Long-Term Effects of Land Reform on Perceived Income Distribution: Evidence from Peru[*]

Emiliano Bohorquez[†]   Brayan A. Condori[‡]   Agustín Deniard[§]

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Abstract

This paper analyzes the impact of Peru's agrarian reform on perceptions of income distribution. Using historical data and the Peruvian household survey, an instrumental variables approach is employed to identify the causal effect of land redistribution on perception bias, defined as the gap between perceived and actual income decile. The results show that in areas with greater reform intensity, the absolute difference between perception and reality is more pronounced. Specifically, a 1-percentage-point increase in redistributed land reduces perceptual bias by an average of 0.127 points, indicating a tendency to underestimate one's actual position in the income distribution. Transmission mechanisms such as changes in income structure, labor formality, and perceived stability are explored, providing relevant evidence for the design of redistributive policies.

Keywords: Land reform, income distribution, biased perceptions
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[†]Universidad Nacional de La Plata, emiliano.bohorque@gmail.com
[‡]Universidad Nacional de La Plata, alexcluque@gmail.com
[§]Universidad Nacional de La Plata, af.deniard@gmail.com

1 Introduction

Land reform has long served as a cornerstone of redistributive policy in agrarian economies, aimed at reducing inequality, dismantling elite landholding structures, and promoting rural development. A substantial body of literature documents the effects of land redistribution on agricultural productivity, labor markets, political behavior, and civil conflict (Albertus, 2020; De Janvry et al., 2014; Caprettini et al., 2023). Yet, there is limited empirical evidence on whether such reforms produce long-term changes in how individuals perceive inequality and assess their relative economic standing.

This paper examines the long-run effect of Peru's 1969 agrarian reform on individuals' perceptions of their income position. Implemented under the military government of General Juan Velasco Alvarado, the reform marked one of the most comprehensive land redistribution programs in Latin America. It expropriated large estates, abolished feudal labor relations in the countryside, and transferred land primarily to workers organized into cooperatives. By 1980, over nine million hectares—roughly one-third of Peru's agricultural land—had been redistributed (Álvarez, 1980). The reform transformed Peru's rural economic structure and institutional landscape, yet its impact on subjective economic perceptions remains unexplored.

This question is motivated by a growing literature in political economy and behavioral economics that highlights the importance of economic perceptions for shaping redistributive preferences, institutional trust, and political behavior. A range of studies find that individuals systematically misperceive their relative income rank, often underestimating or overestimating their position within the income distribution (Cruces et al., 2013; Gimpelson and Treisman, 2018). These misperceptions are not random: they are influenced by local reference groups, social context, and prior experiences. However, little is known about whether—and how—major structural policy interventions can shape such beliefs over time.

We combine detailed administrative data on the geographic implementation of Peru's land reform with nationally representative household surveys collected between 2012 and 2023 that contain both perceived and actual income ranks. Our primary outcome is the deviation between a respondent's perceived and actual position in the national income distribution. To estimate the causal effect of land reform exposure on this perception gap, we exploit spatial variation in reform intensity across districts within agrarian zones. Our empirical strategy uses an instrumental variables approach that compares central and peripheral departmental areas within the same agrarian zone. Since agrarian zone boundaries were delineated prior to the reform and independently of administrative or political criteria, the relative location of a district within its zone provides plausibly exogenous variation in exposure to implementation efforts.

Our findings show that greater exposure to land reform is associated with an increased tendency to underestimate income rank. Specifically, a one-percentage-point increase in the share of land redistributed in a district is associated with a 0.127-point increase in downward perception bias. This effect persists more than four decades after the reform ended and is robust to the inclusion of geographic, demographic, and historical

controls. The impact is strongest among older cohorts with potential exposure to the reform or its intergenerational effects.

We explore three potential mechanisms that help explain the increase in perception bias observed in areas more exposed to land reform: local inequality, perceived income stability, and labor market formality. First, although the reform led to a reduction in income inequality at the district level, this did not translate into improved perceptions of economic standing. Second, individuals in these areas report lower levels of perceived income stability, which is positively associated with underestimating one's relative position in the income distribution. Third, we document an increase in labor formality in reform-exposed areas, largely driven by the creation of cooperatives. However, the centralized and bureaucratic nature of these institutions may have weakened local economic agency, limiting their potential to improve perceived economic status. Together, these findings suggest that even where objective inequality declined, long-term structural conditions shaped a persistent gap between actual and perceived income rank.

This paper contributes to two strands of literature. First, it adds to research on the long-run effects of land reform by examining a previously unstudied outcome: persistent biases in perceived income position. While previous work has focused on outcomes such as productivity, human capital, and political mobilization (Albertus et al., 2020; Martinelli and Vega, 2019), we provide evidence that redistribution can have enduring effects on how individuals interpret their relative economic standing. Second, we contribute to the literature on inequality perception, which finds that misperceived rank strongly affects support for redistribution and political behavior (Cruces et al., 2013; Karadja et al., 2017; Windsteiger, 2022). We show that these perceptions are not solely shaped by current local conditions, but may also reflect the imprint of historical redistributive institutions—suggesting that perception bias, like other behavioral outcomes, may respond to long-run institutional legacies.

The remainder of the paper is organized as follows. Section 2 provides background on the agrarian reform and presents descriptive statistics illustrating the existence, magnitude, and direction of bias in perceived income distribution. Section 3 reviews key contributions from the relevant literature. Section ?? describes the data sources and outlines the empirical strategy. Section 6 presents the main estimation results and explores hypotheses regarding the underlying mechanisms. Finally, Section 7 discusses the conclusions.

