome variable (enrolment and learning outcomes in reading and mathematics – explained later) for individual, *i* from district, *s* and time, *t*. The $post$ dummy takes the value of 1 if the year is 2014, 2016 or 2018 and 0 if the year is before 2014. β_3 is the causal ITT estimate of the impact of KP on the outcome variables. The confounding individual, household and village characteristics which may affect the outcome variables are controlled by C_i. We also controlled for state and year fixed effects (δ_s and λ_t respectively) to control for the secular state and year-level changes that might affect the outcome variables.

For learning outcomes, to our advantage, the estimation sample from ASER included the performance record for both enrolled school dropouts and those who were never enrolled in schools. Additionally, the test scores are not school-based but were elicited independently at the individual level. The nature of the sample precludes the bias that might arise from comparing only enrolled females in WB with enrolled girls of similar age in the other states. In fact, the learning outcomes estimates would have a downward bias if enrolled females in the post-KP period were dominated by a pool of less able girls, who would not otherwise be enrolled in schools in the absence of KP. Further, if mean school quality is low, this might attract lower ability students. By comparing the test scores across enrolled and non-enrolled girls we avoided such selection into test taking (Filmer & Schady, 2008; Blimpo et al, 2019).

However, it is also possible that the trends for the girls in WB after KP implementation might not be parallel to those for girls from the control states without the programme. In other words, the parallel trend assumption might not hold. One among many reasons why this may happen is the possible changing labour market conditions within WB, which may systematically affect educational outcomes for its girls in comparison to those for girls in other states. The difference in economic growth in these states during this period

[12] One limitation of the paper is that we were unable to gauge the impact for female children in the adolescent and target age group of 13 to 18 years. Rather, we had to limit our analysis to children in the age group 13 to 16 years because of a paucity of data.

[13] The female-to-male enrolment ratio in West Bengal was 1.11 in the year before KP and continued to increase reaching 1.21 in 2016–17. This was higher than the national average, which was less than 1 in 2012–13 and stood at 1.05 in 2016–17.

might be one among several predictors of changing labour market opportunities for females.

Accordingly, we tested the parallel trend assumption; we took data from 2008 to 2013 and ran the following regression:

$$Y_{ist} = \beta_0 + \beta t_1.WestBengal + \beta_2.TimeTrend + \beta_3.(WestBengal * TimeTrend) + \beta_4.C_i + \delta_s + \lambda_t + \varepsilon_{ist}$$

(2)

Essentially, the symbols remain the same as that in equation 1. The $TimeTrend$ variable is coded as 0 to 4 for the years 2010 to 2013, respectively. A statistically insignificant β_3 would indicate that, pre-programme, the trend for girls in WB was not different in comparison to other states, which would imply that the parallel trend assumption might hold, especially when state and year fixed effects are controlled for, along with their interaction.

For the regression to estimate enrolment, the null hypothesis of parallel trends at a 5% level of significance was rejected. However, for the regressions to estimate learning outcomes, we were not able to reject the null hypothesis of parallel trends. Therefore we used triple difference (DDD) regression to estimate KP's impact by comparing the DID estimates from WB with those from the other states. Here, we considered girls of age group 13 to 16 years as the treated group and boys of the same age as the control group. As shown in Jayachandran and Lleras-Muney (2009) and Muralidharan and Prakash (2017), boys can serve as a useful control group for the KP because they would have been exposed to all the other interventions taking place in WB after its implementation, except the cash transfers. These interventions may have produced gains in schooling potentially because of increasing household incomes, increased public investment in education and other educational awareness programmes.

We tested for parallel trends in the triple difference regression in the period 2008 to 2013. Our findings indicate that we are unable to reject the null hypothesis of parallel trends in terms of enrolment, with the coefficient on the triple interaction term found not to be significantly statistically different from zero. However, the parallel trend assumption is rejected for learning outcomes, implying that the gap between male and female children in WB changed in the pre-intervention period in comparison to that for the neighbouring states and hence potentially might not have been similar in the post-KP period in the absence of the programme.

The other issue we may face is that of boys being taken as a pure control group. It is possible that, because of the programme, there has been a secular impact on male children with respect to their enrolment and learning outcomes. As a result of increased income because of the transfer for girls, an income effect might have led to the substitution of labour for schooling among boys. It could also be that, because of the increased cost of schooling for females, which might supersede the yearly amount given to them under the programme, boys, who otherwise would have attended schools in the

absence of the programme, might again substitute their schooling for paid work (Khandker et al, 2013). In addition, the learning outcomes for the boys also might have been affected by the potentially higher enrolment of girls as a result of the programme, especially if these gains were not adequately complemented by improvements in infrastructure. For example, if there is an increase in the pupil–teacher ratio (PTR) because of a higher enrolment of girls, this may adversely affect the learning outcomes for male children at school.

We tested these possibilities through a DID regression, taking boys from WB as the treated group and those from the control states as the control group. The regression equation is similar to that in equation 2 except for the fact that, instead of for the female children, we run the regressions only for the male children. The findings from the DID regression indicate that there has been no change in the enrolment of boys as a result of the KP, and thus that KP may have a minimal average effect on boys in terms of enrolment. This is plausible, perhaps because of the meagre transfer amount even in real terms, which is lower than $1.2 a month. Because of this, the income and substitution effects may actually not be sufficient to change the behaviour of boys in terms of enrolment. Despite this, we observed deterioration in the levels of learning for the boys in WB after the implementation of KP.

To sum up, we reject the parallel trend assumption for enrolment of females from WB when compared to those from the control states in the pre-intervention period. However, the parallel trend assumption cannot be rejected for the DDD regression when boys in the same age group are taken as an additional comparison group to control for potential state-specific interventions apart from KP to enhance enrolment. Further, because the enrolment trend for boys did not change significantly after the implementation of KP, we used DDD regression to estimate the effect of the KP on enrolment. However, since we are unable to reject the parallel trend assumption for learning outcomes, DID regression (equation 1) is our preferred methodology for estimating the impact on learning outcomes. An additional justification for using DID instead of DDD regression here is our inability to use boys as a control group because of the possible lower learning outcomes resulting from potentially higher female school enrolment induced by the KP. Available data from District Information System for Education (DISE) 2015–16 also indicate that three-quarters of the schools in WB are co-educational. Thus, any increase in female enrolment as a result of the programme is likely to exert an influence on the average learning outcomes.

The triple difference regression to estimate the impact on enrolment is given as follows:

(3)

$$Y_{ist} = \beta_0 + \beta_1.Female + \beta_2.post + \beta_4.WestBengal + \beta_5.(Female * post) + \beta_6.(WestBengal * post) + \beta_7.(Female * post) + \beta_8.(WestBengal * Female * post) + \beta_9.C_i + \delta_s + \lambda_t + \varepsilon_{ist}$$

Here, $Female$ is the dummy to indicate whether the child is a female or not. The unbiased causal estimate of the impact would be given by β_8.

4 Results

4.1 Findings from the main regressions

Before moving on to the regressions, we look at the two broad indicators of schooling: enrolment and learning outcomes through reading and mathematics scores for all the sampled female children in the age cohort 13 to 16 years before and after the implementation of KP for WB and the three control states. We found there was a seven percentage points increase in enrolment in WB compared to five percentage points in the control states, indicating a potential positive impact of the programme. However, we found a close to 1.5% and over 5% decrease in reading and mathematics scores, respectively, in WB compared to the scores in the control states.

