Beyond Generations: Old Age Allowance and Girls' Educational Investment in Nepal

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Abstract

We study the intergenerational effects of Nepal's Old Age Allowance (OAA), a universal non-contributory pension, on children's educational expenditure. Using a fuzzy regression discontinuity design based on the program's age-70 eligibility rule, we find a strong gender asymmetry: OAA receipt increases annual educational expenditure for female students by more than Rs 4,000, while the corresponding effect for male students is small and statistically insignificant. The increase for girls is concentrated in tuition and uniforms, indicating that additional household resources are used to cover formal schooling costs. Results by recipient gender do not support a simple female-control bargaining channel; instead, the evidence is more consistent with a financial-constraints interpretation in which daughters' schooling is the margin most affected by limited household resources. Heterogeneity analysis further supports this view, with stronger effects in mixed-gender households, among relatively better-off rural households, and among households located farther from primary schools. The results suggest that social pensions can generate meaningful intergenerational spillovers and reduce gender disparities in educational investment even when they are not explicitly targeted to children.

Keywords: Social pensions, Educational expenditure, Gender inequality, Intra-household allocation, Intergenerational spillovers

JEL Codes: H55, J16, I24, D13, O15

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1 Introduction

Despite dramatic expansion in primary school enrollment in recent decades, gender gaps in educational attainment and progression remain a major development challenge in low- and middle-income countries (Group, 2017; UNESCO, 2025). The 2025 UNESCO Global Education Monitoring Report shows that although gender disparities in participation have narrowed on average, parity remains far from achieved in many regions, and gaps are especially pronounced in progression and completion at the secondary and upper-secondary levels (UNESCO, 2025). These disparities do not arise solely from supply-side constraints such as school availability or physical access. Even where tuition is nominally free, households continue to face substantial indirect schooling costs, including uniforms, textbooks, transportation, and examination fees, which can represent significant barriers to participation for low-income families (Evans & Ngatia, 2021). Evidence from a large review of education interventions across low- and middle-income countries further suggests that policies relaxing household resource constraints—such as cash transfers—are among the most effective at improving girls' access to schooling (Evans & Yuan, 2022).

When households face limited budgets, these costs often force families to allocate educational resources across children. In contexts characterized by son preference, patrilocal marriage norms, and lower perceived returns to daughters' education, girls may receive lower priority in educational investment (Jayachandran, 2015). In such environments, girls' schooling may be especially vulnerable to household resource constraints: when resources are limited, schooling expenditures are more likely to be reduced for girls, while increases in household resources may disproportionately benefit them (Evans & Yuan, 2022; Glick, 2008). A large body of evidence similarly shows that girls' schooling is often more sensitive to household resource constraints than boys' (Baird, Ferreira, Özler, & Woolcock, 2014; Duflo, Dupas, & Kremer, 2015; Glick, 2008). This pattern raises a fundamental question about whether exogenous increases in household income can reduce gender gaps in educational investment. If girls' schooling is especially sensitive to binding financial constraints, relaxing

those constraints may shift household spending toward daughters even when transfers are not explicitly targeted to children.

We examine this question in the context of Nepal, where gender disparities in educational investment remain pronounced. Despite near-universal primary enrollment, more than 80 percent of girls leave school before reaching higher secondary education, a rate far exceeding that of boys (Paudel, 2019). Even among enrolled children, parents tend to invest more in boys' education than in girls', as reflected in higher enrollment of boys in private schools (Khanal, 2018). Nepal, therefore, provides a useful setting for examining whether increases in household income can reduce gender gaps in educational spending.

To identify the causal effect of income on educational investment, we exploit the age-based eligibility rule of Nepal's Old Age Allowance (OAA). The OAA is a universal non-contributory social pension that provides a monthly cash transfer to individuals aged 70 and above who are not entitled to a government pension. During our study period, eligibility for most households began at age 70. This creates quasi-experimental variation in household income as households with a member just above the threshold are more likely to receive the transfer than otherwise similar households just below it. Because take-up is imperfect, we implement a fuzzy regression discontinuity design that instruments actual OAA receipt with eligibility at the age cutoff. Using panel data from the Nepal Household Risk and Vulnerability Survey (HRVS) covering 6,000 non-metropolitan households from 2016 to 2018 (The World Bank, 2020), we estimate the causal effect of OAA receipt on educational expenditure for students enrolled in government schools.

Our results reveal a large and economically meaningful gender asymmetry. Receipt of OAA increases annual educational expenditure for female students by Rs 4,046 in the covariate-adjusted specification, relative to a control mean of Rs 7,201, implying an increase of roughly 56 percent. The corresponding estimate for male students is small and statistically insignificant. The increase for girls is concentrated in tuition and uniforms, while boys experience no net increase in total educational expenditure. This evidence is consistent with

daughters' schooling being more vulnerable to household resource constraints at baseline: when household budgets are relaxed through OAA income, additional resources are directed disproportionately toward daughters.

A natural alternative explanation is that the observed effects arise through changes in intra-household bargaining power rather than through the relaxation of household financial constraints. A prominent literature argues that who controls income within the household can affect child outcomes, particularly when women receive transfers (Duflo, 2003; Lundberg, Pollak, & Wales, 1997; Thomas, 1990). To examine this possibility, we test whether the educational gains for girls are concentrated in households where the OAA recipient is female. We find no evidence that this is the case. Instead, the positive effect on girls' educational expenditure is stronger when the recipient is male, which does not support a simple female-control bargaining channel. These results are more consistent with a financial-constraints interpretation: when household resources increase, additional spending is directed toward daughters' schooling.

This paper contributes to three strands of literature. First, it contributes to the literature on gender inequality in human capital investment by showing that an income transfer can narrow gender disparities in educational spending even when it is not targeted to children or mothers, consistent with evidence that untargeted interventions can generate disproportionate educational gains for females (Agte, Bernhardt, Field, Pande, & Rigol, 2024; Baird et al., 2014; Evans & Yuan, 2022). Second, it contributes to the literature on intra-household allocation by showing that relaxing household budget constraints can shift resources toward daughters even when the transfer is not controlled by women, providing evidence against a simple female-control bargaining interpretation and consistent with collective models of household allocation (Lundberg et al., 1997; Thomas, 1990). Third, it contributes to the literature on social pensions by documenting that an elderly transfer generates meaningful intergenerational spillovers in girls' education (de Carvalho Filho, 2012; Duflo, 2003).

The remainder of the paper is organized as follows. Section 2 describes the Old Age

Allowance program and the educational context in Nepal. Section 3 presents the data. Section 4 outlines the empirical strategy. Section 5 presents the main findings. Section 6 examines heterogeneity, Section 7 discusses mechanisms, and Sections 8 and 9 discuss the implications and conclude.

2 Background

This section describes the institutional context of Nepal's Old Age Allowance (OAA) and the structure of education in Nepal, highlighting features relevant to our empirical strategy.

2.1 Old Age Allowance

Many countries have adopted non-contributory cash transfers to support aging populations and reduce old-age poverty (Pallares-Miralles, Romero, & Whitehouse, 2012). Nepal's Old Age Allowance (OAA) is a non-contributory social assistance program that provides monthly transfers to elderly individuals who do not receive a government pension. Introduced in 1994 as a modest benefit for individuals aged 75 and above, the program has expanded over time through repeated reductions in the eligibility age and increases in benefit levels (Holmes, Bhandary, & Jha, 2019; Rajan, 2003).

During our study period (2016–2018), eligibility for most households began at age 70. Certain subgroups, including Dalit households and residents of the Karnali region,[1] face different eligibility thresholds and benefit levels. Because these groups are subject to distinct rules, they are excluded from our main analysis to preserve a single, well-defined age cutoff.

OAA is administered through local governments. Eligible individuals apply by presenting a citizenship certificate verifying age, and transfers are disbursed periodically through bank accounts. The program is unconditional: there are no behavioral requirements and no restrictions on how funds may be used. Not all eligible individuals receive benefits, and a

[1]The Karnali region includes five historically underserved districts: Dolpa, Humla, Jumla, Kalikot, and Mugu.

small number of ineligible individuals report receipt, generating imperfect compliance that motivates the fuzzy regression discontinuity design employed in this paper.

By fiscal year 2022/23, nearly two million individuals received OAA, accounting for more than half of all social assistance beneficiaries. Social assistance spending reached approximately 2 percent of GDP, with the majority allocated to elderly recipients (UNICEF, 2024). As Nepal's population ages, evaluating the broader effects of the program has become increasingly important for policy.

Multigenerational co-residence is common in Nepal, and elderly individuals frequently lack independent income sources. OAA therefore introduces a predictable and sustained increase in household income. Prior qualitative work suggests that transfers are often used for household consumption, health expenditures, and support for grandchildren (International, 2009; Ranabhat, 2022; Sapkota, 2016). Whether and how this income affects educational spending is an empirical question addressed in this paper.

2.2 Education in Nepal

Until 1951, access to formal education in Nepal was largely restricted to the ruling class and higher castes, such as Brahmins and Chhetris, and the estimated literacy rate was less than 2 percent. At that time, there were only 311 primary schools in the country, fewer than 1,000 individuals had attained a high school–level education, and approximately 300 had completed college-level education (Parajuli, 2012; Wood & Knall, 1962). In response to this extremely limited access, the government initiated a nationwide effort to expand education by establishing schools, training teachers, and encouraging families to send their children to school (Wood & Knall, 1962).