2 Historical Background and Institutional Context

2.1 Historical Context

By the mid-twentieth century, land distribution in Peru was highly concentrated in large farms and estates, with a parallel sector of smallholders and peasant communities in the highlands. According to the 1961 Agricultural Census, of the 878,667 agricultural holdings, just 0.4% exceeded 500 hectares yet accounted for 76% of all agricultural land. These holdings were concentrated among the wealthiest 1% of the population. In contrast, 83% of holdings were under five hectares, accounting for only 5.5% of total

land area (Caballero, 1984). In 1965, half of the economically active population was employed in the agricultural sector (Albertus, 2020).

The agrarian structure at the time reflected a colonial legacy of concentrated land ownership and socioeconomic exclusion. This structure entrenched rural inequality, limited economic mobility, and consolidated the power of a landowning elite. Labor conditions were precarious, with servitude-like relations common on many estates. During the 1950s, rural unrest escalated in response to these conditions, culminating in widespread peasant mobilization. Emerging guerrilla movements such as the Movimiento de Izquierda Revolucionaria (MIR) and the Ejército de Liberación Nacional (ELN) framed agrarian inequality as a root cause of conflict, placing land reform at the center of national debate.

While landowners held both economic and political influence, the growing threat of rural insurgency prompted the first legislative response: the Ley de Bases para la Reforma Agraria of 1963. However, its implementation was limited and geographically targeted to areas with guerrilla activity, reflecting a reactive rather than structural approach to reform.

A decisive shift occurred after the 1968 military coup led by General Juan Velasco Alvarado. The reform process was formalized with Decree Law 17716 (1969), which imposed a landholding ceiling of 150 hectares, varying by region, and authorized the expropriation of holdings above this threshold. Expropriated land and capital assets were transferred primarily to agricultural workers organized into production cooperatives. In some cases, land was also redistributed to indigenous communities in less fertile areas. These cooperatives were state-supervised and intended to promote collective production under the slogan "the land belongs to those who work it". In summary, the reform fundamentally restructured landholding patterns and rural governance in Peru (Albertus et al., 2020; Cleaves and Scurrah, 1980).

2.2 Agrarian Zones

To examine the long-run effects of the agrarian reform on individuals' perceptions of their income rank, we exploit variation introduced by the structure of Peru's agrarian zones—a key institutional feature of the reform. In 1960, prior to the reform's implementation, the Ministry of Agriculture's Servicio de Investigación y Promoción Agraria (SIPA) had established twelve agrarian zones covering the national territory.[1]

These zones were originally designed for research and agricultural development, not policy implementation. Their boundaries were drawn based on ecological, social, and infrastructural factors, including access to markets and transport networks. With the exception of Zone 12, each zone encompassed multiple departments.

The adoption of agrarian zones as the reform's administrative units was driven by political and logistical considerations. As noted by Albertus (2020), this strategy avoided delays and resistance that might have emerged from creating new jurisdictions, enabled
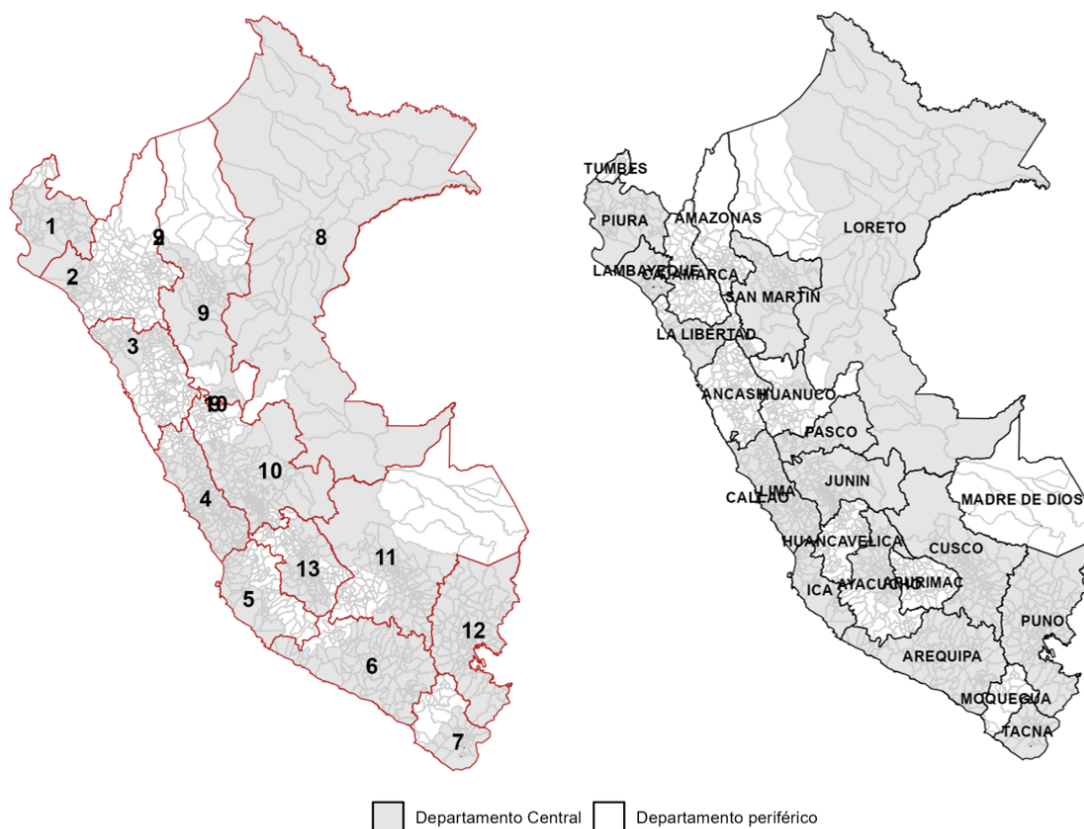
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[1]A thirteenth zone was created in 1974, but we restrict our sample to the original twelve for consistency in boundary definitions.

