Causal Effect of Inflation Expectations on Human Capital Investment and Employment Decisions: Evidence from CUNY, the Public University System in New York City

Pre-analysis Plan

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1 Introduction

The early 2020s saw a rapid and substantial increase in prices, with inflation in the US increasing from below 1.5 percent in 2020 to above 9 percent only two years later.[1] Unexpected increases in prices may be disruptive both at the aggregate level as well as for individual consumers' spending and investment decisions, choices which may have long-term consequences for individual welfare (Armantier et al., 2015; Ichiue and Nishiguchi, 2015; Bachmann et al., 2015; Burke and Ozdagli, 2023).

While previous research has established that inflation may affect physical and financial investments, human capital investment decisions and employment decisions have been less considered. Yet, human capital and employment decisions are an important determinant of individual economic prospects as well as for long-term aggregate economic growth and are typically thought of in the same way as investments in physical or financial capital: individuals make their educational and employment choices based on calculations of costs and benefits from their investments and choices are subject to several sources of uncertainty (see, Becker, 2009; Card, 2001, and references therein).

[1] Inflation, measured as Consumer Price Index for All Urban Consumers (CPI-U), U.S. city average, all items index, was 1.4 percent in December 2021 and reached 9.1 percent in June 2022 (BLS News release: Consumer Price Index – August 2024. URL: https://www.bls.gov/news.release/pdf/cpi.pd.

In this project, we propose to analyze whether inflation expectations impact individuals' human capital investments in general, and specifically their educational and employment choices. To do so, we generate exogenous variation in inflation expectations through a RCT information treatment design to identify the causal impact of inflation expectations on City University of New York (CUNY) students' human capital investment and employment decisions post-graduation.

2 Experimental Design

2.1 Sample

We administered a special online survey and information experiment to CUNY students between April 5, 2023 and June 21, 2023.[2] CUNY is the public university system of New York City. It is also the largest urban university in the United States and a major provider of social mobility in the country (U.S. News & World Report, 2023).

The survey served multiple purposes. First, it collected information on the difficulties that CUNY students faced during the Covid-19 pandemic. Second, it collected data on the impacts of the CUNY Chancellor Emergency Relief (CER) fund, which supported students during the pandemic. Lastly, it collected information on individuals' expectations, both about the aggregate economy and their own economic situation, and it included the information intervention described below.

The survey was sent to: 1) a random sample of students enrolled in Spring 2023; and 2) the totality of students who were eligible for the CER fund in Spring 2020. Because CER fund eligibility was based on socioeconomic status, the survey thus oversampled economically vulnerable students. This is important as it will allow us to increase precision in subgroup analysis by economic vulnerability. All subjects in the survey were 18 years old or older and provided informed consent.

There were three versions of the survey based on students' enrollment status in Spring 2023 and CER fund eligibility:

- **Spring 2023 & CER.** One version asked questions relevant to those who were CER fund eligible AND enrolled in Spring 2023.
- **CER only.** Another version asked questions relevant to those who were CER fund eligible but no longer enrolled.

[2]The survey was created in Qualtrics and received IRB approval (IRB file #2020-0475 on July 21st, 2020, amended on March 28 2023).

- **Spring 2023 only.** A final version asked questions relevant to those who were enrolled in Spring 2023 but not CER fund eligible.

58,248 students were invited to take the survey across the three groups and 5,123 students responded to the invitation, for a response rate of 8.8 percent. Our analysis will focus on the 2,255 respondents who completed the survey up through the experimental questions. A copy of the full survey appears on our AEA RCT registry page[3] or at this link.

2.2 Information intervention

At the end of the survey, after answering baseline questions about inflation and labor market expectations, participants were randomly assigned into two treatment groups, one falsification group, and one control group:

- **Inflation information (T1).** One group ($N = 446$) was provided with the following statement: "The current average rate for fixed-rate 30-year mortgage is 6.12% per year. This rate was 5.34% on average in 2022, 3.07% in 2021, 2.83% in 2020, 3.69% in 2019, and 4.83% in 2018." The statement provides information about inflation using the 30-year mortgage rate as a proxy measure that is likely more intuitive to students.

- **Inflation information + Labor market impacts (T2).** The second group ($N = 420$) was provided with the following statement: "The current average rate for fixed-rate 30-year mortgage is 6.12% per year. This rate was 5.34% on average in 2022, 3.07% in 2021, 2.83% in 2020, 3.69% in 2019, and 4.83% in 2018. The Fed is expected to continue its policy of raising interest rates to slow economic growth and bring inflation under control. Even though jobs are plentiful, and wages are rising, the Fed's aggressive policy risks slowing down the labor market. Fanny Mae estimates that the unemployment rate will increase from 3.6% at the end of 2022 to 5.4% by the end of 2023." This alternative statement provides the same information about recent inflation but adds information about how these rate increases may come at the expense of a higher unemployment rate.

