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HR EXCELLENCE IN RESEARCH

# The impact of drought on education in rural Thailand: a synergy between SDG-4, SDG-2, and SDG-13

10 years of the Turin Centre on Emerging Economies: lessons learned and perspectives for the future  
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# 1. Introduction

## Synergies Across SDGs: **Climate, Education, and Food Security**



# 1. Introduction

## Synergies Across SDGs: Climate, Education, and Food Security



## A fitting context: The Lower Mekong Basin



## 1.1 Drought and vulnerability in Thailand

### Tropical climate:

- Seasonal monsoon winds with variability in precipitation
- Heavily influenced by the **El Niño Southern Oscillation (ENSO)**

### Precipitation variability:

- Increased frequency and severity of droughts over the past 20 years (Lyon, 2004)

### Most affected regions:

- **Northeast Thailand**, the Poorest Region of the country:
  - Poor soil quality and extended dry seasons (Garbero and Muttarak, 2013)
  - Least agriculturally productive area in the country (Mekong River Commission, 2019)
- **Lower Mekong Basin:**
  - 45% of the population lives below \$1.90/day, PPP (WB, 2020)
  - Agriculture is the livelihood for over 70% of the population

## 1.2 Agriculture and food security in Thailand

### Agriculture: a key sector

- Employs **30% of the national workforce** (IMF, 2022)
- Generates the **lowest value added per worker** in the economy (Udomkerdmongkol, 2020)
- Thailand is the **world's second-largest rice exporter**, projected to overtake India by 2027 (OECD, 2018)

### Vulnerability to drought:

- **Lower Mekong Basin:** highly reliant on rice cultivation
- 2015 drought:
  - Economic losses of **USD 1.7 billion** (Mekong River Commission, 2019)
  - **9.56 million people** affected (Mekong River Commission, 2019)
- Increased drought frequency expected over the next 30 years (Yamauchi, 2014)

### Importance of rice production:

- Key to **economic growth** and **poverty eradication**
- Essential for ensuring **regional food security** in the Mekong Basin (Jalota et al., 2012)

## 1.3.1 Historical development of education in Thailand

### Key Milestones

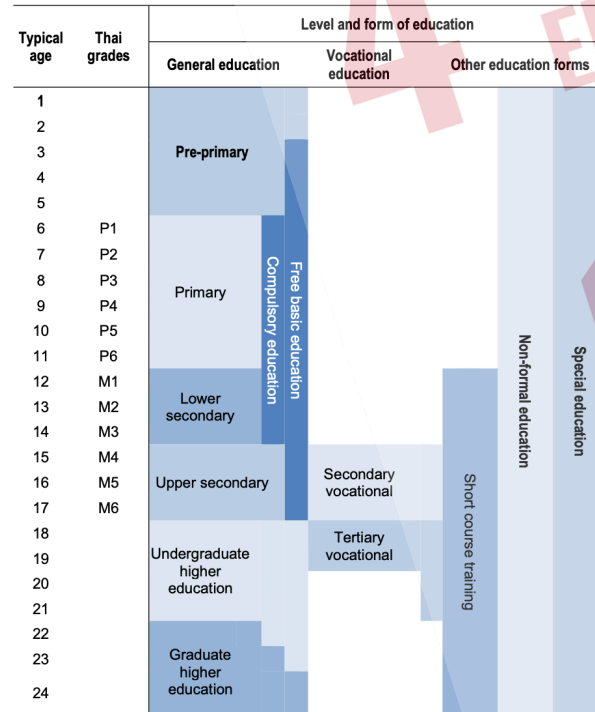
- **1921:** Introduction of free and compulsory education for children aged 7–14 under King Vajiravudh (Rama VI)
- **1997 Constitution:**
  - Extension to **12 years of free schooling** (6 primary + 6 secondary)
  - Aimed at addressing low transition rates to secondary school and boosting Thailand's competitiveness
- **2009 Education Act:** Further extension to **15 years of free education**, including **2 years of kindergarten** and **1 year of pre-primary education**

### Historical Context

- **Unique development path:** Never colonized by Western powers, allowing early emphasis on Thai culture and values in education
- **Modernization:** Opening to Western influences in the 20th century, particularly in secondary education
- Significant public investment in education to improve access and equity.