regional planning that accounted for existing landholding patterns, and allowed the government to appoint trusted local administrators to lead the reform effort (Cleaves and Scurrah, 1980).

In practice, the central offices of each zone were located in the most developed department within the zone, often corresponding to pre-existing administrative centers. This resulted in unequal proximity to state authority and differential implementation intensity. Peripheral districts, especially those farther from the central office, tended to receive less attention. Echevarria (1978) notes that these areas were under-served due to logistical and resource constraints, and Albertus (2020) cites Ministry of Agriculture documents reporting limited capacity for training reform agents in remote areas. Likewise, Condor (2024) finds a negative correlation between land redistribution and distance from the central office.

Figure 1 presents the administrative layout of agrarian zones and departments. Districts located in the same department may fall under different agrarian zones. We define the "central department" of each zone as the one hosting its administrative office, resulting in a single central department per zone. This geographic centralization generated variation in reform exposure across districts, which we exploit to study long-term effects on perceptions of inequality and income rank.

Figure 1: Agrarian Zones and Departmental Boundaries

3 Related Literature

3.1 Income Perceptions

A growing literature in behavioral economics and political economy has documented consistent biases in how individuals perceive their own position in the income distribution. These biases are typically explained by limited information, cognitive heuristics, and social comparisons. Since individuals lack full knowledge of the national distribution, they rely on local "reference groups"—often defined by geography, occupation, or social networks—to infer their relative position. If these reference groups are systematically different from the broader population, such inferences can lead to substantial misperceptions.

This phenomenon is particularly relevant in light of the canonical model of Meltzer and Richard (1981), which posits a direct link between inequality and support for redistribution. If individuals' preferences are shaped by perceived, rather than actual, inequality, then political behavior and redistributive outcomes may deviate from standard predictions. Several extensions of the Meltzer–Richard framework explicitly model these perceptual biases, showing that they can account for empirical deviations from theory (Choi, 2019; Iacono and Ranaldi, 2021; Windsteiger, 2022). From a policy perspective, this implies that support for redistribution may depend less on objective income and more on how individuals interpret their relative economic standing.

Empirical studies have consistently found that most individuals perceive themselves as belonging to the middle of the income distribution—even when they are objectively in the upper or lower tails. This "central tendency" or "middle-class bias" has been documented in diverse contexts, including Argentina (Cruces et al., 2013), Germany (Fehr et al., 2022), Denmark (Hvidberg et al., 2023), and the Kyrgyz Republic (Gassmann and Timár, 2024). International studies confirm the robustness of this bias across cultural and institutional settings (Gimpelson and Treisman, 2018; Hoy and Mager, 2021; Bublitz, 2022).

However, these patterns are not universal. The shape of local income distributions and the composition of reference groups can affect both the magnitude and direction of perception bias. In Sweden, for example, Karadja et al. (2017) find that nearly 90% of respondents underestimate their true position, a much higher share than in other countries. Other recent work shows that people often conflate income and wealth when evaluating inequality (Douenne et al., 2024), suggesting that perceived inequality is shaped by a broader notion of economic standing.

This literature provides a conceptual framework for understanding persistent perception biases. In the context of this paper, it implies that historical changes to the local income or wealth distribution—such as those induced by land reform—may shift reference groups or informational priors in ways that produce long-lasting misperceptions.

3.2 Land Reform

A parallel literature has studied the effects of land redistribution in rural economies. Land reform has been used by both democratic and authoritarian governments to ad-

dress inequality, secure property rights, reduce poverty, and limit political unrest. However, empirical findings on the success of land reform have varied substantially across contexts, often depending on implementation mechanisms, state capacity, and political conditions (Bhattacharya et al., 2019).

In Peru, the agrarian reform initiated in 1969 and implemented through 1980 involved the expropriation of large landholdings exceeding 150 hectares and their redistribution primarily through cooperatives. Several studies have evaluated its long-run impacts. Albertus and Popescu (2020) find that districts with greater exposure to the reform experienced long-term stagnation and higher poverty. Albertus et al. (2020) documents negative effects on human capital accumulation, driven in part by increased opportunity costs of education. In the political sphere, Albertus (2020) finds an inverted U-shaped relationship between reform intensity and civil conflict: moderate exposure heightened conflict, while deeper reforms reduced it by mitigating grievances. Finally, Condor (2024) shows that the reform increased the participation of candidates from marginalized ethnic groups in local elections, although it did not improve their electoral success.

Taken together, these studies show that Peru's land reform produced persistent effects on economic, political, and social outcomes. However, none have examined whether the reform also altered how individuals perceive their economic position. Given the magnitude of the institutional shift and the cooperative model it introduced, this is a potentially important channel for understanding long-run consequences.