- **Falsification (F).** The third group ($N = 470$) received information not related to the economy: "Population of the U.S. grew by 1.4 percent between 2018 and 2020." This serves as a falsification group to test the impacts of providing any information.

- **Pure control.** The fourth group ($N = 919$) received no information at all and serves as a pure control group .

[3]See here: https://www.socialscienceregistry.org/trials/15034.

2.3 Randomization

Randomization was done using a computer by the CUNY Office of Applied Research, Evaluation and Data Analytics, who administered the survey. Individuals were randomly assigned to the treatment and control groups at the time of survey invitation. We will test whether there is any imbalance in survey completion across the treatment groups.

2.4 Data collection

In addition to outcomes collected in the survey, the survey data will be merged with two administrative data to measure respondents' subsequent academic and labor market behavior of these individuals over the years after responding the survey.

The first dataset includes administrative education records from CUNY. This data includes information on credits registered/enrolled/earned, GPA, and student demographics for each semester for all students in the CUNY system. A secondary dataset contains graduation records for all students in our analysis sample. We currently have access to the CUNY data for the years 2016–2022, but we are in the process of extending this through 2025 or 2026 to measure human capital outcomes such as credit accumulation, drop out, and graduation after the survey was administered.

The second administrative dataset comes from the New York State Department of Labor (DoL). This data provides quarterly earnings and NAICS industry codes for any individuals who work formal jobs in New York State. The merge will allow us to observe labor market outcomes for any individual in our survey sample who appears in the DoL data. We currently have access to the DoL data for Q1 2019 through Q2 2024. We are also in the process of extending the DoL data through 2025 or 2026.

3 Analysis Plan

Survey data was collected between April 5, 2023 and June 21, 2023. At the time of the posting of this pre-analysis plan, we have explored preliminary outcomes related to inflation as measured in the survey. We have not yet accessed the CUNY and DoL data, nor have we received the most recent versions of these datasets that would allow us to examine longer-run outcomes, which is the primary focus of the paper and this pre-analysis plan.

3.1 Primary outcomes

We have four categories of primary outcomes. Within each category, we describe how we will define our key variables.

1. **Inflation and labor market expectations.** After the information intervention, participants were re-surveyed about their inflation and labor market expectations to test the impacts of providing the information on short-run beliefs. These post-treatment survey outcomes that measure expectations are as follows:

   - Question D6. Over the next 12 months, what do you think the overall rate of inflation/deflation (as measured by the Consumer Price Index) will be in the economy (NOTE: Nobody knows the answer. Just try your best to guess given what you know). (Range: 1 -100, up to 1 decimal point)[4]
   - Question D7. What annual rate of inflation/deflation (as measured by the Consumer Price Index) do you expect over the next 3-5 years? (Range: 1% - 100%, up to 1 decimal point) Note: no one knows the correct answer. Just try your best to guess given what you know.
   - Question D10. What do you think is the current interest rate on a fixed-rate 30-year mortgage for someone with excellent credit? (Range: 1% - 100%, up to 1 decimal point)
     - Question D10.1. Current rate (%):
     - Question D10.2. At the end of 2023:
     - Question D10.3. At the end of 2024:
     - Question D10.4. In the next 5-10 years:
   - Question D11. What is your best guess about the rate at which average wages in the economy will grow on average over the next 12 months? (Range: 1% - 100%, up to 1 decimal point)
   - Question D12. What is your best guess about the rate at which housing prices in the U.S. will change over the next 12 months? (Range: 1% - 100%, up to 1 decimal point)
   - Question D13. What is your best guess about the rate of unemployment in NYC over the next 12 months? (Range: 1% - 100%, up to 1 decimal point)

     The share of people looking for work but unable to find employment over the next 12 months will be (%):

   For each outcome, we are interested in whether the information caused participants to revise their beliefs, and, if so, if they revised them towards the truth. Thus our main outcomes of interest are:

[4]This question was not asked to the control group.

(a) An indicator for whether the participant filled out the question.

(b) The value of the expectation.

(c) An indicator for changing their expectation from before to after the information treatment.

(d) An indicator for whether participants revised their expectations toward the true value.

(e) The absolute value of the difference between the participant's answer and the truth.

