Pre-Analysis Plan

Valuing Formal Jobs and Formality in Labor Market Trajectories Using Discrete Choice Experiments: Evidence from Colombia

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1. Introduction

Rates of labor informality have remained stubbornly high in Colombia and the rest of Latin America for decades. Informal workers lack access to the nonwage benefits mandated by labor and social security laws. A central argument for why informality persists is that workers select it because the value of these nonwage benefits, such as health insurance and retirement accounts, is less than their costs—costs that workers pay in the form of payroll taxes, foregone wages, and increased market rigidity.

Yet there is limited knowledge about the values that Colombian workers place on the individual components of the mandated benefits package of the formal sector or on a formal labor market trajectory more broadly. Participating in the formal sector awards individuals access to a wide range of social benefits, including pensions, life and disability insurance, subsidized mortgage loans, and others. Estimating the values that workers place on all of these items is essential for evaluating the argument that informality is an optimal choice and for understanding which characteristics of formal jobs drive this choice. This study uses two complementary discrete

choice experiments to estimate workers' valuations or willingness to pay (WTP) for the benefits that accompany formal employment in Colombia. The first experiment, the Job Choice Conjoint, isolates valuations of each benefit by presenting pairs of hypothetical job offers to respondents. We randomly assign wage and ten different benefit levels to each offer. The second experiment, the Life-History Conjoint, provides respondents with pairs of labor market biographies, randomly assigning each biography to different levels of job stability, income growth, health shocks, retirement outcomes, and so on. Respondents' choices between biography pairs reveal how much they value the cumulative consequences of different shares of formality through a labor trajectory.

This pre-analysis plan provides an overview of the questionnaire, including the experimental design and observational items about respondents work and lives, as well as hypotheses and eventual analyses. It was registered before data collection began on June 22, 2026.[1]

2. Overview of Sampling and Questionnaire

2.1 Sample and Recruitment

The target sample is 4,000 working adults aged 25-65 in Colombia who work at least 30 hours per week, recruited by Netquest from their online panel. Quotas are enforced on sex (approximately 2,460 men / 1,640 women), age (approximately 2,050 aged 25-40 / 2,050 aged 41-64), and socioeconomic level (estratos 1-6: approximately 640, 1,160, 1,373, 440, 284, and 108, respectively). Fieldwork is planned for June 22 to July 20, 2026.

2.2 Treatment Arms

For the conjoints, respondents are randomly assigned to one of three arms: Arm 1 receives the Job Conjoint only (30%, approximately 1,200 respondents); Arm 2 receives the Life History Conjoint only (30%, approximately 1,200 respondents); Arm 3 receives both conjoints in sequence (40%, approximately 1,600 respondents).

2.3 Job Choice Conjoint

Each choice task presents two hypothetical job offers described by 11 attributes. For each task, respondents are asked which job offer they would choose. The order of attribute rows is randomized once per respondent and held fixed across tasks. Each respondent completes 8 choice tasks: 7 with unique profiles and 1 reliability check (round 8 reverses the column order of round 2). After completing the 8 choice tasks, respondents answer follow-up questions about the same tasks: which job would be easier to find (1 task), which has lower dismissal risk (2 tasks), which offers more task independence (2 tasks), and which offers more scheduling flexibility (2 tasks).

The 11 attributes and their levels are:

Attribute	Levels

Salary	Anchored to respondent's own income: 40%, 50%, 60%, 70%, 80%, 90%, 100%, 110%, 120%, 130%, 140%, 150%, 160% of current salary, expressed in pesos per pay period. The distribution is roughly a discrete normal, such that it overweighs levels near the current wage.
Health insurance	No health insurance; Free EPS coverage; EPS plus a private medical plan
Retirement plan	No plan; Employer contributes 8%, 10%, 12%, or 15% of monthly salary to individual account
Workplace injury insurance	None; Half salary during partial disability; Full salary during permanent disability
Housing subsidy	None; 25 SMMLV; 50 SMMLV
Work weeks needed to access pension (men/women)	350/400; 650/700; 950/1000; or 1250/1300 weeks
Life insurance	None; Beneficiaries receive full retirement fund upon death
Severance pay	None; 10, 20, or 30 days' salary per year worked, upon dismissal
Vacation	None; 7, 15, or 21 paid vacation days
End-of-year bonus (prima)	None; 15 days; 30 days; 45 days
Unemployment severance fund (cesantias)	None; Employer contributes 4%, 8%, or 12% of monthly salary to individual account