This paper contributes to both strands of literature. First, it adds to the inequality perception literature by showing that long-term exposure to redistributive policy—not just local inequality or information gaps—can shape persistent perception biases. Second, it extends the literature on land reform by introducing a novel outcome: subjective perceptions of income rank. While prior work has focused on political and economic effects, we provide evidence that historic institutional change can influence how individuals assess their relative position, linking two literatures that have so far evolved in parallel.

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4   Data and Descriptive Statistics

This study combines administrative and household survey data to estimate the long-run effects of Peru's agrarian reform on income perception bias. The analysis relies on two main sources: (i) the National Household Survey (ENAHO), and (ii) district-level data on the implementation of the agrarian reform, originally compiled by Albertus (2020). We complement these sources with geographic and historical controls from external datasets.

The ENAHO is an annual, nationally representative household survey conducted by Peru's National Institute of Statistics and Informatics (INEI). It collects detailed information on demographics, income, employment, education, and governance. We use the 2012–2023 survey rounds, during which the governance module includes a question

on perceived income position.[2] To construct our main outcome, we pool all available years and aggregate the data to the district level, forming a repeated cross-section.

Our primary outcome variable is the absolute deviation between a respondent's perceived and actual position in the national income distribution. Actual income rank is defined as the income decile to which the respondent belongs, based on per capita household income (adjusted for inflation and survey weights). Perceived rank is self-reported in the survey. We compute the perception bias as the difference between perceived and actual income decile, and use both the signed and absolute values in alternative specifications.

For treatment intensity, we use district-level measures of land redistribution from the agrarian reform database compiled by Albertus (2020), which draws on archival records from the Ministry of Agriculture and agrarian reform zones between 1969 and 1980. The dataset identifies districts affected by the reform, their location within each agrarian zone, and distances from both the central office and the zone's geographical centroid.

To control for historical confounders, we incorporate several additional variables. Districts that participated in the colonial-era *mita minera* are flagged using data from Dell (2010), given the documented long-term effects of forced labor on human capital accumulation and local institutions. Geographic controls include altitude, district area (in km^2), and the proportion of arable land, constructed using the FAO's Global Agro-Ecological Zones database. These variables account for geographic features that influence agricultural potential and, by extension, the scope of land redistribution.

Table 1 presents summary statistics for the key variables used in the analysis.

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Bias	-2.58	1.42	-7.43	2.71	7096
Formality (Proportion)	0.10	0.07	0	0.4	4057
Perceived Stability (Proportion)	0.33	0.23	0.01	1	6131
Gini Index	0.28	0.1	0.02	0.73	7248
Inside Agrarian Zone Core (=1)	0.55	0.5	0	1	7248
Redistributed Area (%)	17.15	25.7	0	100	7248
Altitude (km a.s.l)	2.32	1.49	0	4.84	7248
Mita Zone (= 1)	0.15	0.36	0	1	7248
Area (hundreds of km^2)	6.95	20.17	0.02	292.35	7248
Cultivable land (% area)	7.78	11.17	0	90	7248

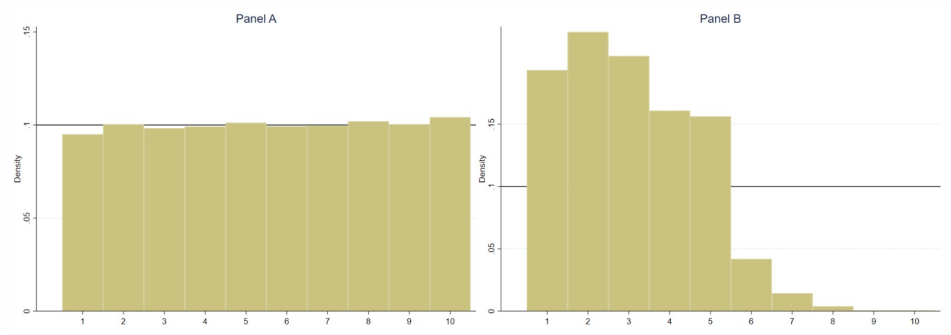## 4.1 Descriptive Evidence on Perception Bias

We begin by examining the distribution of perception bias—defined as the difference between an individual's perceived and actual income decile—using pooled ENAHO data

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[2]The perception module is administered only to the household head or their partner.