## 1.3.2 Contemporary overview of education in Thailand

The Thai formal education system



## 1.3.2 Contemporary overview of education in Thailand

		Completion rates (%)		
		Primary	Lower secondary	Upper secondary
Total		99	86	47
Sex	Male	98	81	42
	Female	99	92	54
Area	Urban	99	90	56
	Rural	98	83	37
Wealth quintile	Poorest	97	66	19
	Second	97	85	35
	Middle	99	88	43
	Fourth	99	91	60
	Richest	100	98	76
Region	Bangkok	99	88	64
	Central	99	91	50
	North	99	86	43
	Northeast	100	85	35
	South	95	79	42

### Challenges:

- Inequalities in completion rates:**

- **Rural vs. Urban:** Urban children fare better, especially in upper secondary school
- **Wealth gap:** Children in the poorest quintile have **31% lower completion rates** in upper secondary than those in the richest quintile
- **Regional disparities:** The **Northeast region** has the **lowest completion rates** (35% for upper secondary)

- **Data gaps:** No official data on repetition rates, an important indicator of system efficiency



## 1.4 Research Questions

1. How does drought affect enrolment and grade delay for children in rural Thailand?
2. Is there a specific impact of drought on families reliant on rice farming for their livelihoods?
3. Are the effects of drought on education outcomes influenced by drought severity and school cycle?

## 2. Data

**Dataset: TVSEP Project** (*Thailand Vietnam Socio-Economic Panel*) project, conducted by *Leibniz Universität Hannover and the University of Göttingen*

- **Purpose:** Analyse vulnerability to poverty in rural Thailand and Vietnam
- **Target Population:** Rural households with per capita income at or below the poverty line
- **Coverage:**
  - **Sample Size:** 4,400 households across **440 villages** in Thailand and Vietnam
  - **Thailand Provinces:** **Nakhon Phanom, Ubon Ratchathani, Buriram** (Northeast region, Lower Mekong Basin)
- **Survey Types:**
  - **Households:** Detailed socio-economic and demographic data
  - **Village Heads:** Infrastructure, institutions, services, and village-level production
  - **Migrants:** Rural-to-urban migration dynamics
- **Data Collection**
  - **Waves:** Six waves (2007, 2008, 2010, 2011, 2016, 2017)

## 2.1 Data on education

### Variables of Interest

- **Enrolment:** *Currently enrolled in school?*
- **Grade delay:** *Grade currently enrolled in*
  - Difference between expected and actual grade based on age
  - $GradeDelay_{it} = Age_{it} - (Grade_{it} + 5)$
  - A positive change indicates falling behind

### Dataset Cleaning and Focus

- **Age Group:** Individuals aged 6–18
- **Final Sample**
  - **Enrolment Analysis:** 8,126 observations from 3,105 individuals across 220 villages and 45 districts
  - **Grade Delay Analysis:** 6,704 observations from 2,696 individuals across 220 villages and 45 districts



## 2.2 Data on drought

- **Drought exposure:** Dummy variable indicating whether the household experienced drought in the previous year.
  - Constructed from the survey question: *"What shocks did your household experience in the last year?"*
  - If **drought** was mentioned among the first five responses, the variable is coded as 1; otherwise, it is 0

### Variables (self reported):

- *Year & Month of Drought*
- *Severity:* High, Medium, Low
- *Extension:* Impacted households in village/district/province/country
- *Recovery Time:* Months to recover

### Agriculture Variables

- **Rice Cultivation for Market (Agr. HH):** Dummy variable indicating whether the household primarily produces rice for the market
  - Constructed from survey data on agricultural production:
    - $TotalRiceProduction [Kg] = RiceForPersonalConsumption [Kg] + RiceForMarketSale [Kg]$
    - If  $\frac{RiceForPersonalConsumption [Kg]}{TotalRiceProduction [Kg]} < 25\%$ , **Agr. HH = 1, 0 otherwise**