2.4 Life History Conjoint

Each choice task presents the labor market biographies (from age 25 to 70) of two fictitious people. Each profile is described by 10 attributes. Row order is randomized per respondent and fixed across tasks. Each respondent completes 8 tasks (7 unique + 1 reliability check). Each life history is also independently assigned an institutional-uncertainty shock - at most one of: an increase in the contribution weeks required for a pension, an increase in the minimum retirement age, a forced diversion of part of an AFP contributor's wages to the public fund, or a delay before publicly covered health care is received - each eligibility-gated by the story and with a randomized magnitude (a story with at least one eligible dimension stays stable with ~20% probability). The shock is decoupled: folded as narrative into the relevant existing row below (whose levels are listed there), without recomputing the displayed benefit outcomes.

The 10 attributes and their levels are:

Attribute	**Levels**
Number of jobs (25-70)	5, 10, 15, 22, or 30 jobs
Job type descriptions	Informal sector (e.g., street vending, construction, domestic work); Formal sector (e.g., factories, offices, department stores); Mixed
Formality share	100% informal; 75% informal/25% formal; 50/50; 25% informal/75% formal; 100% formal
Employment continuity	Never unemployed; Short unemployment spells; Significant unemployment (6 months)
Income trajectory (start to end)	Anchored to empirical Colombian distributions (monthly COP, start to end). Approximate ranges by formality: informal $900,000-$2,250,000; formal $1,750,000-$5,950,000; mixed $1,100,000-$4,700,000.
Weeks contributed to social security	Derived from formality share and employment continuity. May carry an institutional-uncertainty shock: the minimum number of weeks required to qualify for a pension rose (1,000→1,300; 1,150→1,300; or 1,300→1,500).
Health event	Workplace back injury at 50; Type 2 diabetes diagnosis at 45; Childbirth hospitalization (for self or wife depending on story's gender) at 35
Health coverage during event	Independently randomized (~50/50), regardless of formality. If covered, the coverage type depends on formality: contributory EPS for formal/mixed profiles, or the subsidized regime (SISBÉN) for 100% informal profiles; if not covered, treatment is paid out of pocket. Only covered profiles (EPS or SISBÉN) are eligible for the health-care wait-time uncertainty shock: when applied, covered care is delayed 3 or 6 months (baseline: immediate); uncovered profiles carry no shock.

Pension system (Sistema de pensión)	AFP (private individual account), Colpensiones (public defined benefit), or none (no contributions). Drawn conditional on formality: 'none' if 100% informal, otherwise AFP or Colpensiones at random. May carry an uncertainty shock: forced to divert 1%, 3%, or 5% of salary to the public fund.
Monthly retirement income	Total monthly retirement income from any source. Independently randomized, drawn from four levels in multiples of the 2026 SMMLV ($1,750,905) - 0.5, 1, 2, and 3 SMMLV - with a non-uniform marginal distribution resembling Colombian pension reality (draw probabilities 31/38/23/8 percent); orthogonal to formality, income, weeks, and pension system. May carry an uncertainty shock: the minimum retirement age rose to 70 (from 60, 62, 65, or 67).

Respondents in Arm 3 complete four tasks of the Job Choice conjoint followed by four of the Life History conjoint.

2.5 Pre-treatment Background Variables

Before the conjoint tasks, all respondents complete questions on the following background variables. These will be used for heterogeneity analysis and controls. They are also used to determine the respondent's income, which is fed to the job choice conjoint to determine hypothetical salary offers.