from 2012 to 2023. This variable captures the extent to which individuals misperceive their relative position in the national income distribution.
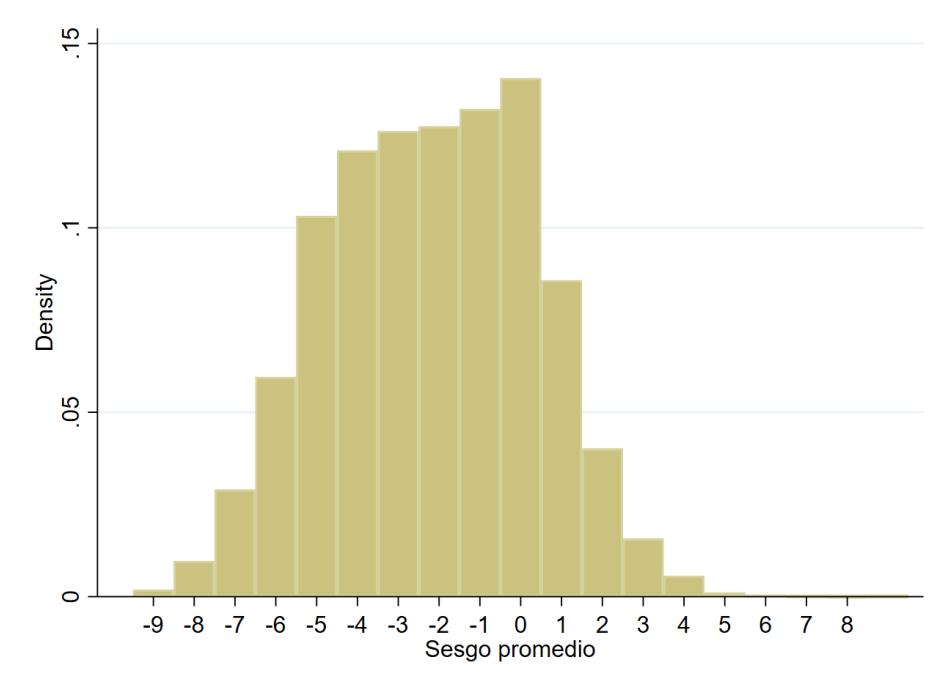
Figure 2 shows the distribution of both objective (Panel A) and perceived (Panel B) income deciles. Most respondents place themselves between the second and fourth deciles, regardless of their actual position. This reflects a widespread tendency to underestimate one's income rank. Figure 3 confirms this pattern: the distribution of the bias is left-skewed, with a national average of nearly minus two deciles.

Figure 2: Distribution of Objective and Perceived Income Decile

Source: Author's own elaboration based on ENAHO microdata (2012–2023)

Figure 3: Distribution of Perception Bias (Perceived – Objective Decile)

Source: Author's own elaboration based on ENAHO microdata (2012–2023)

These patterns remain stable across survey years and across the income distribution. Appendix Figures A1 and A2 show the evolution of the average bias over time and its relationship with actual income decile, respectively. Notably, the sharp increase in underestimation during 2020 coincides with the economic uncertainty caused by the COVID-19 pandemic.

Taken together, these findings highlight the presence of systematic and persistent misperceptions in self-assessed income rank. In the next section, we examine whether exposure to the agrarian reform can explain spatial variation in this bias.

5 Empirical Strategy

To estimate the causal effect of Peru's agrarian reform on individuals' perceptions of their income rank, we implement a two-stage least squares (2SLS) strategy. The key identification challenge is that reform exposure—proxied by the percentage of redistributed land at the district level—may be endogenous to unobserved local characteristics correlated with the outcome, such as inequality, mobilization, or productive structure.

To address this concern, we construct an instrumental variable based on whether a district lies within the *central department* of its agrarian reform zone. Districts in central departments systematically received greater exposure to the reform due to proximity to the administrative hub (Albertus, 2020; Condor, 2024). The reform was implemented using a highly centralized administrative model, with bureaucratic offices and cooperatives concentrated in the zone's central department. However, since these locations were not randomly assigned, this approach raises concerns about endogeneity if central departments differ in unobservable ways.

Our identification strategy hinges on the institutional process that generated the agrarian zones and their administrative centers. The zones were created in 1960 by SIPA for research and extension purposes—well before the 1969 reform. According to historical documents held by the National Institute for Agrarian Innovation (INIA), these zones were defined using ovoid templates, largely based on ecological considerations and access to transport infrastructure. They were not aligned with departmental or political boundaries, and at the time of delimitation, planners lacked census data and accurate maps of the productive structure.

Although the location of the central department within each zone was chosen to facilitate implementation, within-zone variation in departmental affiliation can be considered exogenous to pre-reform characteristics. In other words, conditional on being in a given agrarian zone, whether a district falls within the central department is plausibly uncorrelated with omitted variables affecting current perception bias. This follows from the arbitrary shape of the zones, the limited information available at the time, and the centralized nature of state planning.

To construct the instrument, we create a binary variable indicating whether each district belongs to the central department of its agrarian zone. Unlike Albertus (2020), who focus on marginal variation at departmental borders, our approach identifies discrete

variation in reform intensity within zone boundaries. Our approach is also distinct from Condor (2024), who use continuous distance to agrarian offices. Instead, we use the institutional designation of central departments to proxy for administrative exposure, which captures intensity more sharply.

The instrument must satisfy two assumptions: relevance and exclusion restriction. We satisfy the relevance condition empirically: the first stage shows that central-department districts received significantly more redistributed land, with the coefficient significant at the 1% level.

The exclusion restriction—requiring that the instrument affects perceptions only through reform exposure—cannot be tested directly. However, we provide institutional and historical justification. Peru has historically operated as a highly centralized state, with political and fiscal power concentrated in Lima (Aguilar, 1994; Schonwalder and Thomson, 2003). Departments have long served as administrative units with limited capacity to design or implement their own development policies. This pattern held during the agrarian reform, which was planned and executed uniformly from the central government, without tailoring to local conditions. Therefore, affiliation with the central department within a agrarian zone is unlikely to be correlated with unobserved local policies or political environments that directly affect income perceptions. This supports the plausibility of the exclusion restriction.

Following Albertus (2020), we restrict the sample to districts with populations under 75,000 to avoid conflating rural reform effects with urban labor markets. We also limit the sample to agrarian zones 1–7 and 11, based on three criteria: (i) the reform was implemented; (ii) boundaries remained unchanged during the reform period; and (iii) the zone does not coincide entirely with a single department. This excludes Zones 8 and 9 (Amazon), Zone 10 (split during reform), and Zone 12 (aligned exactly with Puno).