The results from the DID regression as indicated in equation 1 are shown in Table 1. We used three specifications: the first with only the interaction variables along with the individual variables (WB and post-KP dummies), the second including the child- and household-level characteristics as controls and the third including the village-level characteristics. The third specification, with all the control variables, is our final preferred specification. The findings indicate a significant and positive impact of KP on enrolment for females (at 1% level) with an increase of about 3.4 percentage points in the probability of a girl being enrolled. However, in terms of learning outcomes, we observed a significant deterioration among the female children. Indeed, the probability of a female child being able to read a story and perform a division sum was actually reduced by close to 3.4 and 6 percentage points, respectively.

Even though both language proficiency and mathematical skills registered a decline in the post-KP period, it must be noted that the deterioration has been much steeper in the case of the latter. A couple of factors might have contributed towards this differential decline in learning skills. When KP began, secondary education in WB was characterised by an acute shortage of science teaching facilities. Evidence shows that, while only 7% of applicants for teaching posts indicated science as their preferred subject, in practice almost 30% of teachers were teaching science subjects.[14] Clearly, this indicates the involvement of non-specialised teachers in teaching practice at the secondary level. With respect to physical infrastructure, the DISE 2015–16 report shows that, in terms of integrated science laboratories, WB was way below the national average – the percentage of government schools in rural areas with an integrated science laboratory

[14] This can be found in a Unicef report at http://14.139.60.153/bitstream/123456789/11441/1/Secondary%20Education%20in%20West%20Bengal.pdf.

was just over 23% in 2015–16 and 2016–17, while that for all-India was 30% and 32%, respectively.[15]

Table 1: Double difference estimates of the impact of KP

	Enrolled in school			Ability to read a story			Ability to solve a 3-by-1 division		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
WB*Post-KP dummy	0.037***	0.036***	0.034***	-0.017	-0.032**	-0.034**	-0.052**	-0.061***	-0.059***
	(0.010)	(0.009)	(0.009)	(0.018)	(0.016)	(0.016)	(0.022)	(0.022)	(0.020)
Post-KP dummy	0.120***	0.052***	0.049***	-0.032*	-0.158***	-0.162***	0.065***	0.066***	-0.376***
	(0.010)	(0.010)	(0.010)	(0.017)	(0.018)	(0.018)	(0.020)	(0.019)	(0.021)
WB	0.002	-0.002	-0.004	0.049*	0.032	0.027	0.099***	0.081***	0.078***
	(0.015)	(0.013)	(0.013)	(0.028)	(0.021)	(0.022)	(0.029)	(0.023)	(0.024)
Household and child level controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Village controls	No	No	Yes	No	No	Yes	No	No	Yes
State fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Year fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	68,738	65,379	65,379	58,112	55,319	55,319	57,940	55,159	55,159
Pseudo R-squared	0.026	0.117	0.119	0.005	0.110	0.110	0.05	0.117	0.117

*Notes: Marginal effects from probit regression are presented with clustered standard errors at the district level given in parenthesis. ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level.*
Source: ASER 2009–18; authors' own calculations.

As indicated earlier, we tested this parallel trend assumption through DID regressions using equation 2 for the period before 2014, when KP was implemented, and found the assumption did not hold for enrolment. Therefore we used DDD regression as given in equation 3. We tested for the parallel trends in the DDD regression, where we found that the trends for boys and girls were similar and did not systematically change in WB when compared with the control states. We also used a DID regression only for male children and used WB as the treatment state, with the three other states as the control group. The findings indicate that boys as a control group cannot be used in the regressions for learning outcomes but can effectively be used to gauge the impact on enrolment through a DDD regression model.[16]

Accordingly, we employed the double difference regression as our preferred estimation strategy to assess the impact on learning outcomes. However, the DDD regression

[15] More details on this are presented in section 6.1.
[16] Estimation results for testing the parallel trends can be obtained from the authors on request.

estimation strategy is the preferred one for assessing the impact on enrolment. Table 2 shows the results from the main DDD regression outlined in equation 3. As observed earlier, we found a significant increase of some 4.7 percentage points in the probability of a female in the age cohort 13 to 16 years being enrolled in schools because of KP. Of note is the fact that we present average treatment effects along the intensive and extensive margins and this encompasses the adjustments made by the schools or households in response (Blimpo et al, 2019).

Table 2: Triple difference (DDD) estimate of the impact on female enrolment

	(1)	(2)	(3)
WB*Female*Post-KP dummy	0.044***	0.047***	0.047***
	(0.010)	(0.010)	(0.010)
WB* Post-KP dummy	-0.004	-0.007	-0.009
	(0.009)	(0.009)	(0.009)
WB*Female	0.037***	0.036***	0.036***
	(0.012)	(0.013)	(0.013)
Female* Post-KP dummy	0.004	0.007	0.007
	(0.005)	(0.005)	(0.005)
Post-KP dummy	0.071***	0.028***	0.027***
	(0.007)	(0.006)	(0.006)
Female	0.016**	0.013**	0.013**
	(0.007)	(0.006)	(0.006)
WB	-0.122***	-0.102***	-0.096***
	(0.027)	(0.022)	(0.022)
Household and child level controls	No	Yes	Yes
Village controls	No	No	Yes
State fixed effects	No	Yes	Yes
Year fixed effects	No	Yes	Yes
Observations	139,568	132,130	132,130
Pseudo R-squared	0.020	0.107	0.108

Notes: Marginal effects from probit regression are presented with clustered standard errors at the district level given in parenthesis. ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level.
Source: ASER 2009–18; authors' own calculations.

4.2 Robustness checks

Synthetic controls

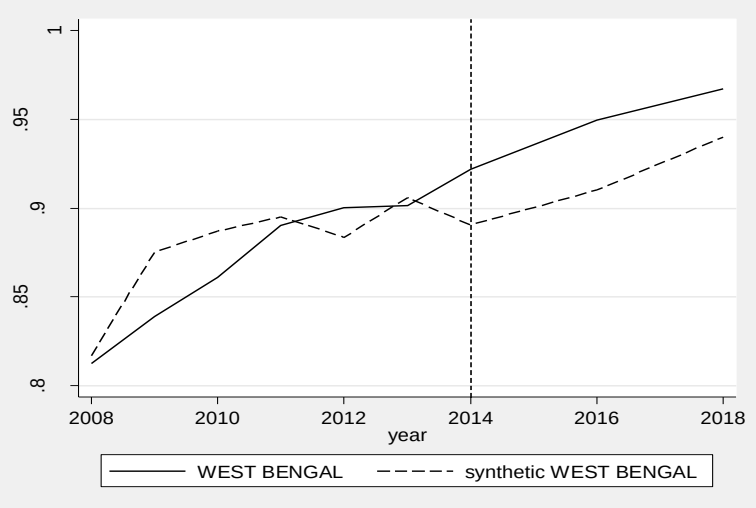
One limitation of our analysis is that the control states, which were chosen because of their cultural and socioeconomic similarities, may nevertheless not be suitable and it could thus be argued that this choice was arbitrary and ad hoc. To be sure that our estimates are unbiased and avoid arbitrary choice of control states, we made use of a synthetic control method (SCM) that has been used in extant literature to measure impact (Abadie & Gardeazabal, 2003; Abadie et al, 2010; Peri & Yesenov, 2019). These papers argue that SCM is methodologically superior to the classic DID because it takes a linear combination of states that is found to form a better control group for WB than a single

state. More specifically, we created a synthetic optimal control group, which minimised the pre-KP difference with WB for a given set of relevant characteristics that determine educational outcomes. The synthetic state here reduces the ad hoc nature of the choice of the control states, which were otherwise chosen without applying the SCM methodology. For this, we made use of the ASER database from 2008 to 2018. We calculated the state-level annual estimates of dropout rates, enrolment and learning outcomes among females in the age cohort 13 to 16 years.