Over the past several decades, Nepal has made substantial progress in expanding access to education. Literacy rates have risen significantly, reaching 76.2 percent according to the 2021 Census, and educational facilities are now distributed throughout the country. Primary school enrollment is now nearly universal, and approximately 82 percent of students complete

primary education. However, progression to higher levels of schooling remains a challenge. While completion rates are high at the primary level, they decline sharply at later stages, with only about 27 percent of students completing upper secondary education (UNESCO, 2025).

Public education is constitutionally guaranteed through the secondary level, and public schools dominate in non-metropolitan areas. As discussed earlier, although tuition is nominally free, households still face substantial indirect schooling costs, including uniforms, textbooks, transportation, examination fees, and private tutoring. These expenses can be considerable relative to household income, particularly in rural communities.

Gender disparities remain evident in both school progression and parental investment. Girls are more likely than boys to leave school before completing higher secondary education, and households tend to invest more in boys' schooling, including through higher enrollment in private schools (Khanal, 2018; Paudel, 2019). These differences arise within a broader social context characterized by patrilocal residence patterns and expectations that sons will provide economic support to parents (Jayachandran, 2015).

Together, these institutional and social features create a setting in which increases in household income may differentially affect educational investment across children, allowing us to examine whether relaxing financial constraints alters gender disparities in schooling expenditures.

3 Data

We use data from the Nepal Household Risk and Vulnerability Survey (HRVS) conducted by the World Bank (The World Bank, 2020). This panel survey covers 6,000 households and 400 non-metropolitan communities across three waves: 2016, 2017, and 2018. The main objective of this three-year panel is to provide the government with empirical data on household exposure to shocks and the vulnerability of household welfare to these shocks. It includes

detailed modules on education, health, household expenditures, labor force participation, migration (both internal and international), agriculture, community characteristics, and social welfare and assistance. Data are collected at both household and individual levels. The survey year t records the educational expenditure and social security allowance data from year $t-1$.

The variable of interest is the annual education expenditure from the previous year, recorded at the individual level for household members currently attending school. Detailed information is available on the current level of education and whether the individual received any scholarships. The survey disaggregates this into six categories: tuition, lunch, transportation, school supplies, uniforms, and other expenses. This granular breakdown is central to our analysis of the mechanism: by examining which categories change for female versus male students, we can identify precisely how OAA income is channeled within the household.

The full education sample includes 22,940 individuals with educational expenditure records from non-metropolitan Nepal: 2,084 in preschool, 9,195 in primary school, 5,004 in lower secondary, 3,475 in secondary, and 3,182 in higher education. We restrict the analysis to individuals enrolled in government schools, yielding a working sample of 14,003 observations pooled across all three years. Among these, 6,665 are male and 7,334 are female.

Table 1 reports the mean values for various variables at the household level for each survey year. The average household size remained relatively stable, with a slight increase in 2017. The maximum age in families gradually increased, suggesting an aging population. Educational expenses have steadily increased over three years in nominal terms. Food expenses showed minor fluctuations, while non-food expenses peaked significantly in 2017. The average number of local migrants increased each year, reflecting growing internal migration, while international migration remained fairly constant. Access to essential services improved, as indicated by the decrease in average distances to banks, black-topped roads, health posts, motorable roads, and schools. The total amount of remittances received re-

mained substantial, highlighting the economic reliance of rural households on them. Gross livestock revenue showed considerable variability, with a notable increase in 2018. Water and electricity bills increased, reflecting higher utility costs.

Table 2 summarizes household eligibility and OAA receipt by year and pooled across three survey waves[2]. The data show that most eligible households received OAA, while a small number of ineligible households also reported receipt. The latter likely reflects age misreporting in the survey or failure to report the death of a household member who had previously been receiving the benefit. Manipulation of age records at the government level is unlikely, as local authorities verify age through the citizenship card.[3] Among eligible households, 69 and 64 percent received OAA in 2016 and 2017 respectively, rising to 84 percent in 2018, suggesting improvements in program distribution or awareness over time. Pooled across all three waves, of 2,833 eligible households, 2,061 (72.7 percent) received OAA; 318 ineligible households also received it; and 772 eligible households did not. This two-sided non-compliance confirms the fuzzy nature of the treatment and motivates the fuzzy RD design described in Section 4.

4 Empirical Methodology

For the period 2016–2018, which corresponds to the period covered by our data, the standard eligible age for OAA was 70 years. The identification strategy relies on this government-defined eligibility rule. An individual is considered to be in the treatment group if the oldest member of the household is above the eligibility threshold. As a result, treatment assignment exhibits a discontinuity at the age cutoff. However, because of noncompliance, where not all eligible households receive OAA and some ineligible households may also receive it, a Fuzzy Regression Discontinuity (RD) design is appropriate for causally estimating the effect

[2]We define a household as eligible if it has at least one member above the statutory threshold age.

[3]Nepali citizens become eligible for a citizenship card once they turn 16. The card contains the holder's name, date and place of birth, photograph, and a unique identification number. Since citizenship is issued at a young age, manipulating the record to qualify for OAA is unlikely.

of OAA on educational expenditure.

Treatment is defined at the household level. Although OAA is received by eligible elderly individuals, it increases the total resources available to the household. Therefore, a household becomes eligible for treatment when its oldest member reaches age 70. The running variable is defined as:

$$Runvar_{ht} = \text{O.A}_{ht} - 70, \tag{1}$$

where O.A_{ht} denotes the age of the oldest household member in household h at time t. The cutoff is normalized to zero.

We estimate local linear regressions of the form:

$$Y_{ihlt} = \alpha_l + \theta_t + \tau \text{OAA}_{hlt} + \gamma f(Runvar_{hlt}) + \beta \mathbf{X}_{ihlt} + \varepsilon_{ihlt}, \tag{2}$$

where Y_{ihlt} denotes annual educational expenditure for individual i in household h, served by local government l, and year t. OAA_{hlt} equals one if at least one household member receives OAA. The function $f(\cdot)$ is a local linear polynomial in the running variable, estimated separately on either side of the cutoff. $\mathbf{X}_{ihlt}$ includes individual-level covariates (sex, education level, scholarship status). α_l denotes local government fixed effects and θ_t denotes survey-wave fixed effects. Standard errors are clustered at the household level.

Identification relies on the standard RD assumption that, in the absence of treatment, potential outcomes evolve smoothly with respect to age at the eligibility threshold. Under this assumption, crossing the age-70 cutoff generates quasi-experimental variation in the probability of receiving OAA. Because treatment assignment is imperfect, we implement a fuzzy RD design in which actual OAA receipt is instrumented by an indicator for being above the eligibility threshold. The corresponding first-stage regression is given by:

$$\text{OAA}_{hlt} = \pi_l + \delta_t + \rho\, Treat_{hlt} + \gamma f(Runvar_{hlt}) + \nu_{hlt}, \tag{3}$$

where $Treat_{hlt}$ equals one if the oldest household member is at least 70. π_l denotes local government fixed effects and δ_t denotes survey-wave fixed effects, respectively.

The coefficient τ in equation (2) identifies the local average treatment effect (LATE) of OAA receipt on annual education expenditure for individuals in households in households near the eligibility threshold. We implement the estimation using the `rdrobust` package following Calonico, Cattaneo, Farrell, and Titiunik (2017), which implements the robust bias-corrected inference procedures for regression discontinuity designs developed by Calonico, Cattaneo, and Titiunik (2014). Bandwidths are selected using the mean-squared-error optimal procedure proposed by Calonico, Cattaneo, and Farrell (2020). A triangular kernel is used, placing greater weight on observations closer to the cutoff. Because age is discrete, inference relies on robust bias-corrected procedures appropriate for discrete running variables.

A key threat to identification is the manipulation of the running variable around the cutoff. We test for discontinuities in the density of the running variable at the threshold using the McCrary (2008) procedure. Figures 1 show no statistically significant discontinuity in density at the threshold. Manipulation is also unlikely on institutional grounds. The eligibility age for the Old Age Allowance has been revised multiple times over time, making precise age targeting difficult. In addition, once a citizenship certificate has been issued, the recorded date of birth cannot be altered, limiting the scope for strategic age misreporting to qualify for the benefit. The small number of households that report receiving OAA despite having no apparently eligible member likely reflects survey measurement error, such as age misreporting or failure to report the death of a household member during the reference period, rather than deliberate manipulation of eligibility status.

To assess whether observable characteristics are balanced at the cutoff, we conduct covariate balance tests. Specifically, we examine 16 predetermined individual and household

characteristics by estimating the specification in equation (2), using each characteristic as the outcome variable. Table 3 reports the estimated discontinuities at the cutoff using a first-degree polynomial in the running variable. Overall, we find little evidence of systematic imbalance across predetermined characteristics. Most variables are statistically indistinguishable across the threshold. A few characteristics, including total household members, distance to the bank, house storeys, and water bills, are marginally significant at the 10 percent level.

5 Results

5.1 First Stage

Table 4 reports the first-stage estimates from the fuzzy RD design. Crossing the age-70 eligibility threshold increases the probability of receiving OAA by 40.7 percentage points without covariates and 41.9 percentage points with covariates, with both estimates statistically significant at the 1 percent level. Figure 2 illustrates the discontinuous increase in the probability of OAA receipt at the cutoff. These results indicate a strong first-stage, confirming that eligibility generates strong quasi-experimental variation in OAA receipt and justifying the use of a fuzzy RD design.