We estimate the following 2SLS specification:

$$Y_{dz} = \delta \cdot \widehat{D}_{dz} + X'_{dz}\beta + \varepsilon_{dz} \tag{1}$$

where Y_{dz} denotes the average perception bias in district d, agrarian zone z. $\widehat{D}_{dz}$ is the predicted share of land redistributed (exposure), instrumented by an indicator for central department status. The control vector X_{dz} includes fixed district-level characteristics: altitude, arable land share, district area, and a dummy for colonial-era mita exposure.

The first stage is given by:

$$D_{dz} = \gamma_z + \pi \cdot Z_{dz} + X'_{dz}\theta + \nu_{dz} \tag{2}$$

where Z_{dz} is the central department dummy.

6 Results

6.1 Main Results

Using an IV approach with a 2SLS model, we find that a 1 percentage point increase in the redistributed area reduces the bias by 0.127 points on average, controlling for time-invariant district characteristics such as altitude, cultivable area, total surface area, and mita zone. The results are statistically significant at the 1% level. In particular, in districts belonging to the central department of the agrarian zone, the absolute magnitude of the bias is higher compared to peripheral districts, indicating a more pronounced underestimation of relative position in the income distribution. This suggests that the massive land redistribution may have generated more distorted perceptions of inequality. Table 2 presents the estimation results.

Table 2: Effect of Agrarian Reform on the Bias in Distribution Perceptions

	Bias	
	(1)	(2)
Redistributed Area (%)	-0.127***	-0.163***
	(0.035)	(0.041)
Controls	Yes	No
Mean Var. Dep.	-2.58	-2.59
Observations	7096	7096

Notes: The table reports 2SLS estimates of the effect of land redistribution on the bias in income distribution perceptions. The redistributed area (%) is instrumented using the binary variable indicating belonging to the central department of the agrarian zone. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, ***
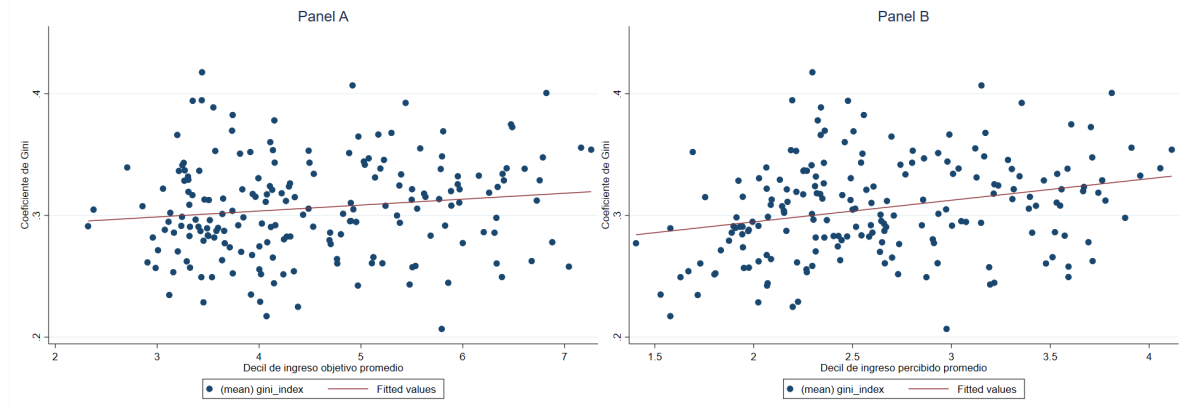
6.2 Mechanisms

The results show that the absolute bias increases in districts with greater exposure to the agrarian reform. We identify three possible transmission mechanisms that could explain this effect: inequality, perceived stability, and labor formality.

Historically, agrarian reform emerged as a response to the landlords' abuses of power over workers, which generated political instability and fostered the rise of subversive movements. In this context, land redistribution aimed to reduce inequality and mitigate potential uprisings.

Testing the inequality mechanism is challenging, especially in the long run. Ideally, inequality measures before, during, and after the reform would be required, but data availability is limited. Given this constraint, we assess the long-term impact of the reform on inequality using the Gini coefficient for the period relevant to this study. Figure 4 shows the relationship between the provincial-level Gini coefficient and the average target income decile (Panel A) and the average perceived income decile (Panel

B). A positive relationship with the Gini coefficient is observed, where the values of the average perceived decile are bounded between 2 and 4, while the target decile ranges from 2 to 8, highlighting the presence of a negative bias at the provincial level.

Figure 4: Relationship between the Gini Coefficient and Objective and Perceived Income Decile by Province

Source: Author's own elaboration based on ENAHO microdata (2012-2023)

Table 3 presents the 2SLS estimation results, using the Gini coefficient as the dependent variable to analyze its role as a mechanism. We find that a one-percentage-point increase in redistributed land has a negative and significant effect at the 5% level on inequality. In other words, in the last decade, living in an area with greater agrarian reform intensity is associated with lower inequality.

Since inequality acts as a mechanism influencing bias, this suggests that lower inequality is linked to a greater negative bias. However, theoretically, a reduction in income disparity could decrease the underestimation of economic position or even lead to an overestimation in contexts where the socioeconomic environment was below average. Nevertheless, the literature on agrarian reform indicates that it had no significant impact on economic development or human capital accumulation in the affected regions (Albertus et al., 2020; Albertus and Popescu, 2020). This suggests that its effects were not sustainable over time. In this context, the negative bias can be explained by the fact that inhabitants of these areas tend to perceive themselves as poorer compared to other regions. Thus, although income inequality decreased, the perception of relative position remains more pessimistic.