The SCM produces a figure with two time series plots, one for the treated unit (WB in our case) and one which represents the synthetic control. In our context we used synthetic control methods to assess the impact on the enrolment rate among females in the age cohort 13 to 16 years because of KP. The predictors of the enrolment and learning outcomes for the synthetic control were the state-wide proportion of mothers who had gone to school at some point in time and the proportion of households which were fully cemented, along with the proportion of households with television and electricity. The outcome variables for 2008, 2011 and 2013 were also used as predictors. We found the trend of female enrolment (in 13-to-16 year-olds) for the synthetic control to be similar to that for WB (Figure 1) in the pre-intervention period. Post-2013, we observed a difference between the synthetic control state and WB. This difference was close to four percentage points in 2016 and 2018 and can be seen as the impact of KP (Figure 2).

We also examined the effect on learning outcomes by using the SCM. We used the same set of predictors to generate a similar figure for reading and mathematical ability outcomes as defined earlier. Figures 3(a) and 3(b) present the trends in the proportion of females in the age cohort 13 to 16 years who can read a simple story and those who can perform a simple division, respectively. As can be seen, there is a substantial decline in learning outcomes (both reading and mathematics ability) following the implementation of KP in WB in comparison with the synthetic state.

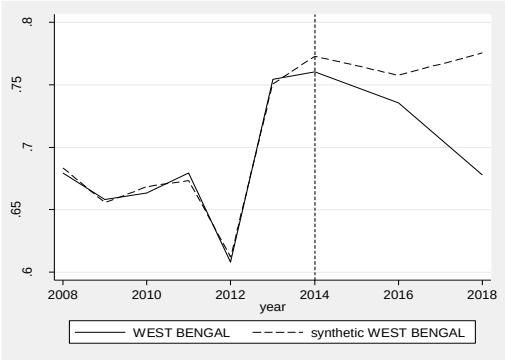
Figure 2: Female enrolment rate for WB and the synthetic state



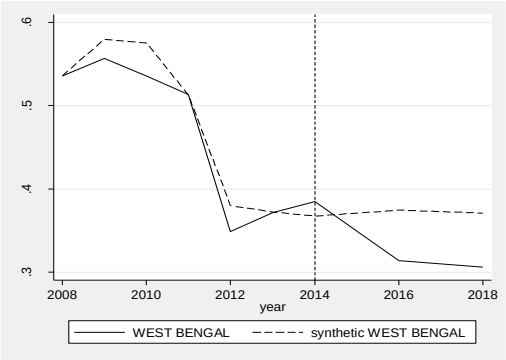
Note: The synthetic control method was used to generate these figures. Data from 2008 to 2018 were used.

Figure 3: Learning outcomes for WB and the synthetic control

(a) Reading scores



(b) Mathematics scores



Note: The synthetic control method was used to generate these figures. Data from 2008 to 2018 were used.

Placebo test

In this section, we present DDD and DID estimates of the impact on enrolment and learning outcomes, respectively, through two placebo tests. More specifically, in two set of regressions, we specify placebo groups, which were potentially not exposed to the KP programme. In the first set of regressions, we used data from before KP implementation (from 2010 to 2013) and assigned 2011 as the pseudo-year of KP implementation. In the second set of regressions, we assigned 2012 as the pseudo-year of KP implementation and then examined the impact of this placebo treatment. We expected null results: since females were not exposed to KP in 2011 or 2012, the impact on enrolment and learning outcomes should be indistinguishable from zero even at the 10% level of significance. This was confirmed by the results, which indicate that the impact estimate is statistically insignificant.

District-level estimates

The ASER data allowed us to create a district-level panel by averaging all the household-level variables for enrolment and learning scores at the level of the districts. Accordingly, in an alternate specification, we estimated the following panel regression:

$$Y_{dst} = \beta_0 + \beta_1.post + \beta_2.WestBengal + \beta_3.(WestBengal * post) + \beta_4.C_{dst} + \delta_s + \lambda_t + \varepsilon_{dst}$$

Here Y_{dst} denotes the household-level enrolment and learning outcomes for girls in the age group 13 to 16 years aggregated at the district level for time *t* and the explanatory variables have their usual meanings. Following DID regression, β_3 gives the district-level estimate of the average impact of KP, controlling for district-level characteristics and idiosyncratic state-level and year-level shocks. The qualitative directions of the marginal effects on enrolment as well as the learning outcomes remain similar.

Neighbouring districts and enrolled children in grade 8 or above

Further, as an additional robustness check, we estimated the impact of the programme by taking all the districts in WB that border other states or countries and comparing them with those adjacent to these districts in the neighbouring states of Assam, Bihar, Orissa, Jharkhand and Sikkim.[17] As in the earlier cases, we used DDD regression to estimate the impact on enrolment and DID regression to estimate it in terms of learning outcomes. The results from the regressions were qualitatively similar. While a significant positive effect on enrolment was observed, the programme was found to negatively affect reading and mathematics outcomes, implying that our findings are robust. Since the KP was specially designed to provide cash transfers to adolescent girls enrolled in secondary grades, we further examined the effect on learning outcomes for this group. The findings indicate qualitatively similar results, whereby learning abilities were found to deteriorate.[18]

5. Heterogeneous effects

5.1 On households of different income class

Implementation of KP may have a heterogeneous bearing across girls in different socioeconomic groups. Since cash transfer is an integral part of the KP, it is possible that the effects are disproportionately higher for females from poorer households. If this is the case, then KP can be said to have compensated for the cost of going to school, especially among girls from financially constrained households. Indeed, the extant literature has demonstrated that the effect of CCTs might be more pronounced for students from poor families (Galiani & McEwan, 2013).

To categorise the households in terms of economic conditions, we made use of a wealth score created through a Principal Component Analysis of possession of five durable assets: television, mobile phone, computer, toilet and cemented house.[19] The households were then divided into three mutually exclusive, exhaustive and equally divided quantiles based on their calculated wealth scores: low asset score, middle asset score and high asset score, with the first group being the poorest and the last one being the richest. Separate DDD and DID regressions for estimation of the impact on enrolment and learning outcomes were run and the results are presented in Table 3. The findings indicate a significantly positive effect on enrolment and associated deterioration in

[17] The districts were Barddhaman, Birbhum, Darjeeling, Jalpaiguri, Cooch Behar, Maldah, Purba Medinipur, Paschim Medinipur, Purulia and Uttar Dinajpur in West Bengal, Kishanganj, Purnia and Katihar in Bihar, Sahibganj, Pakaur, Dumka, Jamtara, Dhanbad, Bokaro, Ramgarh, Ranchi, Saraikella and Purbi Singhum in Jharkhand, Mayurbhanj, Baleshwar in Orissa, Kokrajhar and Dhubri in Assam and South Sikkim, East Sikkim and West Sikkim in Sikkim.