Module	**Variables**
Demographics	Age, sex (from Netquest profile), marital status, education level
Employment	Employment status, salaried vs. self-employed vs. unpaid, whether has a boss, whether owns a business, whether has employees, year started current job/business
Hours	Total weekly hours across all jobs; weekly hours in main job

Industry	12 categories (agriculture, manufacturing, construction, commerce, education, restaurants, transport, professional services, social services, other services, government, international organizations)
Wages and income	Pay type (commission, piece-rate, tips, bonuses, etc.), pay frequency, exact wage (in pesos by period), income in multiples of minimum wage; for self-employed: monthly revenue and costs, reservation wage to close business
Formality and benefits	Firm size (1 to 501+ workers), written contract, access to benefits (EPS, pension fund - Colpensiones or AFP - cesantias, etc.), retirement system, health insurance affiliation and source
Secondary employment	Types of secondary work activities, total income across all jobs
Retirement	Planned retirement age, reasons for not retiring, reservation pension, WTP for a lifetime annuity
Health	Self-rated health (5-point scale), chronic conditions, healthcare utilization (past 6 and 12 months), types of health facilities used, self-identified main health risk, subjective probability of that risk, expected cost of main risk, expected cost of heart attack/accident/organ problems, EPS utilization history, EPS quality expectations
Household	Total residents, number of income contributors, number of children under 6

3. Empirical Specifications

3.1 Primary Specification: Average Marginal Component Effects (AMCEs)

The primary estimand is the Average Marginal Component Effect (AMCE), which measures the causal effect of changing an attribute from a reference level to an alternative level on the probability that a profile is chosen, averaging over the joint distribution of the other attributes. Standard errors are clustered at the respondent level. AMCEs are estimated by OLS (linear probability model).

Reference categories for the Job Conjoint:

- Salary: 100% of current salary (equal to current wage)
- Health insurance: No health insurance

- Retirement plan: No plan
- Workplace injury insurance: None
- Housing subsidy: None
- Work weeks needed to access pension: 1250/1300 weeks
- Life insurance: None
- Severance: None
- Vacation: None
- Prima: None
- Cesantias: None

Reference categories for the Life-History Conjoint:

- Number of jobs: 5
- Formality share: 100% informal
- Employment continuity: long periods of unemployment (6 months)
- Income trajectory: Lowest income bracket within formality type
- Health coverage during health event: Not covered (paid out of pocket)
- Monthly retirement income: half a monthly minimum wage ($875,453)
- Pension regime: no pension
- Institutional uncertainty shock: no shock

3.2 Marginal Rates of Substitution and Willingness to Pay

The MRS between any nonwage attribute and salary is computed as the ratio of the AMCE of that attribute level to the marginal effect of a unit change in wage:

$WTP_{jl} = b_{jl} / \beta_{wage}$

where b_{jl} is the AMCE of level *l* of attribute *j*, and β_{wage} is the fixed wage coefficient, which is a change in the probability of job acceptance for a one-unit change in the wage offer. We will estimate WTP for wages expressed in both percentages (of the respondent's current income) and pesos.

For the Life-History Conjoint, the MRS is computed between each attribute and:

1) income trajectory (using the present discounted value of income assuming a linear income trajectory between the start and end of the career);

$WTP_{jl} = b_{jl} / \beta_{lifetime\_income}$

2) monthly retirement income (independently randomized across stories, orthogonal to the other attributes, so it serves as a clean numeraire).

$WTP_{jl} = b_{jl} / \beta_{monthly\_retirement\_income}$

3.3 Perceived Job Qualities (Follow-Up Questions)

We also estimate the same AMCE regression with four additional dependent variables: (a) perceived dismissal risk (which job has lower risk), (b) perceived task independence (which job offers more freedom), (c) perceived scheduling flexibility (which job offers more schedule freedom), and (d) perceived ease of finding the job (which offer would be easier to find in real life). (These follow-up questions are asked after the eight choice tasks, about the same tasks: dismissal risk, task independence, and schedule flexibility twice each, and ease of finding once).

These regressions identify which attributes drive workers' perceptions of non-pecuniary job qualities.

3.4 Secondary Outcome Analyses

Reservation wages (self-employed): We report the distribution of the monthly salary that would induce self-employed respondents to close their business. We compare this reservation wage to their reported self-employment income (revenue minus costs) to estimate the non-pecuniary value of self-employment.

Reservation pensions and annuity WTP: We report the distribution of monthly pension amounts sufficient to induce retirement at age 60 and the implied discount rate from the WTP for the annuity product (comparing the lump sum to the expected present value of the income stream under different mortality assumptions).

Health risk perceptions: We test whether respondents who report higher health risks also exhibit higher WTP for health insurance in the Job Conjoint.