2. **Self-reported human capital investment decisions from the survey.**

After the information intervention, participants were asked about their human capital responses to inflation. These post-treatment survey outcomes that measure self-reported human capital investment are as follows:

- Question A1.059. Has the change in prices (inflation/deflation) increased your concern about finding a job after you graduate from CUNY (relative to say October 2020 when inflation was 1.4%)?
  - It has reduced my chances of finding a job very much.
  - It has reduced my chances of finding a job somewhat.
  - It has not impacted my chances of finding a job.
  - It has increased my chances of finding a job somewhat.
  - It has increased my chances of finding a job very much.
- Question A1.060. Has the change in prices changed your plans for graduation (relative to say October 2020 when inflation was 1.4%)? (Select all that apply.)
  - I will consider graduation earlier (if possible).
  - They have not changed.
  - I will postpone graduation.
  - I will consider a double major.
  - I will consider starting graduate school.
  - I will consider taking more courses.

From these questions, we will define the following outcomes that measure self-reported human capital investments:

(a) Binary indicators for inflation increasing/decreasing the individual's chances of finding a job.

(b) Binary indicators for each of the responses in Question A1.060.

(c) A binary indicator for inflation causing more human capital investment, defined as double majoring, starting graduate school, and/or taking more courses.

3. **Actual human capital accumulation from CUNY administrative data.** We will use the CUNY administrative data to examine impacts of the information treatment on various measures of human capital accumulation. Note that some of the outcomes below will be defined only for certain cohorts based on their class enrollment at the time of the survey.

   - **Persistence.** Indicators for still being enrolled in (or graduated from) CUNY by t years after the survey.
   - **Persistence since enrollment.** Using the most recent year of available data, indicators for being still enrolled in (or graduated from) CUNY x years after first enrollment in the current college.
   - **Graduation.** Indicators graduating from CUNY by t years after the survey.
   - **On-time graduation.** Using the most recent year of available data, indicators for graduating from CUNY by x years after enrollment in the current college.
   - **Drop out.** Indicators for dropping out of CUNY by t years after the survey, where drop out means the students is not longer enrolled AND hasn't completed a degree.
   - **Class progression.** The number of semesters successfully completed by t years after the survey.
   - **Number of credits attempted/completed.** Number of CUNY credits attempted and completed by t years after the survey.
   - **GPA.** Grade point average by t years after the survey.
   - **Major switching.** An indicator for whether participants changed their major after Spring 2023.
   - **Double major.** An indicator for whether participants added a second major.

4. **Actual employment and earnings trajectories from NYS DOL.**

   - **Employed in New York State.** Indicators for appearing in the DoL data t years after the survey.

- **Earnings.** Annual earnings measured in the DoL data t years after the survey. For robustness, we will use multiple earnings measures: log annual earnings excluding missing values, annual earnings in levels excluding missing values, and annual earnings in levels with missing values included as zeroes.
- **Industry mean earnings** Average earnings in the individual's industry as measured by NAICS codes.
- **Employed in industries with stable employment**. Measures of the stability of employment at the NACIS code level (e.g., the covariance of industry employment with average employment over the past 25 years.)

3.2 Secondary outcomes

After the information intervention, participants were asked about their ability to pay bills and their support for government economic policies. These post-treatment survey outcomes are as follows:

- Question A1.039. Has the change in prices changed your ability to pay in full any of the following in February 2023 (relative to say October 2020 when inflation was 1.4%)? (select increased, decreased, or no change)
  - My ability to pay in full rent or mortgage (A1.039_1)
  - My ability to pay in full my credit card payment (A1.039_2)
  - My ability to pay in full the water, gas, or electric bill (A1.039_3)
  - My ability to pay in full the phone or cable bill (A1.039_4)
  - My ability to pay in full car payment (A1.039_5)
  - My ability to pay in full student loan (A1.039_6)
  - My ability to pay in full other bills (A1.039_7)
- Question A1.049. Has the change in prices changed your confidence about your (or your household's) ability to afford food next month (relative to say October 2020 when inflation was 1.4%)?
  - Has increased it a lot
  - Has increased it somewhat
  - Has not changed it
  - Has decreased it somewhat

  - Has decreased it a lot

- Question A1.050. Has the change in prices changed your confidence about your (or your household's) ability to pay next month's rent/mortgage on time (relative to say October 2020 when inflation was 1.4%)?
  - Has increased it a lot
  - Has increased it somewhat
  - Has not changed it
  - Has decreased it somewhat
  - Has decreased it a lot
  - Has payment is/will be deferred

- Question Q169. Overall, how satisfied or dissatisfied are you with the way the Federal Reserve Bank is doing its job to set interest rates in order to control inflation?
  - Not satisfied at all
  - A little satisfied
  - Quite satisfied
  - Very satisfied