[18] Results from all the regressions for heterogeneous effects can be obtained from the authors on request.

[19] The command *pca* in STATA 14 was used to get the wealth scores. For details see https://www.stata.com/manuals13/mvpca.pdf.

learning abilities across all the economic classes, which seems to suggest that the effects of KP have been uniform.

Table 3: Heterogeneous impact on different income class

	Low asset score			Middle asset score			High asset score		
	Enrolled in school	Ability to read story	Ability to do division	Enrolled in school	Ability to read story	Ability to do division	Enrolled in school	Ability to read story	Ability to do division
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
WB*Female*Post-KP	0.052* (0.030)			0.034*** (0.012)			0.029** (0.014)		
WB*Post-KP	Yes	-0.040** (0.020)	-0.065** (0.032)	Yes	-0.046* (0.024)	-0.062*** (0.024)	Yes	-0.039* (0.021)	-0.072*** (0.022)
	Yes			Yes			Yes		
Double interaction	Yes			Yes			Yes		
Linear terms	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	44,656	17,853	17,772	46,884	19,853	19,812	38,964	16,892	16,857
Pseudo R-squared	0.0567	0.110	0.132	0.071	0.072	0.091	0.067	0.053	0.084

Notes: Marginal effects from probit regression are presented with clustered standard errors at the district level given in parenthesis. ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level.
Source: ASER 2009–18; authors' own calculations.

5.2 For girls from villages without a government secondary school

Is there a differential impact of the programme for girls residing in villages without a government secondary school? The literature has indicated that enrolment gains as a result of CCT are higher for individuals who live in close proximity to their schools or have a shorter travel time to reach school (De Janvry & Sadaoulet, 2006). This effect is stronger for girls, for higher safety and security reasons (Coady & Parker, 2004). In this section we answer the above question by exploiting a variable which gathers information on whether there is a government secondary school in the village where the child resides. The idea is that the cost of schooling for girls in villages where there is no government secondary school would potentially be higher as a result of the large distance that the child may have to travel. It is possible that, if KP compensates for this cost, the schooling outcomes for female children who otherwise would not have enrolled in the absence of the programme might improve. Accordingly, we usd the following quadruple regression to estimate the heterogeneous impact on enrolment:

$$Y_{ist} = \beta_0 + \beta_1.(WestBengal * Female * Post * NoGovtSchool) + \sum_{i=2}^{5} \beta_i (FourTripleInteractions) + \sum_{i=6}^{11} \beta_i (SixDoubleInteractions) + \beta_{12}.WestBengal + \beta_{13}.Female + \beta_{14}.Post + \beta_{15}.NoGovtSchool + \beta_{16}.C_i + \delta_s + \lambda_t + \varepsilon_{ist} \quad (4)$$

For estimation of the effect on learning outcomes, we use the DDD regression model:

$$Y_{ist} = \beta_0 + \beta_1.(WestBengal * Post * NoGovtSchool) + \sum_{i=2}^{4} \beta_i (ThreeDoubleInteractions)$$
$$+\beta_5.WestBengal + \beta_6.Post + \beta_7.NoGovtSchool + \beta_8.C_i + \delta_s + \lambda_t + \varepsilon_{ist}$$

(5)

Here $NoGovtSchool$ is a dummy variable that indicates whether there is a secondary government school in the village where the child, i resides. Table 4 presents the results from the regression. The findings show a more than 6% increase in the probability of such a female child being enrolled, although no impact is found in terms of learning outcomes.

We also made use of household possession of means of transportation in terms of two-wheelers that could potentially reduce the travel time to school as a proxy for school access. We ran the same regression for two sub-samples: girls from households with a motorised two-wheeler and those without such a vehicle. Notably, the regressions control for the economic variables, hence the difference in effects gives the secular effect of having a motorised vehicle in the household. The findings reveal a significantly higher impact among girls from households not possessing a motorised vehicle (a close to 10% increase in the probability of enrolment). For the girls from households with such a vehicle, this effect was close to zero. This suggests that, despite its higher costs, thanks to KP a higher number of female children without access to a motorised two- wheeler has been enrolled in school.

Table 4: Heterogeneous impact on females residing in villages not having a government secondary school

	Full sample			Females from households with two-wheelers			Females from households without two-wheelers		
	Enrolled in school	Ability to read story	Ability to do division	Enrolled in school	Ability to read story	Ability to do division	Enrolled in school	Ability to read story	Ability to do division
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
WB*Female*Post-KP*No Govt Sec School	0.061**			-0.054			0.098***		
	(0.029)			(0.055)			(0.033)		
WB*Post-KP*No Govt Sec School	Yes	0.004	-0.031	Yes	0.168**	0.070	Yes	0.019	-0.031
	Yes	(0.035)	(0.036)	Yes	(0.077)	(0.095)	Yes	(0.042)	(0.047)
Triple interaction	Yes			Yes			Yes		
Double interaction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear terms	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	132,130	55,319	55,159	16,781	6,923	6,903	62,466	26,102	26,041
Pseudo R-squared	0.109	0.108	0.117	0.124	0.079	0.061	0.111	0.092	0.059

Notes: Marginal effects from probit regression are presented with clustered standard errors at the district level given in parenthesis.
***=significant at 1% level, **=significant at 5% level, *=significant at 10% level.
Source: ASER 2009–18; authors' own calculations.

5.3 Complementary inputs

The negative impact of KP on learning outcomes could be to the result of higher enrolment without an adequate improvement in school infrastructure. Complementary inputs, including better school infrastructure, teacher attendance or private tuition may thus be necessary to translate the potential gains of increased enrolment into better learning outcomes. The literature has indicated that increasing school amenities, both in terms of learning facilities and physical infrastructure, often leads to higher enrolment and better learning outcomes (Kazianga et al, 2013). Therefore, we expect variations in the level of complementary inputs like the number of teachers absent, availability of usable blackboards as well as possibilities for private tuition for students to result in a differential impact of the KP on educational outcomes. In terms of potential channels, we examined whether such educational inputs were associated with better learning outcomes when combined with KP. This is especially important from the perspective of teacher absenteeism, which has been found to be high in rural India (Drèze & Sen, 2002). For this, we used the triple difference regression model as specified in equation 5 for a set of four education inputs: (i) female children at schools with full teacher attendance; (ii) girls at schools with a usable blackboard; (iii) girls at schools providing supplementary learning outcomes; and (iv) girls who opt for private coaching or tuition.

For this we used a subset of female children from among the whole sample. This is because the ASER dataset gathers contemporaneous information about public schools in every village where the household surveys are conducted. We matched all the information on the female children enrolled in the surveyed school and dropped those not enrolled in these schools.

The results from the regressions are presented in Table 5. The findings indicate modest complementarities with respect to teacher attendance, which can arguably be considered to be among the most important inputs. For example, in schools with 100% teacher attendance, there is an increase in the probability of a child being able to perform a simple division by more than six percentage points after the implementation of the KP. Further, in schools with usable blackboards, the associated increase in mathematics scores was found to be 10.5% because of the KP. This is significant as we found an overall significant decline in mathematics scores following the implementation of KP, and it underlines the importance of complementarities.