4. Hypotheses: Main Treatment Effects

4.1 Job Conjoint Hypotheses

H1 (Positive valuation of all formal benefits). Workers prefer jobs that include each formal benefit over jobs without it, holding salary constant.

H2 (Marginal value of contribution rates). For benefits with multiple contribution levels (retirement plan: 8-15%; cesantías: 4-12%), the AMCE of moving from 0% to 1% is different than the AMCE of moving from 4% to 5%.

H3 (Wage-benefit tradeoff). Workers are willing to accept lower wages in exchange for formal benefits. The marginal rate of substitution (MRS) estimates imply that the total WTP for the full bundle of formal benefits at their maximum levels is substantial — potentially exceeding the statutory employer cost of providing them.

H4 (Formal benefits signal job security). Jobs with formal attributes are perceived as having lower dismissal risk (in the post-task follow-up questions). .

H5 (Benefits signal job finding difficulty). Jobs with more formal benefits are perceived as harder to find (in the post-task follow-up questions).

H6 (Benefits signal independence and flexibility). Jobs with more formal benefits are perceived as offering less task independence and less schedule flexibility (in the post-task follow-up questions).

4.2 Life-History Conjoint Hypotheses

H7 (Preference for formal trajectories). Respondents prefer life histories with a higher share of formal employment, all else equal. The AMCE of moving to a trajectory with a higher share of time spent in the formal sector is positive.

H8 (Value of EPS coverage during health shocks). EPS coverage during a health event has a large positive AMCE, reflecting the larger financial risk of uninsured events.

H9 (Employment continuity matters). Life histories with continuous employment are strongly preferred over those with significant unemployment spells.

H10 (Retirement income is positively valued). Monthly retirement income has a large positive AMCE, and the MRS between retirement income and working-age income reveals workers' implicit discount rates and time preferences over lifetime consumption.

H11 (Fewer job transitions preferred). Respondents prefer life histories with fewer jobs (5 vs. 30), reflecting a preference for stability and the costs of job search and adjustment.

H12 (Formality premium in trajectories exceeds the sum of individual benefit values). The implicit value of a fully formal trajectory in the Life-History Conjoint (which bundles EPS coverage, retirement savings accumulation, and retirement income) exceeds the sum of the individual benefit WTP estimates from the Job Conjoint. This would suggest that formality carries additional value beyond the social benefits accessible through any one formal job spell, through complementarities, cumulative effects.

H13 (Preference for trajectories with no changes in institutional requirements). Respondents discount life histories that carry an uncertainty shock (contribution weeks, retirement age, contribution diversion, or health-care delay), with the discount increasing in shock magnitude.

5. Heterogeneity Analyses

We conduct heterogeneity analyses by calculating conditional AMCEs by subgroup and by interacting the conjoint attribute indicators with respondent characteristics. All subgroup indicators are measured before the administration of the conjoints.

5.1 Current formality status

We classify respondents as formal or informal based on their reported access to social security benefits (job_enoe_3m / job_enoe_3m_se) or whether they have a written contract (job_enoe3j_contract).

5.2 Salaried workers vs. self-employed

We split the sample based on trabajo_con_pago (salaried vs. business owner) and job_enoe3b_ownact (whether they own a business).

5.3 Income level

We split respondents into groups based on their reported monthly income expressed as multiples of the minimum wage (wage_enoe6c_numSMs) and as sample quartiles.

5.4 Health status and expectations

We allow for heterogeneous WTP across respondents by self-rated health (health_today: excellent/very good/good vs. fair/poor) and with whether the respondent reports a chronic condition (health_chronic).

We interact conjoint attributes with the respondent's subjective probability of their self-identified health risk (pr_main_risk) and their expected medical costs (cost_mainhealth_risk, expect_cost).

5.5 Prior Experience with EPS

We compare respondents who have recently used EPS services (use_healthpoints includes EPS) with those who have not. Direct experience with EPS may increase or decrease WTP depending on quality perceptions.

We interact the health insurance AMCE with used_eps_ever (whether the respondent has ever used EPS) and eps_expectation (four ordered categories of expected EPS quality). This tests whether perceived quality moderates WTP: workers who believe EPS would provide effective treatment should exhibit higher WTP than those who believe it would be slow or ineffective.