## 3.0 Methodology

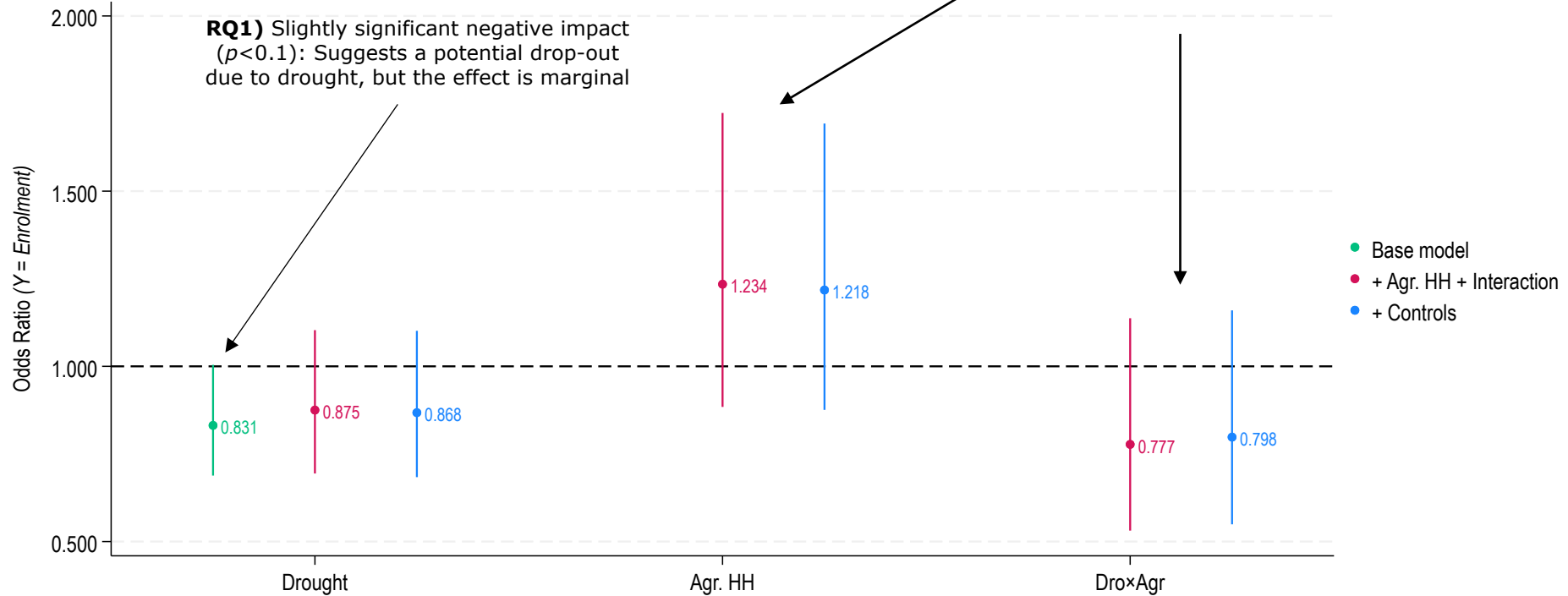
**Multilevel regression models** with random intercept (individuals nested within villages) and standard errors clustered at the district level

1.  $Y_{ihvdt} = \beta_0 + \beta_1 \text{Drought}_{hvd(t-1)}$
2.  $Y_{ihvdt} = \beta_0 + \beta_1 \text{Drought}_{hvd(t-1)} + \beta_2 \text{Agr}_{hvd(t-1)} + \beta_3 \text{Drought}_{hvd(t-1)} \times \text{Agr}_{hvd(t-1)}$
3.  $Y_{ihvdt} = \beta_0 + \beta_1 \text{Drought}_{hvd(t-1)} + \beta_2 \text{Agr}_{hvd(t-1)} + \beta_3 \text{Drought}_{hvd(t-1)} \times \text{Agr}_{hvd(t-1)}$   
 $+ X_{ihvdt(t-1)}$  - Individual-level controls: *gender, health status*  
 $+ Z_{hvd(t-1)}$  - Household-level controls: *size, HH head's education*