Table 5: Heterogeneous effects on complementary educational inputs

Input	Teacher attendance		Usable blackboard		Learning material		Takes tuition	
	Ability to read story	Ability to do division	Ability to read story	Ability to do division	Ability to read story	Ability to do division	Ability to read story	Ability to do division
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WB*Post-KP*Input	0.002	0.062*	0.058	0.105**	0.016	0.016	-0.004	0.031
	(0.028)	(0.036)	(0.076)	(0.047)	(0.027)	(0.034)	(0.021)	(0.023)
Double interactions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Linear terms	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	40,614	40,511	39,994	39,894	43,050	42,936	48,718	48,583
Pseudo R-squared	0.053	0.085	0.051	0.081	0.053	0.084	0.082	0.119

*Notes: Marginal effects from probit regression are presented with clustered standard errors at the district level given in parenthesis. ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level.*
Source: ASER 2009–18; authors' own calculations.

6. Further analysis

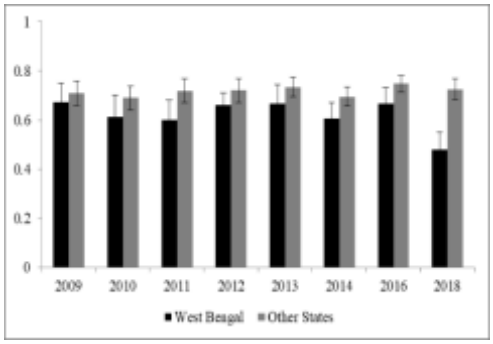
6.1 School infrastructure in WB

Our findings regarding a deterioration in learning outcomes is in tune with a number of existing studies (Baez & Camacho, 2011; Akresh et al, 2013; Mo et al, 2013; Benhassine et al, 2015). What are the possible reasons for this decline, given the context of WB? We speculate that the detrimental impact on learning outcomes might have arisen as a result of structural factors like school facilities or household cultural practices regarding female education. For instance, if schools are inadequately staffed, increased enrolment might result in congestion externality and could negatively affect learning outcomes.

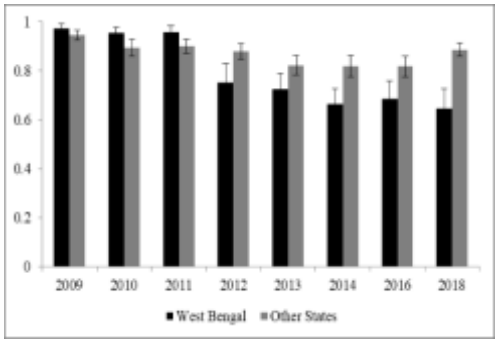
Using the ASER data, we compared some of the indicators of the condition of school infrastructure in WB and in the other control states over the years before and after the implementation of KP. More specifically, we looked at both physical infrastructure, like the presence of boundary walls or taps in schools, and teacher and learning infrastructure, like teacher and principal attendance, usage of computers and supplementary materials in schools. Figure 4 (a–f) presents the relevant proportions from 2009 to 2018 along with the 95% confidence interval calculated by clustering the standard errors at the district level. We observe for most of the indicators that conditions in WB have deteriorated in comparison with the other control states.

Figure 4: Proportion of surveyed schools

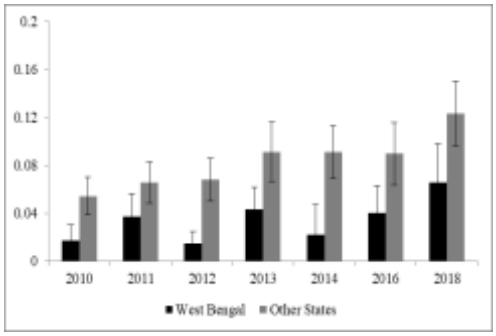
(a) with full teacher attendance on the date surveyed



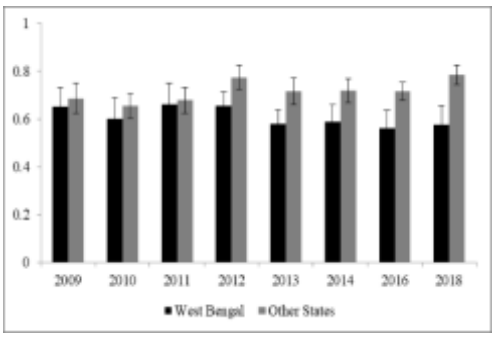
(b) with principal present on the date surveyed



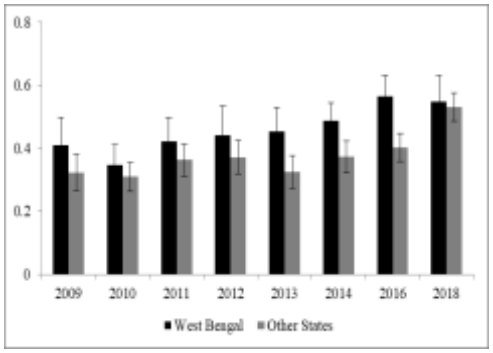
(c) with computers



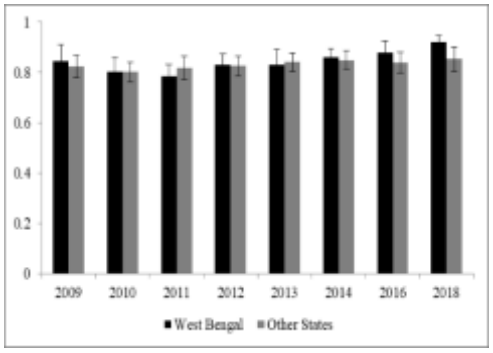
(d) offering supplementary learning material



(e) with boundary walls



(f) with tap in schools



Note: 95% confidence intervals (clustered at district level) are presented along with the relevant proportions. Other States are Assam, Tripura and Orissa.
Source: ASER 2009–18; authors' own calculations.

We further made use of the available DISE data for secondary schools in rural areas to look into the state of school infrastructure in WB in the post-KP period in comparison with the rest of India. We examined the following indicators: (1) Student–classroom ratio (SCR); (2) ratio of secondary schools to upper primary schools; (3) percentage of schools with an integrated science laboratory; and (4) percentage of schools with an information and communication technology (ICT) laboratory (Figures 5(a) to 5(d)) for WB as well as for the whole of India. The first two indicators checked whether there were adequate

instructional spaces to accommodate the increase in female enrolment numbers in WB. Studies have shown that student achievement responds to the quality of the learning environment and that overcrowding in class has a negative effect on both teaching and learning (Corcoran et al, 1988; Angrist & Lavy, 1999; Case & Deaton, 1999). Keeping in mind the falling performance of the students in mathematics, the last two indicators account for the state of science education in secondary schools. Studies have found significant improvements in mathematics scores through computer-aided learning (Banerjee et al, 2007). Besides capturing the condition of learning infrastructure in general, the availability of ICT facilities can indicate the potential for augmenting mathematical skills, if they are put to such use.

As is evident from the figures, there is a substantial difference in the indicators (1), (3) and (4) in WB relative to the country average, with the former revealing a lack of capacity. With respect to the second indicator, we find that the number of secondary schools in WB relative to upper primary schools is higher in comparison to the all-India figures. However, the gap between the two has been coming down and we observed that this ratio has indeed been decreasing over the years, albeit marginally. This is despite the jump in school enrolment that occurred after the implementation of the KP. In passing, we also note that, for both WB and the country as a whole, the learning infrastructure fails the norm of the Right to Education (RTE) Act that came into force in 2010.[20] Initially the RTE Act was set to regulate education modalities for children aged 6–14 years but in 2011 its scope was extended to cover students of class X, that is, up to 16 years of age. By RTE norms, the ideal SCR is 30:1 but WB exceeds that figure by a multiple of 2. Interestingly, when we consult the PTR, we find that both WB and the country average are above the RTE recommended norms.[21] The decline in PTR suggests that the influx of newly enrolled girls was accompanied by the fresh recruitment of teachers but, at the same time, the high SCR, implying space constraints, had an impact upon teaching and learning activities. The literature does indeed indicate that overcrowding in schools not only affects student performance but might also lead to teacher absenteeism (Corcoran et al, 1988).