5.6 Age
We split the sample at age 40 (the quota boundary) or use a continuous interaction. Older workers are predicted to have higher WTP for retirement benefits and health insurance (due to proximity to retirement and higher health risks)

5.7 Gender
We examine whether WTP for specific benefits varies by gender.

5.8 Tenure in current job
We use job_enoe3r_lengthsub (year entered current employer) or job_enoe3r_lengthind (year started current business) to compute tenure and evaluate whether the value of job attributes and life-stories elements differs across them. We split workers by median tenure and into categories (less than 1 year, 1-3 years, 3-5 years and more than 5 years).

5.9 Retirement expectations
We interact with planned retirement age bins (plan_retiro_edad) and reservation pension (res_pension, by medians and by quartiles in levels and relative to their current wage).

5.10 Perceived institutional uncertainty
We use respondents' self-reported expectations to the magnitude and timing of uncertainty in pension requirements and de-facto benefits to evaluate whether the value of job attributes and life-stories elements differs across individuals that expect changes versus those who don't.

6. Sample Restrictions and Data Quality

6.1 Eligibility Screening
The survey screens for age (25-65), employment (at least 30 hours/week), and having income from work. Respondents who are under 25, unemployed, or unpaid workers (confirmed via sin_pago_confirm) are screened out and do not proceed with the questionnaire.

6.2 Attention Checks
Respondents that fail the first attention check are screened out by the survey and do not proceed with the questionnaire. Our primary analysis includes all eligible respondents who completed the survey and passed the first attention check. As robustness checks, we report results excluding respondents who failed additional attention checks. We will report the failure rate for each check.

7.3 Reliability Check (Round 8)

Round 8 of each conjoint repeats round 2 with reversed column order. We will report the reliability rate and use the techniques in (Clayton et al Forthcoming) to correct estimates and standard errors for the error rates.

7.4 Speeders

We will flag respondents whose total survey completion time is below one-third of the median. We report results with and without speeders as a robustness check.

7.5 Income and Wage Outliers

When respondents enter a wage or (for self-employed) income that is below zero or greater than 10 minimum wages, we use the respondent's answer to wage_enoe_6c_numSMs–their reported income in minimum salaries–as their wage to anchor the conjoint.

7.6 Quota Compliance

We verify that the final sample approximately meets the Netquest quota targets for sex, age, and socioeconomic level. We report the achieved distribution and note any significant departures from targets.

8. Statistical Power

4,000 respondents allocated 30/30/40 across three arms. At the profile level: approximately 1,200 x 7 x 2 = 16,800 independent observations from Arm 1 (Job Conjoint only); 1,200 x 7 x 2 = 16,800 from Arm 2 (Life-History Conjoint only); 1,600 x 4 x 2 = 12,800 for each from Arm 3. Total profile observations: approximately 29,600 for Job Conjoint and 29,600 for Life-History Conjoint.

For conjoint experiments, statistical power depends on the number of respondents (N), the number of choice tasks per respondent (T), the number of profiles per task (J=2), and a design effect based on intra-cluster (respondent) correlation (ICC), following the framework in Cohen 1988.

For the Job Conjoint (Arms 1 and 3 combined): The number of profiles is 29,600. Assuming an ICC of .10, the minimum detectable effect (MDE) for each attribute level (at 80% power) is 1.96 percentage points. Assuming an ICC of .00, the MDE is 1.63 percentage points.

For the Life-History Conjoint (Arms 2 and 3 combined): The power calculations are analogous. The number of profiles is 29,600. Assuming an ICC of .10, the MDE for each attribute level (at 80% power) is 1.96 percentage points. Assuming an ICC of .00, the MDE is 1.63 percentage points.

10. Timeline

Milestone	Date
Pre-registration	June 22, 2026 (before data collection)
Survey soft launch (100 cases)	June 22, 2026

Survey full launch	June 24, 2026
Target completion of data collection	July 20, 2026 (or until 4,000 surveys are completed)

References

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[1] A soft launch of the survey to check the questionnaire launched on June 22, 2026. The soft launch sample is 100 respondents. The survey for the full study will be launched shortly afterwards.