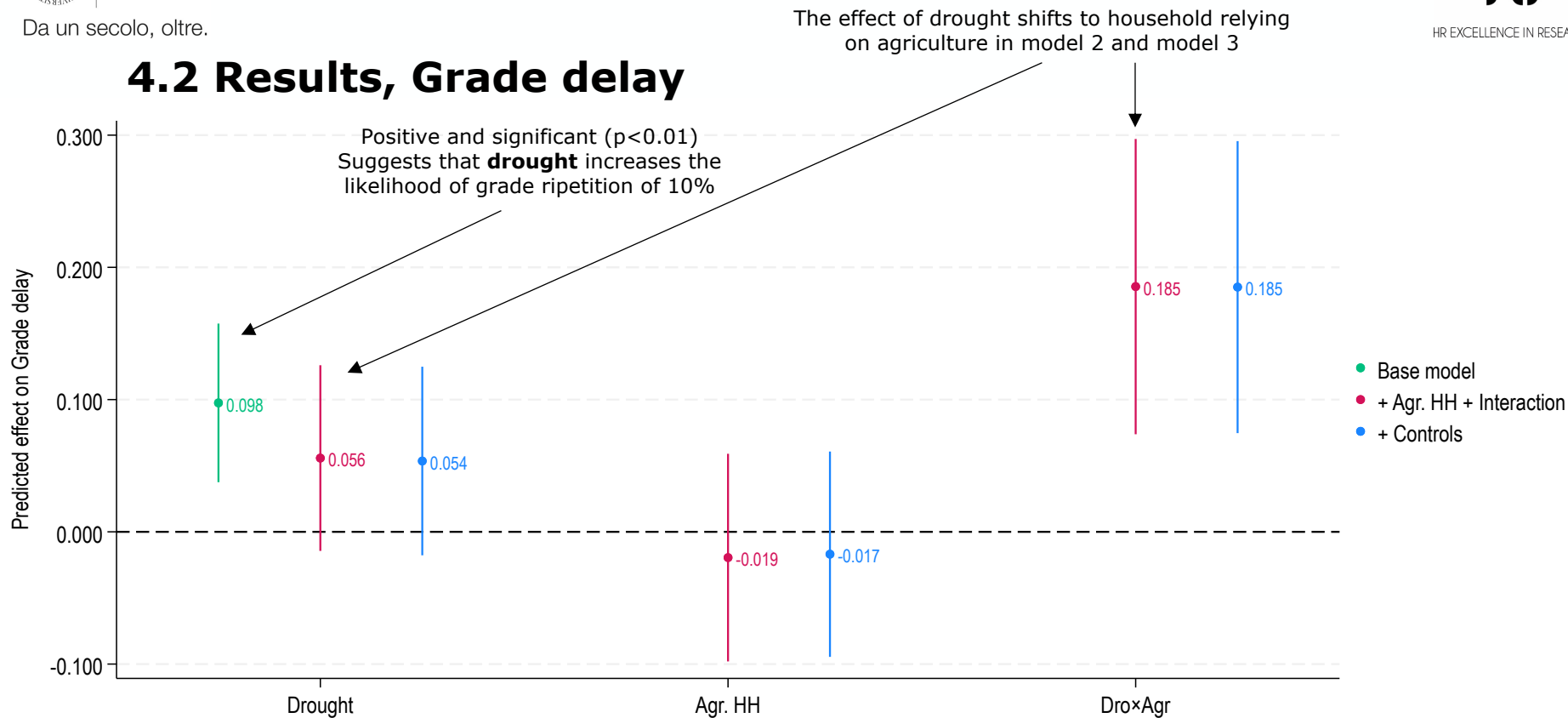
Where  $Y_{ihvdt}$  determines the model type:

- **Enrolment** ( $Y_{ihvdt} = 1$  if enrolled, 0 otherwise): **Multilevel logistic regression** ( $+ u_v$ )
- **Grade delay** ( $Y_{ihvdt} = \text{Grade delay}$ ): **Multilevel mixed-effects regression** ( $+ u_v + \varepsilon_{iv}$ )