5.2 Aggregate Effect on Educational Expenditure

Table 5 presents estimates of the effect of OAA receipt on total annual educational expenditure pooled across all students near the eligibility threshold. Receiving OAA increases educational expenditure by Rs 4,316 without covariates and Rs 2,799 with covariates. However, this pooled result masks a substantial asymmetry by student gender. As the following subsection shows, the aggregate increase is driven by effects on female students and reveals an important gender asymmetry.

5.3 Effects by Student Gender

Table 6 reports fuzzy RD estimates separately for female and male students and shows that the positive effect is driven entirely by female students. For female students, OAA receipt increases annual educational expenditure by Rs 4,926 without covariates ($p = 0.004$) and by Rs 4,046 in the specification with covariates ($p = 0.002$). The estimate from the specification with covariates implies a 56 percent increase relative to the control mean. For male students, by contrast, the estimated effects are small and statistically insignificant: Rs 2,989 ($p = 0.217$) without covariates and Rs 421 ($p = 0.785$) in the specification with covariates.

Table 7 yields the same qualitative result under a second-degree polynomial specification. The estimated effect for female students remains large and statistically significant (Rs 6,618 without covariates and Rs 5,840 in the specification with covariates), while the effect for male students remains statistically indistinguishable from zero. Reduced-form estimates (Table 8) lead to a similar conclusion: eligibility increases female educational expenditure by approximately Rs 2,300–2,500, with no corresponding effect for male students.

5.4 Expenditure Categories by Student Gender

Tables 9 and 10 decompose total educational expenditure into categories to identify the margins driving the gender asymmetry, and Figure 4 summarizes the estimated effects. For female students, the increase in total expenditure is concentrated in tuition and uniforms. Tuition expenditure rises by Rs 3,338–4,030 across specifications ($p < 0.01$), and uniform expenditure increases by approximately Rs 530 ($p < 0.01$). No statistically significant effects are observed for transportation, lunch, school supplies, or other categories. For male students, positive effects in some categories are offset by significant reductions in transportation and lunch expenditures, yielding no net increase in total educational spending.

5.5 Falsification Test

To assess whether the observed discontinuity reflects age-related trends rather than OAA eligibility, we estimate placebo regressions at alternative age thresholds (64, 69, 71, and 76 years). Table 11 reports the results for the female subsample. Estimated treatment effects at all placebo cutoffs are statistically insignificant, with robust p-values well above conventional thresholds. The absence of discontinuities at these artificial thresholds supports the validity of the identifying assumption that potential outcomes evolve smoothly with age at the true eligibility cutoff.

5.6 Robustness

We re-estimate the main results under alternative kernel functions, bandwidth selection procedures, polynomial orders, and standard error clustering to assess sensitivity to specification choices. Across these alternatives, the core result remains unchanged: the estimated effect of OAA on educational expenditure is positive for female students and statistically indistinguishable from zero for male students.

Table A1 replaces the baseline triangular kernel with an Epanechnikov kernel while maintaining MSE-optimal bandwidth selection. The estimated effect for female students remains positive and statistically significant under both first- and second-order polynomial specifications, with magnitudes comparable to the baseline, while the male estimates remain insignificant. Table A2 instead applies the coverage-error-optimal bandwidth (`cerrd`) with a triangular kernel. Under the first-order polynomial, the female estimate remains positive and statistically significant; under the second-order polynomial, it remains positive and similar in magnitude, although it is no longer statistically significant. Table A3 combines the coverage-error-optimal bandwidth with an Epanechnikov kernel. Under this more conservative specification, the female estimates remain positive across both polynomial orders, although statistical significance weakens, while the male estimates continue to show no significant effect.

Finally, following Lee and Card (2008), Table A4 clusters standard errors at the level of the running variable to account for the discrete nature of age. Using the baseline triangular kernel and the MSE-optimal bandwidth, the qualitative result remains unchanged across both linear and quadratic specifications: the estimated effect for female students remains positive and statistically significant, while the estimated effect for male students remains close to zero and statistically insignificant.

Overall, the robustness checks show that the paper's main finding is not driven by a particular specification choice. Across a wide range of alternative implementations, OAA receipt increases educational expenditure for female students, with no corresponding effect for male students.

6 Heterogeneity Analysis

If OAA operates by relaxing binding financial constraints, its effects should vary systematically with household characteristics that shape intra-household allocation. We examine heterogeneity along three dimensions: household gender composition, asset wealth, and distance to the nearest primary school.

6.1 Heterogeneity by Household Gender Composition

If OAA income is reallocated within the household toward daughters, the effect should be strongest in households where parents allocate resources across both sons and daughters. In mixed-gender households, additional income can be directed toward either child, making intra-household allocation decisions particularly salient. Table 12 presents estimates separately for households with only male students, only female students, and mixed-gender students. The results show that the effect of OAA on educational expenditure is concentrated in mixed-gender households. In these households, OAA receipt increases educational expenditure by approximately Rs 4,687 in the specification with covariates and Rs 6,159 without

covariates, with both estimates statistically significant. In contrast, the estimated effects for households with only male students and only female students are statistically insignificant. This is consistent with OAA income being reallocated within the household toward daughters when families must divide resources between sons and daughters (Lundberg et al., 1997; Thomas, 1990).

6.2 Heterogeneity by Household Asset Wealth

We next examine whether the impact of OAA varies with baseline household economic conditions. Households are divided at the median of an asset index into asset-poor and asset-rich groups. Because both groups are drawn from non-metropolitan areas, the asset-rich category refers to relatively better-off households within a rural context rather than wealth in absolute terms.

Table 13 shows that the positive effect of OAA on educational expenditure is concentrated among asset-rich households. In this group, receiving OAA increases educational expenditure by approximately Rs 2,551 to Rs 4,739 across specifications, with statistically significant effects in both cases. In contrast, the estimates for asset-poor households are negative in both specifications and statistically significant in one of them. This suggests that when households have some baseline asset buffer, additional income from OAA is more likely to be directed toward educational investment, whereas among poorer households the transfer may be absorbed by more immediate consumption needs.

Table 14 provides additional evidence consistent with this interpretation by jointly examining food and education expenditure. Among asset-rich households, OAA receipt is associated with higher educational expenditure and lower food expenditure, consistent with a reallocation of household spending toward children's education. For asset-poor households, neither education nor food expenditure changes significantly following OAA receipt.

6.3 Heterogeneity by Distance to Primary School

Distance to primary school captures variation in the effective cost of education. Households located farther from school face higher transportation and opportunity costs, which can increase the financial burden of schooling. If OAA operates by relaxing binding financial constraints, its effects should be larger among households facing higher access costs.

Table 15 reports the results. Among households located farther from primary schools, OAA receipt increases educational expenditure by approximately Rs 2,871 to Rs 3,841 across specifications, with both estimates statistically significant. In contrast, the estimates for households located closer to primary schools are less consistent: the specification without individual covariates yields a marginally significant estimate, while the specification with covariates does not. These results are consistent with the interpretation that the educational spending response to OAA is stronger in households facing higher access costs. Additional income from OAA may help offset these costs, allowing households located farther from schools to increase educational investment.

7 Mechanism

The gender asymmetry documented in Section 5.3 raises a central question about why OAA receipt increases educational expenditure for girls but not for boys. The evidence points most strongly to a financial-constraints interpretation. We assess this interpretation against two alternative explanations, namely a bargaining channel linked to the gender of the transfer recipient and shifts from government to private schools.

7.1 Financial Constraint Channel

The evidence is most consistent with a financial-constraints interpretation, although the data do not allow us to observe the mechanism directly. In Nepal, girls' schooling is often the margin most vulnerable to household budget constraints, reflecting son preference and

lower perceived returns to daughters' education (Glick, 2008; Jayachandran, 2015). When resources are limited, educational expenditures on girls are more likely to be deferred or reduced. An exogenous increase in household income may therefore disproportionately raise investment in daughters if it eases financial constraints that had limited spending on girls' schooling.

The category-specific results support this interpretation. The increase in girls' expenditure is concentrated in tuition and uniforms, suggesting that OAA income helps households cover formal schooling costs that may otherwise constrain investment in daughters' schooling. For boys, by contrast, there is no net increase in total educational expenditure. Although some categories rise in certain specifications, these increases are offset by reductions in transportation and lunch expenditures. Taken together, the evidence suggests that girls' schooling is the component of household educational investment most affected by resource constraints.

7.2 Recipient Gender and Bargaining

A natural alternative explanation is that the effect operates through intra-household bargaining power rather than through the relaxation of household financial constraints. A prominent literature argues that who controls income within the household matters for child outcomes, particularly when women receive the transfer (Duflo, 2003). Table 16 examines whether the gender of the OAA recipient mediates the effect on educational expenditure. The results do not support a simple female-control bargaining channel. When the OAA recipient is male, receiving OAA increases total annual educational expenditure by approximately Rs 6,043 and the estimate is statistically significant at the 1 percent level. In contrast, when the recipient is female, the estimated effect is small and statistically indistinguishable from zero. This suggests that the gains for girls are unlikely to be driven primarily by shifts in bargaining power associated with female control of the transfer. Instead, the evidence is more consistent with a financial-constraints interpretation in which additional household resources are directed toward daughters' schooling, regardless of the gender of the recipient.