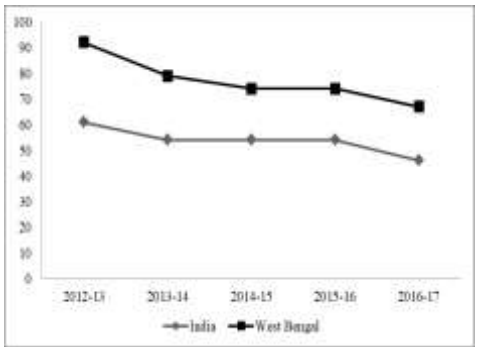
Where infrastructure is concerned, decomposing the budgetary allowances in the period following KP, we note a sharp decline in the allocation for basic infrastructure like classrooms and office space, as well for other building amenities, like separate toilets for girls. From 6% of the total budget in 2014–15, the allocation declined to 3.8% in 2017–18.[22] This insufficiency in the supply side of schooling factors is possibly the key reason why we have observed a fall in learning outcomes after the implementation of KP. However, the extent to which these insufficiencies can be linked to poor learning outcomes among females post-KP needs further investigation.

[20] For more information on RTE, see https://mhrd.gov.in/rte.
[21] The PTR in West Bengal was 23 in 2016–17, the same as the country average.

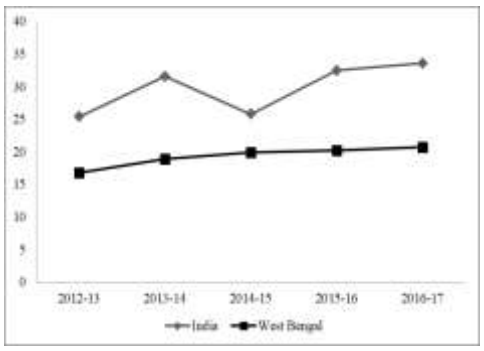
[22] See http://www.cbgaindia.org/wp-content/uploads/2019/03/Budgeting-for-School-Education-in-West-Bengal.pdf.

Figure 5: Comparison of government schools in WB with all-India

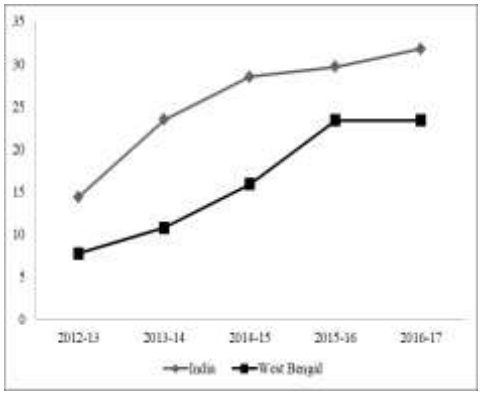
(a) Student–classroom ratio



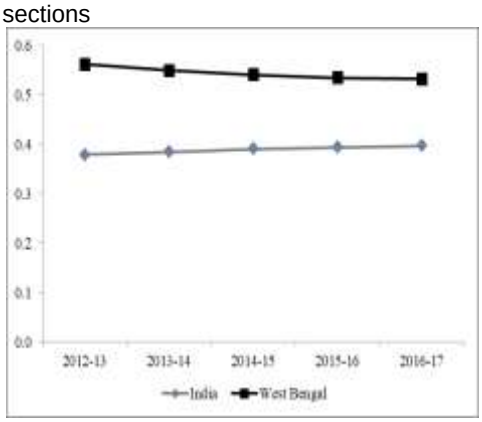
(b) Integrated Science Lab in rural areas (%)



(c) ICT facilities in rural areas (%)



(d) Ratio of secondary to upper primary schools/ sections



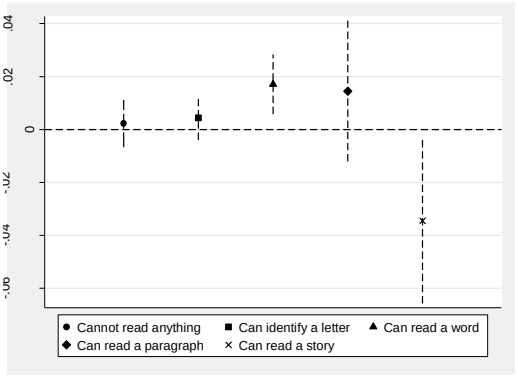
Source: DISE, 201213 to 2016–17.

6.2 Lower-level outcomes

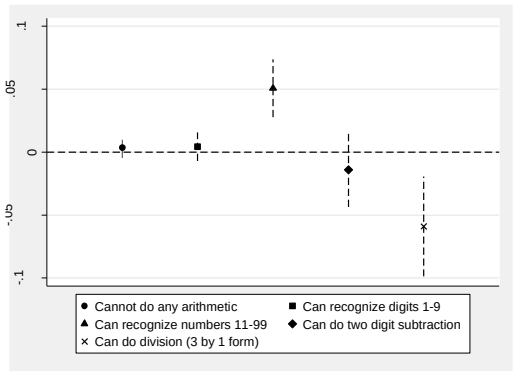
Although we found a dip in higher order learning outcomes, schooling exposure might nevertheless enhance basic skills among enrolled girls. Accordingly, we examined whether the implementation of KP has been able to improve lower order abilities in reading and mathematics for girls. To estimate the impact we ran a similar DID regression for all females in the age cohort 13 to 16 years, comparing the pre- and post-intervention period in WB and in the control states. The outcome variable is the performance of the child with respect to the corresponding category in terms of reading and mathematics scores. Figures 6(a) and 6(b) present the marginal effects from the probit regression of each category of reading and writing scores, adjusted for the control variables, respectively. The findings indicate a positive and significant effect of KP on lower level abilities, especially the ability to read a word or identify numbers. Therefore, while, since implementation of KP, there has been a decline in higher-order learning ability, lower-order abilities have seen an improvement.

Figure 6: Effect of KP on lower order abilities

(a) Reading scores



(b) Mathematics scores



*Note: Marginal effects from probit regression are presented with clustered standard errors at the district level given in parenthesis. ***=significant at 1% level, **=significant at 5% level, *=significant at 10% level.*

6.3 Programme cost

In terms of programme costs we found that the 4.5 percentage point increase in enrolment came at the expense of US$6 per recipient per month. We assumed that households would discount the lump sum payment of Rs. 25,000 at the ongoing interest rate in bank savings, which currently ranges between 3% and 4% per annum. When compared with schooling programmes for girls elsewhere in the sub-continent, KP seems to have a much higher programme cost relative to enrolment gains. For instance, Chaudhury and Parajuli (2010) have estimated that a 9% gain in enrolment in a Pakistani CCT programme cost $3 per person per month. In Bihar, Muralidharan and Prakash (2017) found that the bicycle programme initiated a 5% gain in enrolment at a cost of less than $1 per month per beneficiary. When we place these findings together with the dip in learning outcomes, the KP's costs seem even higher. Of course, we cannot track the benefits of delaying the age of marriage for the programme recipients but, unless they become substantial, KP may not perform well in terms of cost-effectiveness.