Table 3: Inequality

	Gini Index	
	(1)	(2)
Redistributed Area (%)	-0.003**	-0.002*
	(0.001)	(0.001)
Controls	Yes	No
Mean Var. Dep.	0.278	0.278
Observations	7248	7248

Notes: The table reports 2SLS estimates of the effect of land redistribution on the bias in income distribution perceptions. The redistributed area (%) is instrumented using the binary variable indicating belonging to the central department of the agrarian zone. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, ***

Additionally, we explore two other mechanisms linked to living conditions and the labor environment: perceived stability and formality. To measure perceived stability, we use data from the governance module of ENAHO[3].

The model results indicate that a one-percentage-point increase in redistributed land leads, on average, to lower perceived stability in areas more exposed to the reform, with statistical significance at the 1% level. The relationship with bias is direct: a lower sense of stability causes individuals to perceive themselves as poorer than they actually are, reinforcing the underestimation of their economic position.

The third identified mechanism is related to the proportion of formal employees in areas affected by agrarian reform. We find that a one-percentage-point increase in redistributed land is associated with a rise in the proportion of formal workers. This result is intuitive since land redistribution during the reform was implemented through the creation of cooperatives, which led to the formalization of businesses in these regions. Although the relationship with bias is not direct, it can be explained by the fact that the Peruvian economy is highly centralized and bureaucratic. Despite the reform fostering greater prosperity, the cooperatives created were supervised by government-appointed bureaucrats, limiting the direct control of farmers over the management and administration of these entities.

[3]We used a question where respondents are asked whether the household perceives its income as stable, somewhat stable, or very unstable. Stable household were coded as one, zero otherwise.

Table 4: Perceived Stability and Formality

	Perceived Stability (Proportion)		Formality (Proportion)	
	(1)	(2)	(3)	(4)
Redistributed Area (%)	-0.019***	-0.023***	0.011**	0.013***
	(0.005)	(0.005)	(0.006)	(0.005)
Controls	Yes	No	Yes	No
Mean Var. Dep.	0.33	0.33	0.10	0.10
Observations	6131	6131	4057	4057

Notes: The table reports 2SLS estimates of the effect of land redistribution on the bias in income distribution perceptions. The redistributed area (%) is instrumented using the binary variable indicating belonging to the central department of the agrarian zone. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, ***

6.3 Heterogeneous Effects

The main results cover the national territory, excluding agrarian zones based on the previously mentioned criteria. To explore potential heterogeneous effects, we estimate the instrumental variables model for specific groups of individuals.

Table 5 presents the results by cohorts. We analyze whether the effects vary by age group, as one would expect that those who lived through the implementation of the agrarian reform, and were therefore more exposed, exhibit differences in the observed outcomes.

Table 5: IV Results by Cohorts

	Cohort (1950s)		Cohort (1960s)		Cohort (1970s)		Cohort (1980s)		Cohort (1990s)		Cohort (2000s)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Redistributed Area (%)	-0.158***	-0.196***	-0.117***	-0.160***	-0.089***	-0.134***	-0.133***	-0.165***	-0.138	-0.172	-0.487	-0.121
	(0.045)	(0.049)	(0.031)	(0.041)	(0.032)	(0.043)	(0.043)	(0.053)	(0.088)	(0.112)	(2.273)	(0.190)
Controls	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Mean Var. Dep.	-3.01	-3.01	-2.73	-2.73	-2.09	-2.09	-1.84	-1.84	-2.44	-2.44	-3.32	-3.32
Observations	6204	6204	6337	6337	6157	6157	5128	5128	2510	2510	193	193

Notes: The table reports 2SLS estimates of the effect of land redistribution on the bias in income distribution perceptions. The redistributed area (%) is instrumented using the binary variable indicating belonging to the central department of the agrarian zone. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, ***

To compute the cohorts, we use ENAHO to identify the year of birth and assign a cohort accordingly. We collapse the data by year, district, and cohort. We observe that in districts where the intensity was higher, i.e., the central departments, individuals born between the 1950s and 1980s exhibit an increase in absolute bias. The results are significant at the 1% level.

This effect is consistent with the general results in Table 2. However, for younger groups, the estimates are not statistically different from zero. This can be explained by the implementation period of the reform, which spanned from 1969 to 1980. Therefore, those born in the latter decade may have been influenced by the changes resulting from land redistribution. In contrast, individuals born from the 1990s onward grew up

in a context where the reform was already consolidated, implying that they did not experience a direct impact on their perceptions of income distribution.

Finally, we perform a heterogeneous effects analysis for identifiable reference groups. We compute reference groups using a question that identifies with whom or what group the household head identifies. Cruces et al. (2013) found a strong relationship between the socioeconomic level of the place of residence and bias perception. Table 6 presents the 2SLS estimation results using reference groups. We show that a one percentage point increase in the redistributed area leads to an increase in absolute bias for those who consider their reference group to be geographic, their peasant community, or their religious group. All results are statistically significant at the 1% rejection level, except for ethnic or racial groups.