7.3 Switch to Private Institution

One possible alternative explanation is that OAA leads households to shift children from government to private schools, thereby increasing observed educational expenditures. However, only 235 individuals in our sample switch from government to private institutions during the panel period, suggesting that this channel is quantitatively limited. Moreover, any such switching would be expected to raise measured expenditure for both girls and boys and therefore cannot explain the observed gender asymmetry.

8 Discussion

The results of this paper speak to three related strands of literature, namely the intergenerational effects of social pension programs, intra-household resource allocation, and gender gaps in educational investment. We discuss each in turn before noting some limitations.

8.1 Intergenerational Effects of Social Pensions

Our finding that Nepal's Old Age Allowance increases educational expenditure for girls contributes to a growing literature showing that social pensions can generate intergenerational spillovers. A seminal contribution is Duflo (2003), who shows that pension income received by grandmothers in South Africa improves the nutritional status of granddaughters, with no corresponding effect for grandsons. Our results extend this literature to educational expenditure in a distinct institutional setting.

Nepal's Old Age Allowance (OAA) is a universal non-contributory pension that is smaller in absolute value than the South African grant and operates in a different household and cultural context. Although girls benefit disproportionately in both settings, the pathways through which these effects arise may differ across programs and countries.

Our results are also broadly consistent with evidence from Brazil, where pension reform increased school enrollment and reduced child labor among children living with elderly

beneficiaries (de Carvalho Filho, 2012). More broadly, the existing evidence suggests that transfers received by older adults can affect the human capital outcomes of younger household members, although the underlying mechanisms may vary across institutional settings. To our knowledge, this paper provides the first causal evidence on the intergenerational educational spillovers of Nepal's Old Age Allowance and suggests that these spillovers are strongly gender-differentiated.

8.2 Intra-Household Resource Allocation

The intra-household allocation literature provides a useful framework for interpreting these findings. A strict unitary model of the household (Becker, 1981) would predict broadly symmetric responses to an income shock across children. By contrast, our results show a clear gender asymmetry: educational expenditure rises for girls but not for boys. This is more consistent with collective models (Lundberg et al., 1997; Thomas, 1990), in which household resources are allocated across competing uses and children need not benefit equally from additional income.

The composition of the response reinforces this interpretation. For girls, the increase in expenditure is concentrated in tuition and uniforms, while boys experience no net increase in total educational spending. This is consistent with the view that daughters are more exposed to household resource constraints and therefore benefit more when those constraints are relaxed (Glick, 2008; Jayachandran, 2015). In addition, because the gains for girls are not concentrated among female recipients, the evidence does not support a simple female-control bargaining channel. Instead, it is more consistent with a setting in which additional household resources are directed toward daughters' schooling because the baseline margin is more constrained.

8.3 Gender Gaps in Educational Investment

The concentration of the female effect in tuition and uniforms speaks directly to the literature on gender gaps in human capital investment. Jayachandran (2015) emphasizes that social norms and patrilocal expectations shape how families allocate scarce resources across children, while Glick (2008) highlights that girls' schooling is often more sensitive to household resource constraints. Related evidence also shows that income transfers can generate larger long-run educational gains for females than for males (Parker & Vogl, 2023). Our findings are consistent with this broader account: in non-metropolitan Nepal, relaxing household budget constraints appears to increase investment in girls' schooling even when the transfer is not targeted to children or mothers.

The heterogeneity results reinforce this interpretation. The positive effect of OAA on educational expenditure is concentrated among households with greater asset buffers, while the estimates for asset-poor households are negative in both specifications and statistically significant in one of them. This suggests that among the poorest households, additional income may first be absorbed by immediate subsistence needs before educational investment can expand. Similar heterogeneity in educational responses to transfers has been documented in other contexts (Baird et al., 2014).

9 Conclusion

This paper examines the intergenerational effects of Nepal's Old Age Allowance (OAA) on educational expenditure using a fuzzy regression discontinuity design based on the program's age-70 eligibility threshold. Exploiting quasi-experimental variation in household income generated by OAA eligibility, we estimate the causal effect of pension receipt on educational spending for students enrolled in government schools.

The main finding is a pronounced gender asymmetry. Receipt of OAA increases annual educational expenditure for female students by more than Rs 4,000, representing over 50

percent of the control mean, while the corresponding effect for male students is small and statistically insignificant. Category-level evidence shows that the additional spending for girls is directed toward tuition and uniforms, suggesting that additional household resources help families cover formal schooling costs and expand investment in daughters' education.

The evidence is most consistent with a financial-constraints interpretation. The gains for girls are not concentrated in households where the OAA recipient is female, which does not support a simple female-control bargaining channel. Instead, the results suggest that when household resources increase, additional spending is directed toward daughters' schooling, where resource constraints appear to bind more tightly. The heterogeneity results reinforce this interpretation: the expenditure response is strongest in mixed-gender households, among relatively better-off rural households, and among households located farther from primary schools, while among the poorest households additional income appears more likely to be absorbed by immediate consumption needs.

These findings have two broader implications. First, gender gaps in educational investment may reflect not only social norms or parental preferences, but also the interaction of those factors with binding household budget constraints. Second, social pensions may generate meaningful intergenerational benefits even when they are not explicitly designed as education programs. In settings where girls' schooling is the margin most exposed to resource scarcity, untargeted transfers to older adults can shift spending toward daughters and narrow gender disparities in educational investment.

9.1 Limitations and Directions for Future Research

Several limitations should be noted. First, our outcome measure is educational expenditure rather than enrollment, attendance, grade progression, or learning outcomes. Although higher spending on tuition and uniforms is plausibly linked to continued schooling, the data do not allow us to observe longer-run human capital outcomes directly. Second, the fuzzy RD design identifies a local average treatment effect at the age-70 eligibility threshold, so

the findings apply to households near this cutoff and may not generalize to substantially younger elderly populations or to urban settings. Finally, while the results are consistent with a reallocation of household resources toward girls' education, the data do not allow us to observe intra-household decision-making directly. Further work linking expenditure responses to subsequent schooling outcomes, and combining quantitative analysis with evidence on intra-household decision-making, would help clarify these longer-run implications and mechanisms.

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Tables

Table 1: Summary Statistics (Mean) by Year

	(1) 2016	(2) 2017	(3) 2018
Total Members	4.88	5.05	4.84
	(1.993)	(2.061)	(2.029)
Maximum Age in Family	52.74	53.48	54.27
	(14.90)	(15.12)	(14.92)
Members in School	1.44	1.30	1.31
	(1.285)	(1.259)	(1.242)
Educational Expense (Rupees)	9941.44	10480.41	10943.91
	(16241.7)	(16648.3)	(16867.3)
Food Expense (7 days, Rupees)	2241.31	2180.80	2245.28
	(1249.7)	(1181.1)	(1079.1)
Non Food Expense (Past Year, Rupees)	23822.02	29267.67	29070.63
	(20254.9)	(67297.2)	(19932.6)
Local Migrants	0.26	0.35	0.38
	(0.824)	(0.922)	(0.970)
International Migrants	0.39	0.43	0.41
	(0.675)	(0.739)	(0.730)
Distance to Bank (in km)	11.27	10.76	10.28
	(12.82)	(13.80)	(13.49)
Distance to black topped road (in km)	15.24	14.84	14.51
	(33.91)	(31.92)	(31.67)
Distance to Healthpost (in km)	3.02	2.94	2.92

Continued on next page

Table 1: Summary Statistics (Mean) by Year (continued)

	(1) 2016	(2) 2017	(3) 2018
	(7.089)	(2.601)	(2.588)
Distance to Motorable Road (in km)	3.01	2.38	2.28
	(16.03)	(10.29)	(10.18)
Distance to Primary School (in km)	1.37	1.14	1.10
	(9.693)	(2.704)	(0.828)
Distance to Secondary School (in km)	2.38	2.28	2.26
	(6.990)	(2.169)	(2.113)
Number of storeys (house)	1.50	1.50	1.49
	(0.572)	(0.569)	(0.556)
Gross Revenue from Livestock (Rupees)	4002.96	3103.68	5125.01
	(46061.0)	(18409.6)	(25105.6)
Water Bill (12 months, Rupees)	437.07	512.64	613.75
	(994.2)	(1597.3)	(1079.4)
Electricity Bill (12 months, Rupees)	1568.21	2010.52	1875.00
	(3587.2)	(4057.2)	(3134.7)
Financial Asset (Rupees)	56577.36	51394.14	58215.11
	(149805.7)	(182542.6)	(166127.1)
Total Remittance (12 month, Rupees)	140,000	130,000	140,000
	(215823.4)	(215325.1)	(227051.3)
Number of Observation	5654	6005	6051

Notes: This table presents the mean value of household level characteristics. Columns (1), (2), and (3) report the value for 2016, 2017, and 2018, respectively. Standard deviation is in parentheses.

Table 2: Summary of OAA Eligibility and Receipt by Year (Standard Eligibility Rule)

	2016			**2017**			**2018**		
Eligible for OAA	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**	**No**	**Yes**	**Total**
No	3,908	23	3,931	3,915	31	3,946	3,998	20	4,018
Yes	196	451	647	240	481	721	104	636	740
Total	4,104	474	4,578	4,155	512	4,667	4,102	656	4,758

	Pooled 2016–2018		
	No	**Yes**	**Total**
No	11,821	74	11,895
Yes	540	1,568	2,108
Total	12,361	1,642	14,003

Notes: This table summarizes OAA eligibility and receipt for households in the baseline eligibility sample (excluding households subject to alternative age cutoffs), separately for each survey wave and pooled across 2016–2018. A household is defined as eligible if it has at least one member above the statutory eligibility age in the corresponding survey year.