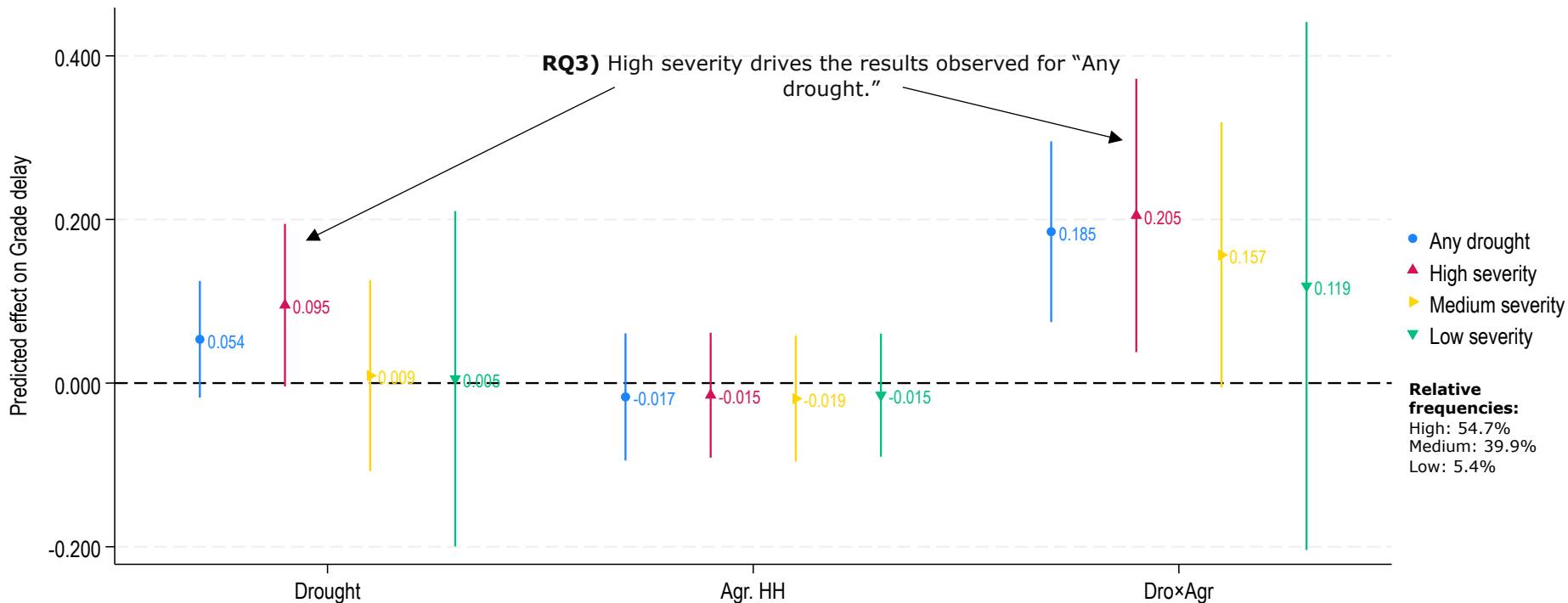
## 4.1 Results, Enrolment



## 4.2 Results, Grade delay

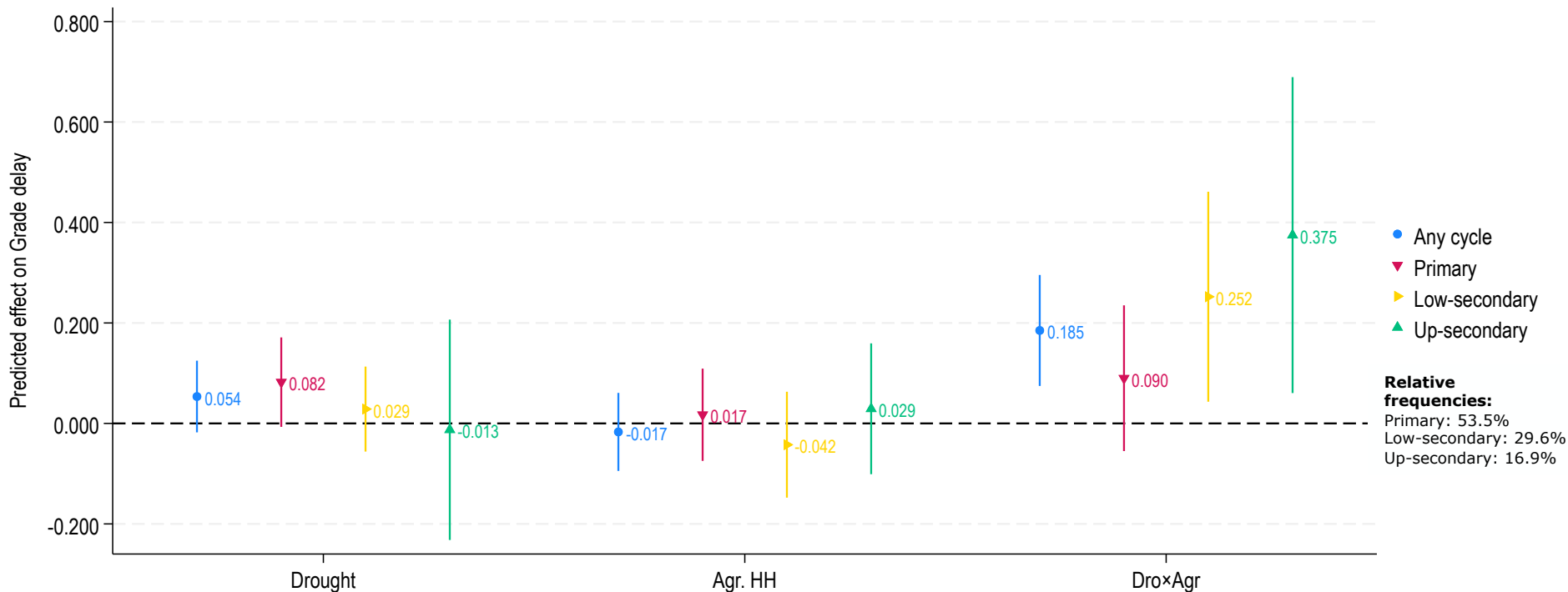


## 4.2 Results, Grade delay by severity of the event





## 4.2 Results, Grade delay by school cycle



## 5.2 Conclusions, Enrolment

**1. No significant effect observed:** drought does not substantially impact **quantity of education**. Explanations:

1. Household adaptation strategies: Families might prioritize children's education despite external economic pressures
2. Community resilience: Schools in affected areas may offer consistent access to education, mitigating adverse impacts

**Conclusion:** While drought has evident economic and agricultural consequences, its direct impact on the quantity of education completed by children seems negligible

## 5.2 Conclusions, Grade delay

### 1. Drought does not impact all households equally:

1. The likelihood of grade repetition reaches the value of 20% for students from families relying on rice production
2. No significant effect observed for non-agricultural households

### 2. Severity of drought matters:

1. For severe droughts, an effect is observed across all families
2. Mild or moderate droughts show no significant impact on grade delay

### 3. Disentangling by education level reveals growing impacts across school cycles:

1. Primary education: no effect
2. Lower-secondary education: Moderately high effect (+25%)
3. Upper-secondary education: Highest effect (+37%)

## 5.3 Conclusions, Potential mechanisms

1. **Economic Strain on Farming Households:** reduced agricultural income during severe droughts leads to:
  1. **Lower investment in education-related expenses:** school supplies, books, uniforms, and transportation
  2. **Prioritization of basic needs** over educational activities
2. **Time Reallocation within Households**
  1. Children in farming households spend more time assisting with household chores or farm-related tasks, this reallocation reduces time available for homework, study, and school attendance
3. **Psychological and physical stress**
  1. Children's stress levels increase due to heightened household tensions or uncertainty
  2. Food insecurity during drought periods may impact concentration and school performance

## 5.4 Conclusions, Policy implications

1. **Targeted Support for Agricultural Communities:** develop support programs for families reliant on farming, including educational subsidies during severe drought periods
2. **Strengthen Secondary Education:** Prioritize interventions for upper-secondary students, who face the highest risk of grade delay (+37%)
3. **Climate-Resilient Policies:** Invest in irrigation systems and drought-resilient farming to protect rural livelihoods, indirectly supporting educational outcomes
4. **Integrating SDG Priorities:** Policies must address interconnections: enhance climate resilience (SDG 13), protect food security (SDG 2), and ensure inclusive education (SDG 4)
5. **Monitoring and Evaluation:** Establish long-term monitoring frameworks to evaluate the educational impact of climate shocks and adjust policy accordingly.



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# Thanks for your attention

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