- Question Q170. How much confidence do you have in each of the following to do or to recommend the right thing for the economy? A) President Biden; B) The Federal Reserve (Q170_2)
  - Almost no confidence
  - A little confidence
  - A fair amount of confidence
  - A great deal of confidence

- Question A1.048. Since the change in prices (relative to say October 2020 when inflation was 1.4%), please indicate how the following have changed: (select increased, decreased, or no change)
  - The amount of stress I've been feeling
  - The amount of trust I have in the government
  - The amount of trust I have in people in my local area

– The amount of conflict I have had with people around me

For these questions, our main outcomes will be binary indicators for a deteriorating financial situation or reduced confidence in government policy.

3.3 Reduced form specifications

Our main reduced-form specification examines the average effect of the information treatments on student outcomes. This specification is motivated by the fact that most students overestimate the level of unemployment or the level of inflation, so the information treatment should reduce inflation or unemployment expectations for the average student. This specification is also the policy-relevant one in the sense that it captures the average effect of providing information to students.

For our main specification, we regress the outcome variable on indicators for each treatment group:

$$Y_i = \alpha + \beta_1 \mathrm{T1}_i + \beta_2 \mathrm{T2}_i + \beta_F \mathrm{F}_i + \mathbf{X_i}'\theta + \epsilon_i. \tag{1}$$

The dependent variable, Y_i, is an outcome for survey respondent i (see Sections 3.1 and 3.2). The main variables of interest, $\mathrm{T1}_i$ and $\mathrm{T2}_i$, are indicators for being in the two treatment groups defined in Section 2.2. The variable F_i is an indicator for the falsification group. To increase precision, we include $\mathbf{X_i}$, which is a vector of individual demographics measured from the survey data and pre-survey measures of human capital and labor market outcomes measured in the CUNY and DoL data. (We will also examine robustness to excluding the $\mathbf{X_i}$ controls). This specification measures the impacts of each individual treatment relative to the pure control group.

We also use two more-powered specifications that measure the impact of *any* treatment:

$$Y_i = \alpha + \beta_1 \mathrm{T1}_i + \beta_2 \mathrm{T2}_i + \mathbf{X_i}'\theta + \epsilon_i, \tag{2}$$

$$Y_i = \alpha + \beta \mathrm{T}_i + \mathbf{X_i}'\theta + \epsilon_i, \tag{3}$$

where T_i is an indicator for either of the two treatments (T1 or T2). These specifications measure the impacts of receiving either treatment (or any treatment) relative to the pure control group combined with the falsification group.

3.4 Instrumental variable specification

We complement our reduced-form regressions with instrumental variable (IV) regressions that follow Coibion et al. (2023). We use a two-stage least squares (2SLS) specification with the following second-stage regression:

$$Y_i = \alpha + \beta^{\pi} \mathrm{E}\pi_i^{\text{post}} + \beta^{u} \mathrm{E}u_i^{\text{post}} + \gamma^{\pi} \mathrm{E}\pi_i^{\text{prior}} + \gamma^{u} \mathrm{E}u_i^{\text{prior}} + \mathbf{X_i}'\theta + \epsilon_i. \tag{4}$$

As above, the dependent variable, Y_i, is an outcome for survey respondent i, and $\mathbf{X_i}$ is a vector of individual demographics and pre-survey outcomes. The variables $\mathrm{E}\pi_i^{\text{prior}}$ and $\mathrm{E}u_i^{\text{prior}}$ are individuals' expectations on inflation (π) and the unemployment rate (u) measured prior to the information treatments. The variables $\mathrm{E}\pi_i^{\text{post}}$ and $\mathrm{E}u_i^{\text{post}}$ are individuals' posterior expectations these variables measured after the information treatments. We instrument for $\mathrm{E}\pi_i^{\text{post}}$ and $\mathrm{E}u_i^{\text{post}}$ using indicators for the inflation and unemployment information treatments, $\mathrm{T1}_i$ and $\mathrm{T2}_i$, as well as their interactions with prior expectations, i.e., $\mathrm{T1}_i \times \mathrm{E}\pi_i^{\text{prior}}$, $\mathrm{T1}_i \times \mathrm{E}u_i^{\text{prior}}$, $\mathrm{T2}_i \times \mathrm{E}\pi_i^{\text{prior}}$, and $\mathrm{T2}_i \times \mathrm{E}u_i^{\text{prior}}$. The main coefficients of interest are the coefficients on the posterior expectations, β^π and β^u.