Table 3: Test of Balance of Household Level Characteristics

	(1) Members in School	(2) Total Local Migrants	(3) Total Intl Migrants	(4) Total Members
Received OAA	-0.151	-0.197	-0.206	-0.875*
	(0.30)	(0.18)	(0.16)	(0.53)
	(5) Distance to Bank	(6) Black Topped Road	(7) Healthpost	(8) Motorable Road
Received OAA	-2.458*	-0.540	0.026	-0.107
	(1.38)	(1.26)	(0.28)	(0.58)
	(9) Primary School	(10) Secondary School	(11) House Storeys	(12) Remittance (12 months)
Received OAA	1.232	0.213	0.244*	-112226.975
	(0.75)	(0.27)	(0.14)	(69408.31)
	(13) Financial Asset	(14) Electricity Bill	(15) Water Bill	(16) Gross Revenue (Livestock)
Received OAA	29402.828	29.108	380.625*	-7186.936
	(28533.14)	(386.24)	(198.92)	(5603.97)

Notes: This table presents the results from the main specification (equation 2) with household-level characteristics as the outcome variables. The model is estimated using a first-degree polynomial of the running variable. Standard errors clustered at the household level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: First Stage: Effect of Age Eligibility on Receipt of Old Age Allowance

	Probability of Receiving OAA	
	(1)	(2)
Above Age Cutoff	0.407***	0.419***
	(0.054)	(0.052)
Observations	14003	13999
Fixed Effects	Y	Y
Additional Covariates	N	Y
Robust p-value	0.000	0.000
Effective Number of Observations	1953	1953
Polyn. Order	1	1
Bandwidth	5.21	5.41
Band. method	mserd	mserd
Kernel	Triangular	Triangular

Notes: This table reports first-stage estimates from a fuzzy regression discontinuity design based on specification 2 with polynomial order of degree 1. The running variable is age and eligibility is determined by crossing the age cutoff. The dependent variable is an indicator for receiving the Old Age Allowance (OAA). The coefficient measures the discontinuous change in the probability of receiving OAA at the eligibility threshold. Bandwidths are selected using the mean squared error optimal (mserd) procedure of Calonico et al. (2014). Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Regression Discontinuity Result: Effect of Old Age Allowance on Education Expenditure

	Annual Education Expenditure (Rs)	
	(1)	(2)
Received OAA	4,316.05**	2,798.58*
	(2,155.91)	(1,591.73)
Mean Dependent Variable (Control)	7,200.74	7,387.87
Observations	14,003	13,999
Fixed Effects	Y	Y
Additional Covariates	N	Y
Robust p-value	0.045	0.079
Effective Number of Observations	2,260	1,953
Polyn. Order	1	1
Bandwidth	6.347	5.998
Band. method	mserd	mserd
Kernel	Triangular	Triangular

Notes: This table reports fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total annual education expenditure. The specification corresponds to equation 2 with polynomial order of degree 1. The running variable is age, and eligibility is determined by crossing the age cutoff. Column (1) includes fixed effects only, while column (2) additionally includes individual-level covariates. Bandwidths are selected using the mean squared error optimal (mserd) procedure of Calonico et al. (2014). Inference follows their robust bias-corrected approach. Standard errors are clustered at the household level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Effect of Old Age Allowance on Education Expenditure by Gender of the Student

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Male	Female	Male	Female
Received OAA	2,989.05	4,926.41***	421.31	4,045.97***
	(2,419.32)	(1,718.36)	(1,545.16)	(1,307.98)
Mean Dep. Variable (Control)	7,221.87	7,200.74	7,281.43	7,200.74
Observations	6,665	7,334	6,665	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	N	Y	Y
Robust p-value	0.217	0.004	0.785	0.002
Effective Num. of Observations	1,690	1,152	1,854	1,152
Polyn. Order	1	1	1	1
Bandwidth	10.324	6.614	11.275	6.341
Band. Method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender of the student. Odd-numbered columns exclude individual-level covariates while even-numbered columns include them. Estimates are obtained using local linear regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Effect of Old Age Allowance on Education Expenditure by Gender of the Student using Second Order Polynomial

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Male	Female	Male	Female
Received OAA	4,467.15	6,617.85**	3,114.09	5,840.33**
	(6,762.98)	(3,043.34)	(4,740.09)	(2,311.59)
Mean Dep. Variable (Control)	7,103.38	7,244.56	7,402.08	7,324.04
Observations	6,665	7,334	6,665	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	N	Y	Y
Robust p-value	0.509	0.030	0.511	0.012
Effective Num. of Observations	1,343	1,288	1,222	1,288
Polyn. Order	2	2	2	2
Bandwidth	8.173	7.311	7.960	7.554
Band. Method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender of the student. Odd-numbered columns exclude individual-level covariates while even-numbered columns include them. Estimates are obtained using local quadratic (second-order) polynomial regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Reduced-Form Effect of OAA Eligibility on Education Expenditure by Gender of the Student

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Male		Female	
Received OAA	1,466.89	2,518.60***	631.66	2,316.63***
	(1,444.84)	(882.42)	(990.14)	(658.54)
Observations	6,665	7,334	6,665	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	N	Y	Y
Effective Number of Observations	1,108	1,442	1,108	1,288
Robust p-value	0.310	0.004	0.524	0.000
Polyn. Order	1	1	1	1
Bandwidth	6.561	8.031	6.630	7.916
Band. Method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table reports reduced-form (sharp RD) estimates of the effect of eligibility for the Old Age Allowance (OAA) on total annual education expenditure by gender of the student. Columns (1) and (2) exclude additional household-level covariates beyond VDC and time fixed effects, while columns (3) and (4) include additional covariates. Estimates are obtained using local linear regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Effect of Old Age Allowance on Education Expenditure Categories: Female Students

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Tuition		Uniform	
Received OAA	4,030.00***	3,337.70***	532.63***	533.75***
	(1,223.90)	(906.00)	(190.74)	(193.32)
Observations	7,334	7,334	7,334	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	Y	N	Y
Robust p-value	0.001	0.000	0.005	0.006
Effective Number of Observations	992	1,152	1,152	992
Polyn. Order	1	1	1	1
Bandwidth	5.310	6.601	6.335	5.667
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

	Annual Education Expenditure (Rs)			
	(5)	(6)	(7)	(8)
	School Supplies		Transportation	
Received OAA	292.41	192.77	87.55	24.55
	(469.24)	(403.43)	(147.68)	(161.49)
Observations	7,334	7,334	7,334	7,334
Fixed Effects	Y	Y	Y	Y
Covariates	N	Y	N	Y
Robust p-value	0.533	0.633	0.553	0.879
Effective Number of Observations	1,288	1,152	1,152	827
Polyn. Order	1	1	1	1
Bandwidth	7.244	6.297	6.510	4.971
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

	Annual Education Expenditure (Rs)			
	(9)	(10)	(11)	(12)
	Lunch		Other	
Received OAA	659.63	623.44	54.85	-82.64
	(471.14)	(437.44)	(258.44)	(230.19)
Observations	7,334	7,334	7,334	7,334
Fixed Effects	Y	Y	Y	Y
Covariates	N	Y	N	Y
Robust p-value	0.161	0.154	0.832	0.720
Effective Number of Observations	827	827	1,152	1,152
Polyn. Order	1	1	1	1
Bandwidth	4.160	4.335	6.147	6.109
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: Tables present fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on education expenditure by category for female students. Even-numbered columns include additional individual-level covariates (scholarship status, school level indicators). Odd-numbered columns include only VDC and time fixed effects. Estimates are obtained using local polynomial regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Effect of Old Age Allowance on Education Expenditure Categories: Male Students

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Tuition		Uniform	
Received OAA	2,696.80*	273.78	581.11**	447.30**
	(1,405.40)	(1,241.40)	(245.44)	(226.97)
Observations	6,665	6,665	6,665	6,665
Fixed Effects	Y	Y	Y	Y
Covariates	N	Y	N	Y
Robust p-value	0.055	0.825	0.018	0.049
Effective Number of Observations	1,953	1,343	1,690	1,529
Polyn. Order	1	1	1	1
Bandwidth	12.005	8.659	10.084	9.909
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

	Annual Education Expenditure (Rs)			
	(5)	(6)	(7)	(8)
	School Supplies		Transportation	
Received OAA	1,381.60**	888.91	-1,160.90**	-1,152.60***
	(681.55)	(578.90)	(457.19)	(415.42)
Observations	6,665	6,665	6,665	6,665
Fixed Effects	Y	Y	Y	Y
Covariates	N	Y	N	Y
Robust p-value	0.043	0.125	0.011	0.006
Effective Number of Observations	1,222	1,222	1,343	1,529
Polyn. Order	1	1	1	1
Bandwidth	7.282	7.864	8.912	9.375
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

	Annual Education Expenditure (Rs)			
	(9)	(10)	(11)	(12)
	Lunch		Other	
Received OAA	-791.49**	-615.74	340.19	354.49
	(399.73)	(475.78)	(379.25)	(317.87)
Observations	6,665	6,665	6,665	6,665
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	Y	N	Y
Robust p-value	0.048	0.196	0.370	0.265
Effective Number of Observations	2,411	1,690	1,690	1,529
Polyn. Order	1	1	1	1
Bandwidth	15.223	10.952	10.144	9.756
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Note: Tables present fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on education expenditure by category for male students. Even-numbered columns include additional individual-level covariates (scholarship status, school level indicators). Odd-numbered columns include only VDC and time fixed effects. Estimates are obtained using local polynomial regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 11: Regression Discontinuity Results for Female Students: Arbitrary Eligibility Age