7. Conclusion

We have added to the growing evidence on CCT programmes by estimating the impact of KP on female education outcomes. Our estimates of KP indicate that the programme has a significant impact on increasing adolescent female enrolment by about 4.5 percentage points, hence curbing adolescent female dropout rates. While these effects are prevalent across all income classes, we also observe that the programme stipends may potentially outweigh supply side constraints like the travel costs associated with schooling. This is evident in the larger enrolment effects for children residing in villages without a secondary school.

Despite this positive influence, we found a marked decline in learning skills, especially in basic mathematics. The extant literature reveals that improved learning outcomes, especially those related to mathematics, are significantly associated with a reduction in the gender wage gap and promote higher returns in the labour market (Hanushek & Woessmann, 2008; Murnane et al, 1995; Altonji & Blank, 1999). This implies that the gains from enrolment or the potential delay in early marriage might wear away in the long run, in particular because inadequate learning skills hamper women's earning prospects and decision-making abilities. Further, our findings also indicate that this decline in learning skills is potentially the result of inadequate physical and learning infrastructure in WB, which may not have been able to cope with the increasing enrolment among female children arising from the programme. Notably, the fact that we found the decline in mathematics outcomes to be much starker than that for reading skills indicates that, while the government needs to focus on augmenting learning facilities in general, special attention needs to be directed towards science learning infrastructure.

One of the main contributions of this paper lies in pointing out the problems in the design of CCTs in resource-scarce developing countries. From the point of view of the elected government, allocating funds for tangible assets that provide immediate returns assumes priority relative to, say, learning facilities, which have a long gestation period. Ensuring education quality involves costly screening activities and this might distort public investment. To add to this, a government might opt for a CCT-type visible transfer strategy to avoid the political cost of restructuring an education management system dominated by political leaders and unions, even though this is leading to weak human capital formation (Reimers et al, 2006).

As an instance, to strengthen the education outcomes in the post-KP period the government of WB launched a bicycle programme in late 2015 known as the *Sabuj Sathi*, which aimed to distribute bicycles to students (both male and female) studying in grades 9 to 12. The programme is a welcome step and can be lauded for encouraging completion of secondary and higher secondary education, along with installing a sense of confidence and agency among disadvantaged groups and promoting an environmentally friendly means of transport. However, data from DISE indicate that the density of schools per ten square kilometres in the state stood at 1.15 in 2015–16 and 1.13 in 2014–15. This is much higher than the country average and exceeds the figure in both the years for WB's immediate neighbours, Assam, Tripura, Orissa, and even Bihar, where the cycle programme was initiated. This seems to indicate that distance may not be among the most crucial constraints to female schooling and improving learning skills. Rather, we argue that such a programme may be unlikely to enhance these skills without complementary improvements in inputs pertaining to physical school infrastructure and numbers of teachers. Our paper shows that the gains in these inputs in WB have been substantially lower not only in terms of levels but also of changes over time in comparison to the rest of the country.

Notably, we find that the programme does not turn out to be cost-effective when the gains in enrolment are compared with the expenditure needed to create these gains. This

becomes starker when we consider the associated deterioration in learning outcomes that the programme seems to be associated with. However, the associated reduction in early marriage resulting from the programme should enhance the acquisition of pre-marital enabling resources and girls' long-term economic empowerment (Field & Ambrus, 2008; Chari et al. 2017; Yount et al, 2018). Once the welfare gains from reducing early marriage are factored in, the benefits may outweigh the costs. However, evidence on this aspect is scarce. Thus one future research agenda would be to examine whether the KP programme has indeed led to an increase in age of first marriage, lower fertility and higher human capital investments among girl children.

References

Abadie, A. and Gardeazabal, J. (2003). 'The economic costs of conflict: a case study of the Basque Country'. *American Economic Review 93*, 112–132.

Abadie, A., Diamond, A. and Hainmueller, J. (2010). 'Synthetic control methods for comparative case studies: estimating the effect of California's tobacco control program'. *Journal of the American Statistical Association 105*, 493–505.

Akresh, R., de Walque, D. and Kazianga, H. (2013). *Cash Transfers and Child Schooling: Evidence from a Randomized Evaluation of the Role of Conditionality*. Policy Research Working Paper 6340. Washington DC: World Bank.

Altonji, J.G. and Blank, R.M. (1999). 'Race and gender in the labor market'. In *Handbook of Labor Economics* (Vol. 3, Part C, pp. 3143–3259). New York: Elsevier [available at https://ideas.repec.org/h/eee/labchp/3-48.html]. Accessed: 29 July 2020.

Anaya, G. (1999). 'College impact on student learning: comparing the use of self-reported gains, standardized test scores, and college grades'. *Research in Higher Education 40*, 499–526.

Angrist, J.D. and Lavy, V. (1999). 'Using Maimonides' rule to estimate the effect of class size on scholastic achievement'. *Quarterly Journal of Economics 114*, 533–575.

Baez, J.E. and Camacho, A. (2011). *Assessing the Long-term Effects of Conditional Cash Transfers on Human Capital: Evidence from Colombia*. Policy Research Working Paper 5681. Washington DC: World Bank.

Baird, S., Ferreira, F.H., Özler B. and Woolcock, M. (2013). 'Relative effectiveness of conditional and unconditional cash transfers for schooling outcomes in developing countries: a systematic review'. *Campbell Systematic Reviews 9*, 1-124.

Banerjee, A.V., Cole, S., Duflo, E. and Linden, L. (2007). 'Remedying education: evidence from two randomized experiments in India'. *Quarterly Journal of Economics 122*, 1235–1264.

Behrman, J.R., Parker, S.W. and Todd, P.E. (2009). 'Schooling impacts of conditional cash transfers on young children: evidence from Mexico'. *Economic Development and Cultural Change 57*, 439–477.

Behrman, J. R., Sengupta, P., and Todd, P. (2005). 'Progressing through PROGRESA: An impact assessment of a school subsidy experiment in rural Mexico'. *Economic Development and Cultural Change*, *54*, 237-275.

Benhassine, N., Devoto, F., Duflo, E., Dupas, P. and Pouliquen, V. (2015). 'Turning a shove into a nudge? A "labeled cash transfer" for education'. *American Economic Journal: Economic Policy 7*, 86–125.

Blimpo, M.P., Gajigo, O. and Pugatch, T. (2019). 'Financial constraints and girls' secondary education: evidence from school fee elimination in The Gambia'. *World Bank Economic Review 33*, 185–208.

Case, A. and Angus, D. (1999). 'School inputs and educational outcomes in South Africa'. *Quarterly Journal of Economics 114*, 1047–1084.

Chakraborty, T. and Jayaraman, R. (2019). 'School feeding and learning achievement: evidence from India's midday meal program'. *Journal of Development Economics 139*, 249–265.

Chari, A.V., Heath, R., Maertens, A. and Fatima, F. (2017). 'The causal effect of maternal age at marriage on child wellbeing: evidence from India'. *Journal of Development Economics 127*, 42–55.