3.5 Heterogeneity

In addition to average effects, we are also particularly interested in treatment effect heterogeneity based on students' initial priors. For this we will augment equations (4)–(3) with a covariate Prior_i and its interaction with the treatment variables, where Prior_i denotes a student's pre-treatment expectation on unemployment and/or inflation rates.

We are also interested in heterogeneity along dimensions that theoretically predict heterogeneity in the impacts of inflation on human capital decisions, including socioeconomic status, an indicator for working during school, financial literacy, and class level in school. As above, we will test for heterogeneity on these dimensions by augmenting equations (4)–(3) with these covariates and their interactions with the treatment variables.

4 Power calculations

Tables 1 and 2 show minimum detectable effect (MDE) sizes for our main outcomes. MDE is defined as the smallest effect size that is detectable with power = 0.8 and a significance level $\alpha = 0.05$.

Table 1 shows power calculations for human capital outcomes. Our main human capital outcomes are binary variables, e.g., persisting in college until year t or graduating from college by year t. It is difficult to know the means of these outcomes ex ante given uncertainty on the timing of our data and the number of students at different levels of education. Therefore, Table 1 shows MDEs assuming control means that range between 0.5 and 0.9.[5] We show power calculations for each of equations (4)–(3). The MDEs range for 0.044 to 0.081 in our benchmark equation (4). For our most powered specification, equation (3), MDEs range from 0.034 to 0.061. We note that these MDEs may overstate the true power because some

[5] In recent years, the average graduation rate at CUNY has been roughly 60 percent.

human capital outcomes may not be well defined for certain individuals in the sample (e.g., if the individual had already graduated from CUNY at the time of the survey).

Table 2 shows power calculations for our main labor market outcome, which is quarterly earnings in the DoL data including zeroes for individuals who do not appear in the data. We estimate that average quarterly earnings for students in our control group will be roughly $8,000 conditional on appearing in the DoL data, and that roughly 80 percent of our sample will appear in the data. This gives a control mean of $6,400 for our outcome of unconditional DoL earnings. The MDEs range from $1,226 in our benchmark specification to $910 in our most powered specification.

Table 1: Minimum detectable effect sizes (MDEs) for human capital outcomes

Equation	Comparison	Sample Size	Control Mean	MDE
(1)	T1 or T2 vs. pure control	1,352	0.5	0.0814
			0.6	0.0786
			0.7	0.0723
			0.8	0.0618
			0.9	0.0444
(2)	T1 or T2 vs. falsification + pure control	1,822	0.5	0.0769
			0.6	0.0744
			0.7	0.0686
			0.8	0.0587
			0.9	0.0425
(3)	T1 + T2 vs. falsification + pure control	2,255	0.5	0.0605
			0.6	0.0586
			0.7	0.0542
			0.8	0.0465
			0.9	0.0337

Notes: MDEs for T1 or T2 are computed using the average sample size for the two treatments: (420+446)/2 = 433.

Table 2: Minimum detectable effect sizes (MDEs) for unconditional earnings

Equation	Comparison	Sample Size	Control Mean	MDE
(1)	T1 or T2 vs. pure control	1,352	\$6,400	\$1,226
(2)	T1 or T2 vs. falsification + pure control	1,822	\$6,400	\$1,157
(3)	T1 + T2 vs. falsification + pure control	2,255	\$6,400	\$910

Notes: MDEs for T1 or T2 are computed using the average sample size for the two treatments: (420+446)/2 = 433.

References

Armantier, Olivier, Wändi Bruine de Bruin, Giorgio Topa, Wilbert Van Der Klaauw, and Basit Zafar, "Inflation expectations and behavior: Do survey respondents act on their beliefs?," *International Economic Review*, 2015, *56* (2), 505–536.

Bachmann, Rüdiger, Tim O Berg, and Eric R Sims, "Inflation expectations and readiness to spend: Cross-sectional evidence," *American Economic Journal: Economic Policy*, 2015, *7* (1), 1–35.

Burke, Mary A and Ali Ozdagli, "Household inflation expectations and consumer spending: evidence from panel data," *Review of Economics and Statistics*, 2023, *105* (4), 948–961.

Coibion, Olivier, Dimitris Georgarakos, Yuriy Gorodnichenko, and Maarten Van Rooij, "How does consumption respond to news about inflation? Field evidence from a randomized control trial," *American Economic Journal: Macroeconomics*, 2023, *15* (3), 109–152.

Ichiue, Hibiki and Shusaku Nishiguchi, "Inflation expectations and consumer spending at the zero bound: Micro evidence," *Economic Inquiry*, 2015, *53* (2), 1086–1107.