	(1)	(2)	(3)	(4)
Received OAA	9850.40	-14207.85	3707.23	-3786.25
	(7406.31)	(9003.39)	(4855.68)	(7159.28)
Cutoff	71	76	69	64
Fixed Effects	Y	Y	Y	Y
Additional Covariates	Y	Y	Y	Y
Robust p-value	0.184	0.115	0.445	0.597
Effective Number of Observations	660	434	1200	1806
Polyn. Order	1	1	1	1
Bandwidth	3.321	3.766	6.203	8.026
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents the results of a falsification test using arbitrary eligibility cutoffs for the Old Age Allowance (OAA) program, restricted to female students. The dependent variable in all columns is total educational expenditure. Each column represents a different arbitrary eligibility cutoff: 71 years in column (1), 76 years in column (2), 69 years in column (3), and 64 years in column (4). All models include fixed effects and covariates, and the results are estimated using the mserd bandwidth selection method with a Triangular kernel. Standard errors are clustered at the household level.Standard errors are clustered at the household level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: Effect of Old Age Allowance on Education Expenditure by Gender Composition of Students in Household

	Annual Education Expenditure (Rs)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Only Male Students	Only Female Students	Mixed Gender Students	Only Male Students	Only Female Students	Mixed Gender Students
Received OAA	6,126.50	2,883.90	4,686.60**	6,304.40	4,967.60	6,159.10***
	(4,795.20)	(1,912.80)	(2,159.20)	(5,486.00)	(4,303.60)	(1,607.20)
Mean Dep. Variable (Control)	7,896.85	7,779.00	6,796.55	7,934.52	8,281.48	6,285.55
Observations	2,814	3,123	8,062	2,818	3,123	8,062
Fixed Effects	Y	Y	Y	Y	Y	Y
Additional Covariates	Y	Y	Y	N	N	N
Robust p-value	0.201	0.132	0.030	0.250	0.248	0.000
Effective Num. of Observations	632	526	895	709	304	1,912
Polyn. Order	1	1	1	1	1	1
Bandwidth	8.582	6.023	4.471	9.460	3.845	10.447
Band. method	mserd	mserd	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender composition of students in the household. Columns (1)–(3) restrict the sample to households with only male students, only female students, and mixed-gender students, respectively, and include individual-level covariates. Columns (4)–(6) use the same samples but exclude individual-level covariates beyond VDC and time fixed effects. Estimates are obtained using local polynomial regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13: Effect of Old Age Allowance on Education Expenditure by Household Asset Wealth

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Asset-Poor Households		Asset-Rich Households	
Received OAA	-1803.800	-2751.100**	4738.700**	2550.900*
	(1312.00)	(1215.60)	(2130.40)	(1412.60)
Observations	5776	5775	7404	7402
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	Y	N	Y
Robust p-value	0.169	0.024	0.026	0.071
Effective Number of Observations	1061	1061	1418	1418
Polyn. Order	1	1	1	1
Bandwidth	8.468	8.748	7.295	7.720
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by household asset wealth. The sample is split at the median household asset index. Columns (1) and (2) restrict to asset-poor households (below median), while columns (3) and (4) restrict to asset-rich households (above median). Even-numbered columns include individual-level covariates (gender, scholarship status, school level indicators) in addition to VDC and time fixed effects. Odd-numbered columns include only VDC and time fixed effects. Estimates are obtained using local polynomial regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 14: Effect of Old Age Allowance on Food and Education Expenditure by Household Asset Wealth

	Annual Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Asset-Poor Households		Asset-Rich Households	
	Education	Food	Education	Food
Received OAA	-1803.800	484.550	4738.700**	-775.710**
	(1312.00)	(415.25)	(2130.40)	(318.43)
Observations	5776	5775	7404	7404
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	Y	N	N
Robust p-value	0.169	0.243	0.026	0.015
Effective Number of Observations	1061	1061	1418	1087
Polyn. Order	1	1	1	1
Bandwidth	8.468	8.873	7.295	5.628
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on education and food expenditure by household asset wealth. The sample is split at the median household asset index. Columns (1) and (2) restrict to asset-poor households (below median), while columns (3) and (4) restrict to asset-rich households (above median). All columns include VDC and time fixed effects. Note that the food expenditure result for asset-poor households (column 2) includes additional individual-level covariates while the remaining columns do not. The results suggest that among asset-rich households, OAA receipt is associated with a significant increase in education expenditure alongside a significant reduction in food expenditure, consistent with a reallocation of household resources toward children's education. No significant effects are found for asset-poor households. Estimates are obtained using local polynomial regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 15: Effect of Old Age Allowance on Education Expenditure by Distance to Primary School

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Near Primary School		Far from Primary School	
Received OAA	4,517.73*	1,154.42	3,840.93**	2,871.11**
	(2,619.32)	(1,742.91)	(1,761.93)	(1,462.98)
Mean Dependent Variable (Control)	7,462.34	7,325.91	6,769.74	6,769.74
Observations	10,118	10,115	3,885	3,884
Fixed Effects	Y	Y	Y	Y
Additional Covariates	N	Y	N	Y
Effective Number of Observations	1,383	1,603	1,150	1,150
Robust p-value	0.085	0.508	0.029	0.050
Polyn. Order	1	1	1	1
Bandwidth	5.930	6.626	11.221	11.445
Band. method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by distance to the nearest primary school. The sample is split at the median travel time to primary school. Columns (1) and (2) restrict to households at or below the median travel time (better school access), while columns (3) and (4) restrict to households above the median travel time (worse school access). Even-numbered columns include individual-level covariates (gender, scholarship status, school level indicators) in addition to VDC and time fixed effects. Odd-numbered columns include only VDC and time fixed effects. Estimates are obtained using local polynomial regressions with robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

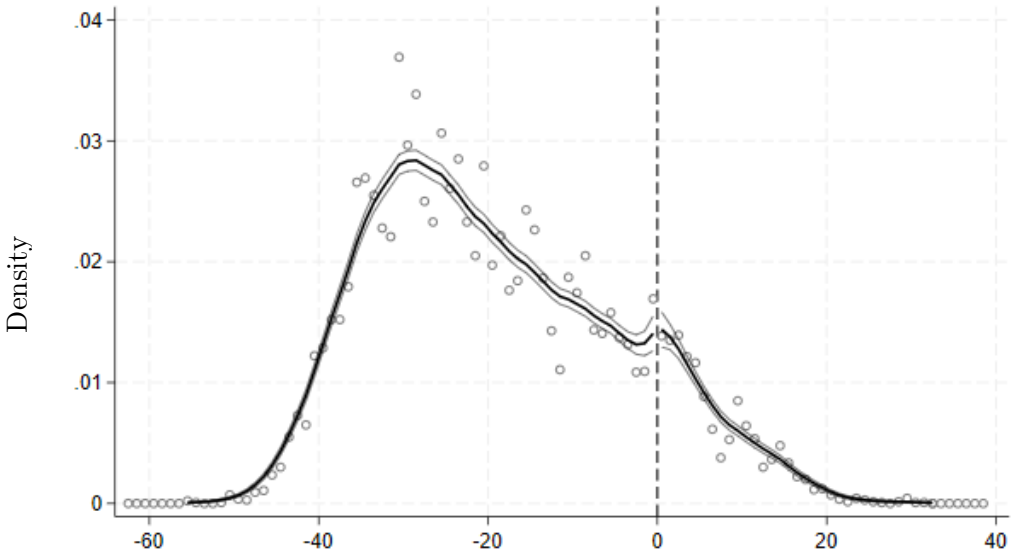
Table 16: Effect of Old Age Allowance on Education Expenditure by Gender of the Recipient

	Annual Education Expenditure (Rs)			
	First Order Polynomial		Second Order Polynomial	
	(1)	(2)	(3)	(4)
	Male Recipient	Female Recipient	Male Recipient	Female Recipient
Received OAA	6,043.14***	210.82	8,781.22**	-379.48
	(2,209.89)	(2,192.68)	(3,798.44)	(3,111.37)
Mean Dep. Variable (Control)	7,392.98	7,387.87	7,200.74	7,077.71
Observations	13,088	12,711	13,088	12,711
Fixed Effects	Y	Y	Y	Y
Additional Covariates	Y	Y	Y	Y
Robust p-value	0.006	0.923	0.021	0.903
Effective Num. of Observations	1,250	1,199	1,798	2,216
Polyn. Order	1	1	2	2
Bandwidth	4.506	5.544	6.578	9.034
Band. Method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender of the OAA recipient. Columns (1) and (2) report estimates from local linear regressions, while columns (3) and (4) report estimates from local quadratic regressions. All specifications include fixed effects and additional covariates. Estimates are obtained using robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Standard errors are clustered at the household level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