Table 6: IV Results by Reference Group

	Geographic		Ethnicity and Race		Peasant communities		Religious group	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Redistributed Area (%)	-0.145***	-0.194***	-0.527	-0.989	-0.081**	-0.097***	-0.162***	-0.231***
	(0.048)	(0.063)	(0.671)	(2.006)	(0.032)	(0.032)	(0.050)	(0.079)
Controls	Yes	No	Yes	No	Yes	No	Yes	No
Mean Var. Dep.	-2.70	-2.70	-2.85	-2.85	-2.48	-2.48	-2.78	-2.78
Observations	5812	5812	1878	1878	4423	4423	4600	4600

Notes: The table reports 2SLS estimates of the effect of land redistribution on the bias in income distribution perceptions. The redistributed area (%) is instrumented using the binary variable indicating belonging to the central department of the agrarian zone. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, ***

7   Conclusions

This study analyzes the long-term effects of the Peruvian agrarian reform, a nation-wide redistributive policy, on individuals' perceptions of income distribution. Using a previously underexplored dataset on land reform and leveraging the governance, democracy, and transparency module of ENAHO, this paper provides novel evidence on the implications of land redistribution over time.

The results suggest that the agrarian reform widened the gap between perception and reality, leading to a greater underestimation of relative economic position in districts with higher levels of intervention.

Furthermore, we identify several transmission mechanisms. First, the Gini coefficient shows that areas exposed to the reform exhibit lower inequality, though with a relatively poorer and more homogeneous population. Second, greater exposure to the reform is associated with a lower proportion of individuals who consider their economic situation stable. Finally, the analysis of the proportion of formal workers reveals an increase linked to the creation of cooperatives during the reform.

The heterogeneous effects analysis reveals that the temporal proximity to the reform influences the magnitude of the perception-reality gap. In the most affected districts, individuals born and living near the implementation period exhibit a greater absolute bias compared to more recent cohorts (born after 1990).

This study has two main limitations stemming from the nature of the data. First, since ENAHO is a representative survey, it does not uniformly cover the entire national territory, preventing the calculation of the bias measure for certain districts and years. Second, the lack of pre-reform data limits the ability to control for initial socio-economic factors that could improve the accuracy of the estimates.
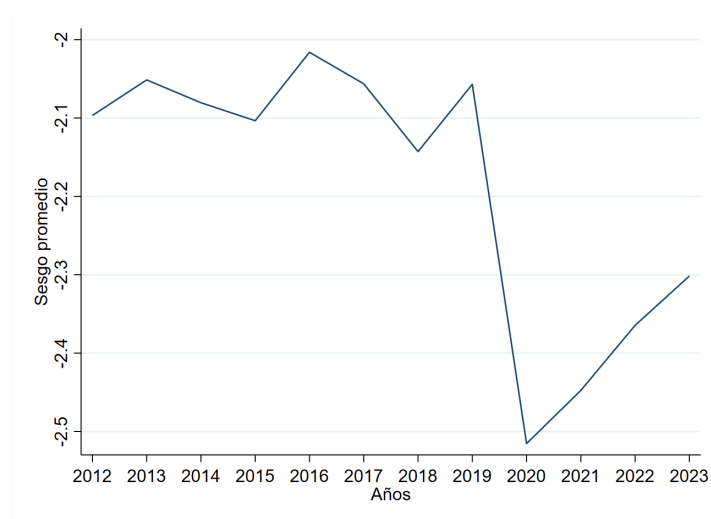
In conclusion, the agrarian reform implemented during Velasco's government played a key role in shaping perceptions of income distribution, especially among those who directly experienced its effects. These findings contribute to the literature on redistribution and distributive perceptions, offering a historical perspective on the persistent effects of redistributive policies on individuals' perceptions of inequality.

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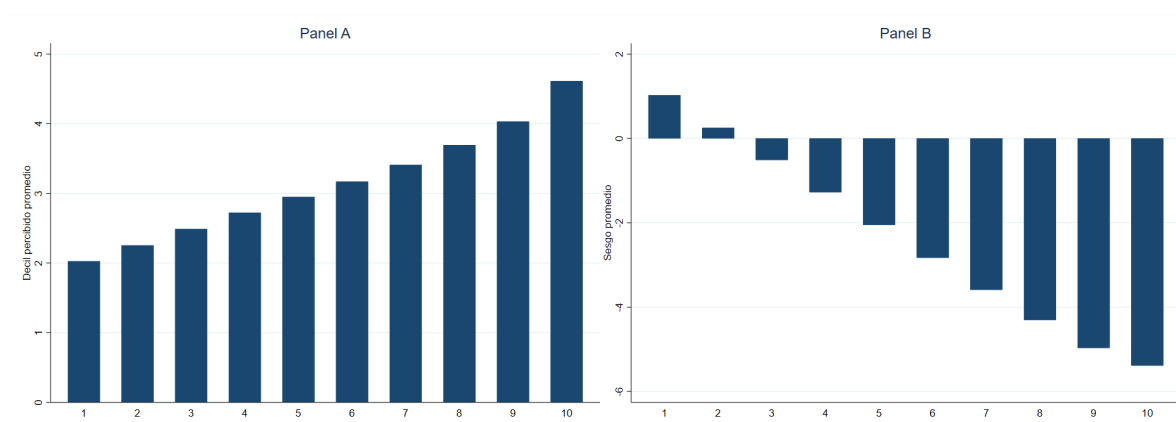
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Appendix Figure A1: Trends in Average Perception Bias (2012–2023)

Source: Author's own elaboration based on ENAHO microdata (2012–2023)

Appendix Figure A2: Perceived Income Decile and Average Bias by Objective Income Decile

Source: Author's own elaboration based on ENAHO microdata (2012–2023)