Chaudhury, N., Hammer, J., Kremer, M., Muralidharan, K. and Rogers, F.H. (2006). 'Missing in action: teacher and health worker absence in developing countries'. *Journal of Economic Perspectives 20*, 91–116.

Chaudhury, N. and Parajuli, D. (2010). 'Conditional cash transfers and female schooling: the impact of the female school stipend programme on public school enrolments in Punjab, Pakistan'. *Applied Economics 42*, 3565–3583.

Coady, D.P. and Parker, S.W. (2004). 'Cost-effectiveness analysis of demand- and supply-side education interventions: the case of Progresa in Mexico'. *Review of Development Economics 8*, 440–451.

Corcoran, T.B., Walker, L.J. and White, J.L. (1988). *Working in Urban Schools*. Washington DC: Institute for Educational Leadership.

De Janvry, A. and Sadoulet, E. (2006). 'Making conditional cash transfer programs more efficient: designing for maximum effect of the conditionality'. *World Bank Economic Review 20*, 1–29.

Drèze, J. and Sen, A. (2002). *India: Development and Participation*. New York: Oxford University Press.

Field, E. and Ambrus, A. (2008). 'Early marriage, age of menarche, and female schooling attainment in Bangladesh'. *Journal of Political Economy 116*, 881–930.

Filmer, D. and Schady, N. (2008). 'Getting girls into school: evidence from a scholarship program in Cambodia'. *Economic Development and Cultural Change 56*, 581–617.

Filmer, D., and Schady, N. (2014). 'The medium-term effects of scholarships in a low-income country'. *Journal of Human Resources*, *49*, 663-694.

Fiszbein A. and Schady N.R. (2009). *Conditional Cash Transfers: Reducing Present and Future Poverty*. Washington DC: World Bank Publications.

Galiani, S. and McEwan, P.J. (2013). 'The heterogeneous impact of conditional cash transfers'. *Journal of Public Economics 103*, 85–96.

Garcia, S. and Saavedra, J.E. (2017). 'Educational impacts and cost-effectiveness of conditional cash transfer programs in developing countries: a meta-analysis'. *Review of Educational Research 87*, 921–965.

Giordono, L. and Pugatch, T. (2017). 'Non-Tuition Costs, School Access and Student Performance: Evidence from the Gambia'. *Journal of African Economies*, *26*, 140-168.

Glewwe, P. and Kassouf, A.L. (2012). 'The impact of the Bolsa Escola/Familia conditional cash transfer program on enrollment, dropout rates and grade promotion in Brazil'. *Journal of Development Economics 97*, 505–517.

Gupta, S. (2009). *Notions of Nationhood in Bengal: Perspectives on Samaj, c. 1867–1905*. Leiden: Brill.

Hanmer, L. and Klugman, J. (2016). 'Exploring women's agency and empowerment in developing countries: where do we stand?'. *Feminist Economics 22*, 237–263.

Hanushek, E.A., Lavy, V. and Hitomi, K. (2008). 'Do students care about school quality? Determinants of dropout behaviour in developing countries'. *Journal of Human Capital 2*, 69–105.

Hanushek, E.A. and Woessmann, L. (2008). 'The role of cognitive skills in economic development'. *Journal of Economic Literature 46*, 607–668.

Honorati, M., Gentilini, U. and Yemtsov, R.G. (2015). *The State of Social Safety Nets 2015.* Washington DC: World Bank Publications.

Jayachandran, S. and Lleras-Muney, A. (2009). 'Life expectancy and human capital investments: evidence from maternal mortality declines'. *Quarterly Journal of Economics 124*, 349–397.

Kazianga, H., Levy, D., Linden, L.L. and Sloan, M. (2013). 'The effects of "girl-friendly" schools: evidence from the BRIGHT school construction program in Burkina Faso'. *American Economic Journal: Applied Economics 5*, 41–62.

Khandker, S., Pitt, M., & Fuwa, N. (2013). '.*Subsidy to promote girls secondary education: the female stipend program in Bangladesh'.* Working paper No. 81464, Washington DC: World Bank Publications.

Lahoti, R. and Sahoo, S. (2020). 'Are educated leaders good for education? Evidence from India'. *Journal of Economic Behavior & Organization 176*, 42–62.

Lloyd, C. B., Mete, C., and Sathar, Z. A. (2005). 'The effect of gender differences in primary school access, type, and quality on the decision to enroll in rural Pakistan'. *Economic Development and Cultural Change*, *53*, 685-710.

Mo, D., Zhang, L., Yi, H., Luo, R., Rozelle, S. and Brinton, C. (2013). 'School dropouts and conditional cash transfers: evidence from a randomised controlled trial in rural China's junior high schools'. *Journal of Development Studies 49*, 190–207.

Momo, M.S., Cabus, S.J., De Witte, K. and Groot, W. (2019). 'A systematic review of the literature on the causes of early school leaving in Africa and Asia'. *Review of Education 7*, 496–522.

Muralidharan, K. and Prakash, N. (2017). 'Cycling to school: increasing secondary school enrollment for girls in India'. *American Economic Journal: Applied Economics 9*, 321–350.

Murnane, R.J., Willett, J.B. and Levy, F. (1995). 'The growing importance of cognitive skills in wage determination'. *Review of Economics and Statistics 77*, 251–266.

Murnane, R.J. and Ganimian, A. (2014). *Improving Educational Outcomes in Developing Countries: Lessons from Rigorous Impact Evaluations*. National Bureau of Economic Research (NBER) Working Paper w20284. New York: NBER.

Odell, E. (2017). 'Lonely schools: the relationship between geographic isolation and academic attainment'. *Educational Research*, *59*, 257-272.

Parker, S.W. and Todd, P.E. (2017). 'Conditional cash transfers: the case of Progresa/Oportunidades'. *Journal of Economic Literature 55*, 866–915.

Peri, G. and Yasenov, V. (2019). 'The labor market effects of a refugee wave: synthetic control method meets the Mariel boatlift'. *Journal of Human Resources 54*, 267–309.

Ponce, J. and Bedi, A.S. (2010). 'The impact of a cash transfer program on cognitive achievement: the Bono de Desarrollo Humano of Ecuador'. *Economics of Education Review 29*, 116–125.

Reimers, F., da Silva, C. and Trevino, E. (2006). *Where is the 'Education' in Conditional Cash Transfers in Education?* Montreal: UNESCO Institute for Statistics.

Rubio-Codina, M. (2010). 'Intra-household time allocation in rural Mexico: evidence from a randomized experiment'. *Research in Labor Economics 31*, 219–257.

Sen, A. and Dutta, A. (2018). 'West Bengal's successful Kanyashree Prakalpa programme needs more push from state and beneficiaries'. *Economic and Political Weekly Engage* [available at https://www.epw.in/engage/article/West-Bengal-Successful-Kanyashree-Prakalpa-Programme-Needs-More-Push-From-State-and-Beneficiaries]. Accessed: 29 July 2020.

Wodon, Q., Montenegro, C., Nguyen, H. and Onagoruwa, A. (2018). *Missed Opportunities: The High Cost of Not Educating Girls*. Washington DC: World Bank.

Yount, K.M., Crandall, A. and Cheong, Y.F. (2018). 'Women's age at first marriage and long-term economic empowerment in Egypt'. *World Development 102*, 124–134.

Zhao, M. and Glewwe, P. (2010). 'What determines basic school attainment in developing countries? Evidence from rural China'. *Economics of Education Review 29*, 451–460.