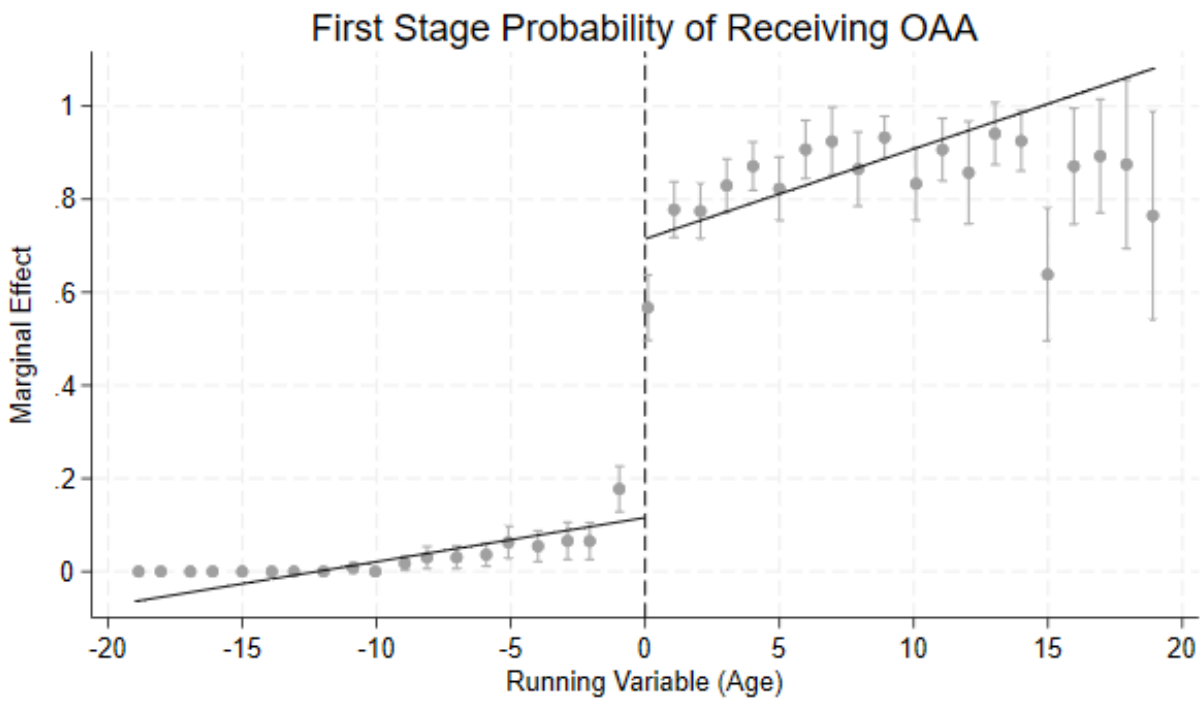
Figures

Figure 1: McCrary Density Test



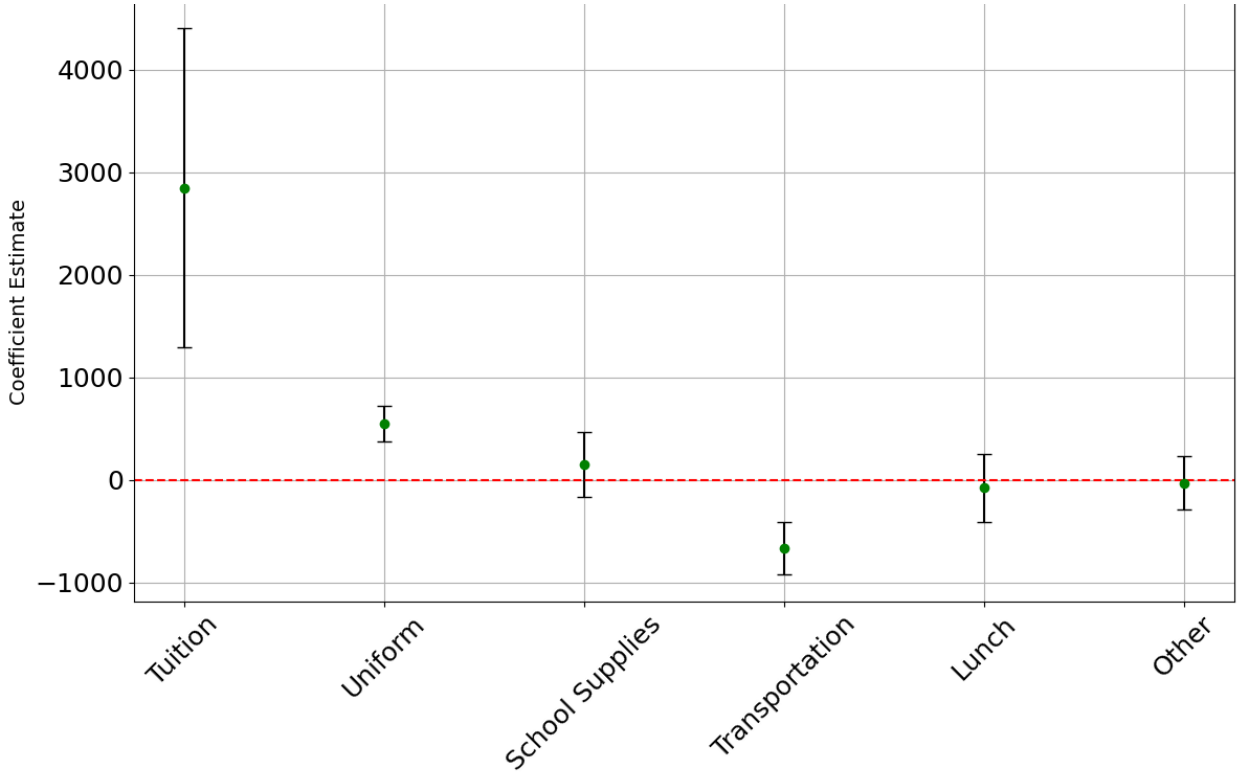
Note: This figure presents the McCrary (2008) density test for manipulation of the running variable at the eligibility cutoff. The horizontal axis shows the running variable as defined in Equation 1. The vertical dashed line marks the cutoff at zero. The discontinuity estimate is 0.002 (SE = 0.086, t-statistic = 0.03), providing no evidence of manipulation at the cutoff.

Figure 2: First Stage: Probability of Receiving OAA



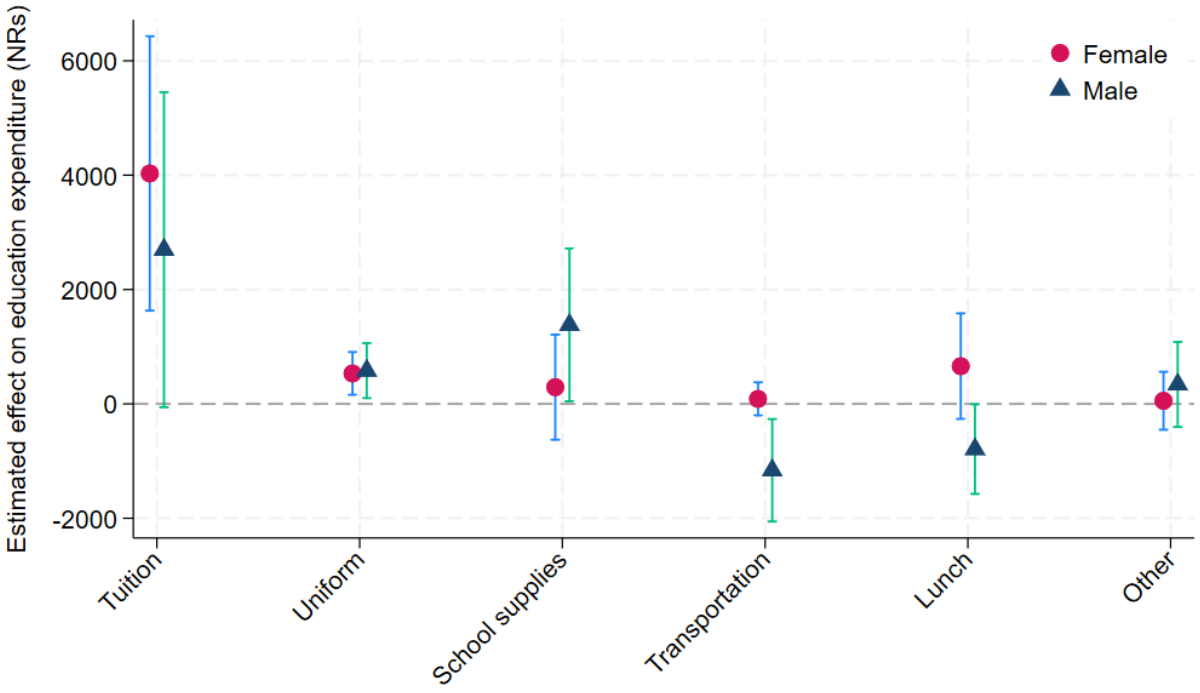
Note: This figure displays the first-stage regression discontinuity plot. The horizontal axis shows the running variable as defined in Equation 1 and the vertical axis shows the probability of receiving the Old Age Allowance. The vertical dashed line marks the cutoff at zero. The solid lines represent the local polynomial fit with 95 percent confidence intervals, estimated using a triangular kernel and a first-order polynomial. Bin selection uses the mimicking variance evenly-spaced method (ESMV).

Figure 3: Effect of Old Age Allowance Eligibility on Educational Expenditure by Category



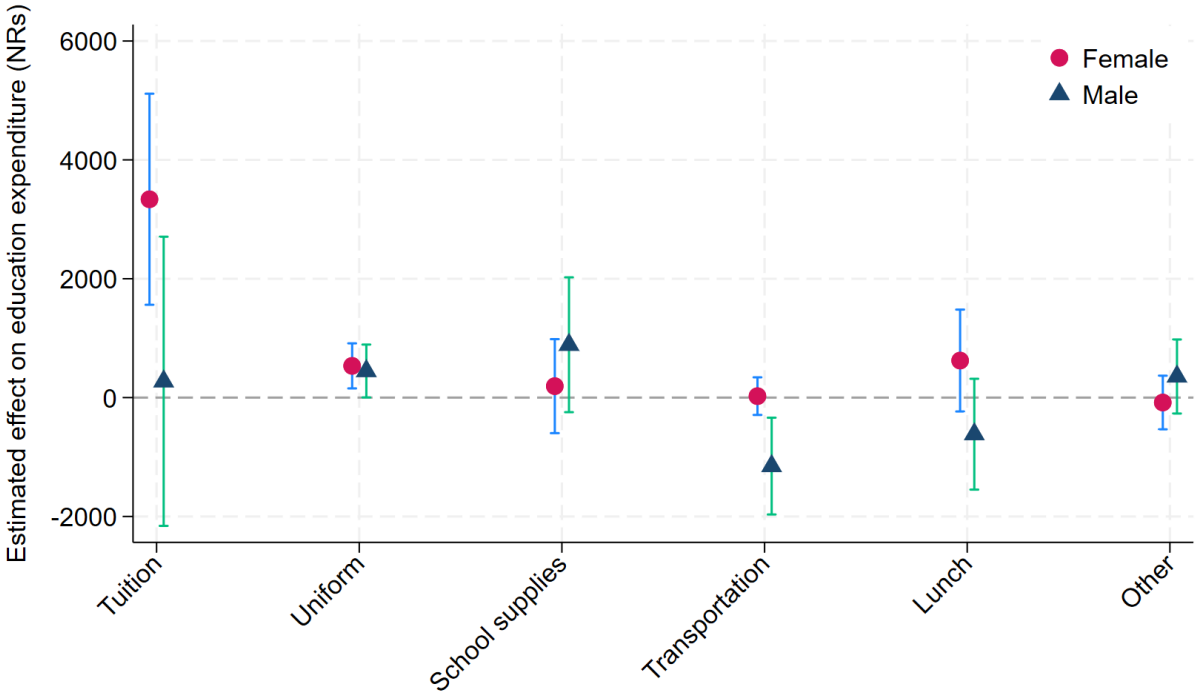
Note: This figure presents fuzzy regression discontinuity estimates of the effect of Old Age Allowance (OAA) receipt on individual categories of household educational expenditure. Each point represents the bias-corrected treatment effect for a separate outcome — tuition, uniforms, supplies, transportation, lunch, and other expenses — estimated using `rdrobust` at the age eligibility cutoff. Vertical lines indicate 95 percent robust confidence intervals clustered at the household level. All specifications include village and survey-wave fixed effects, as well as additional controls. Estimation uses a triangular kernel and a first-order local polynomial in the running variable. Bandwidth selection follows the MSE-optimal procedure and bin selection uses the mimicking variance evenly-spaced method (ESMV).

Figure 4: Estimated Effect: Category-wise Expenses by Gender



Note: This figure reports fuzzy regression discontinuity estimates of the effect of Old Age Allowance (OAA) eligibility on different categories of education expenditure, separately for female and male students. Each point shows the bias-corrected treatment effect for a given spending category (tuition, uniform, school supplies, transportation, lunch, and other), with vertical lines denoting 95 percent confidence intervals. Estimates are obtained using the main `rdrobust` specification with village and survey-wave fixed effects. The estimation uses the rdplot package in Stata. Triangular kernel is chosen and degree one polynomial function in running variable is used. For bin selection, mimicking variance evenly-spaced method (esmv) is used.

Figure 5: Estimated Effect: Category-wise Expenses by Gender (With Covariates)



Note: This figure reports fuzzy regression discontinuity estimates of the effect of Old Age Allowance (OAA) eligibility on different categories of education expenditure, separately for female and male students. Each point shows the bias-corrected treatment effect for a given spending category (tuition, uniform, school supplies, transportation, lunch, and other), with vertical lines denoting 95 percent confidence intervals. Estimates are obtained using the main `rdrobust` specification with village fixed-effects, survey-wave fixed effects, and additional covariates. The estimation uses the rdplot package in Stata. Triangular kernel is chosen and degree one polynomial function in running variable is used. For bin selection, mimicking variance evenly-spaced method (esmv) is used.

Appendix

Table A1: Effect of Old Age Allowance on Education Expenditure by Gender of the Student (Epanechnikov Kernel/mserd Bandwidth)

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Male	Female	Male	Female
Received OAA	581.92	4,908.80***	-2,430.05	5,649.73**
	(1,752.17)	(1,451.92)	(2,875.78)	(2,316.10)
Mean Dep. Variable (Control)	7,171.77	7,329.86	7,605.62	7,160.40
Observations	6,665	7,334	6,665	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	Y	Y	Y	Y
Robust p-value	0.740	0.001	0.398	0.015
Effective Num. of Observations	1,529	992	2,083	1,288
Polyn. Order	1	1	2	2
Bandwidth	9.199	5.009	13.190	7.269
Band. Method	mserd	mserd	mserd	mserd
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender of the student using an Epanechnikov kernel. Columns (1) and (2) report estimates from local linear regressions, while columns (3) and (4) report estimates from local quadratic regressions. All specifications include fixed effects and additional covariates. Estimates are obtained using robust bias-corrected inference. Bandwidth selection follows the `mserd` procedure. Estimates adjust for mass points in the running variable. Robust bias-corrected standard errors clustered at the household level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A2: Effect of Old Age Allowance on Education Expenditure by Gender of the Student (Triangular Kernel, cerrd Bandwidth)

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Male	Female	Male	Female
Received OAA	874.17	4,809.06***	-2,987.40	7,214.20*
	(1,918.80)	(1,634.13)	(5,848.06)	(3,840.11)
Mean Dep. Variable (Control)	7,330.51	7,156.86	7,447.94	7,156.86
Observations	6,665	7,334	6,665	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	Y	Y	Y	Y
Robust p-value	0.649	0.003	0.609	0.060
Effective Num. of Observations	1,222	827	961	827
Polyn. Order	1	1	2	2
Bandwidth	7.647	4.297	5.108	4.842
Band. Method	cerrd	cerrd	cerrd	cerrd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender of the student. Columns (1) and (2) report estimates from local linear regressions, while columns (3) and (4) report estimates from local quadratic regressions. All specifications include fixed effects and additional covariates. Estimates are obtained using robust bias-corrected inference. Bandwidth selection follows the `cerrd` procedure with a triangular kernel. Estimates adjust for mass points in the running variable. Robust bias-corrected standard errors clustered at the household level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Effect of Old Age Allowance on Education Expenditure by Gender of the Student (Epanechnikov Kernel, cerrd Bandwidth)

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Male	Female	Male	Female
Received OAA	1,414.59	5,081.89***	1,647.95	7,122.90*
	(2,125.22)	(1,881.35)	(3,861.49)	(3,720.59)
Mean Dep. Variable (Control)	7,323.07	7,124.73	7,159.95	7,156.86
Observations	6,665	7,334	6,665	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	Y	Y	Y	Y
Robust p-value	0.506	0.007	0.670	0.056
Effective Num. of Observations	1,108	662	1,343	827
Polyn. Order	1	1	2	2
Bandwidth	6.239	3.394	8.463	4.659
Band. Method	cerrd	cerrd	cerrd	cerrd
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender of the student. Columns (1) and (2) report estimates from local linear regressions, while columns (3) and (4) report estimates from local quadratic regressions. All specifications include fixed effects and additional covariates. Estimates are obtained using robust bias-corrected inference. Bandwidth selection follows the `cerrd` procedure with an Epanechnikov kernel. Estimates adjust for mass points in the running variable. Robust bias-corrected standard errors clustered at the household level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Effect of Old Age Allowance on Education Expenditure by Gender of the Student (Clustering at Running Variable)

	Annual Education Expenditure (Rs)			
	(1)	(2)	(3)	(4)
	Male	Female	Male	Female
Received OAA	530.28	3,827.31***	3,692.15	5,393.69***
	(803.49)	(911.08)	(3,272.49)	(1,486.31)
Mean Dep. Variable (Control)	7,284.07	7,160.40	7,330.51	7,160.40
Observations	6,665	7,334	6,665	7,334
Fixed Effects	Y	Y	Y	Y
Additional Covariates	Y	Y	Y	Y
Effective Num. of Observations	1,690	1,288	1,222	1,288
Robust p-value	0.509	0.000	0.259	0.000
Polyn. Order	1	1	2	2
Bandwidth	10.913	7.597	7.098	7.943
Band. Method	mserd	mserd	mserd	mserd
Kernel	Triangular	Triangular	Triangular	Triangular

Notes: This table presents fuzzy regression discontinuity estimates of the effect of receiving the Old Age Allowance (OAA) on total education expenditure by gender of the student. Columns (1) and (2) report estimates from local linear regressions, while columns (3) and (4) report estimates from local quadratic regressions. All specifications include fixed effects and additional covariates. Estimates are obtained using robust bias-corrected inference with standard errors clustered at the running variable. Bandwidth selection follows the `mserd` procedure with a triangular kernel. Estimates adjust for mass points in the running variable. Robust bias-corrected standard errors clustered at the running variable in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.