# Housing Access and Economic Opportunity: Evidence from Brazil's Housing Lottery Program

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How does access to affordable homeownership affect economic opportunity among low-income households? We address this question using the housing lottery program in São Paulo state—accounting for 22% of Brazil's population and 31% of its GDP—which allocates subsidized housing to low-income families through transparent lotteries (see institutional details in Appendix A1). The Companhia de Desenvolvimento Habitacional e Urbano (CDHU) conducted 281 lotteries across 250 municipalities between 2017 and 2024, ranking 494,319 applicants and selecting the top 30,551 ranked individuals to receive housing offers. We link all applicants to comprehensive administrative data from Brazil's Ministry of Labor (RAIS, covering the universe of formal employment) and Ministry of Finance (CNPJ, covering all registered firms), creating an 8-year panel tracking labor market trajectories, business ownership, and human capital investments. Approximately 9% of applicants founded sole-proprietorship firms during this period.

This setting provides several advantages for causal identification: (1) individual-level random ranking assignment within lotteries creates experimental variation in housing eligibility comparable to a randomized controlled trial; (2) sharp discontinuities at ranking cutoffs enable regression discontinuity designs exploiting precise rank positions; (3) substantial wealth transfers—housing worth R$165,000 ($45,000) plus R$383 ($105) monthly liquidity gains—generate meaningful treatment intensity; and (4) geographic variation across 250 municipalities spanning diverse economic contexts enables analysis of heterogeneous effects. Specifically, we examine whether subsidized housing enables households to pursue higher-paying but riskier occupations, start and grow businesses, and invest in human capital. Our empirical strategies exploit both regression discontinuity designs at eligibility cutoffs and lottery fixed effects specifications leveraging the complete lottery-based experimental variation.

Homeownership represents a key policy instrument for promoting economic mobility and financial inclusion worldwide (Collinson et al., 2015). However, prior research primarily examines *marginal changes* in housing equity among existing homeowners, studying how house price appreciation affects entrepreneurship (Adelino et al., 2015; Schmalz et al., 2017), consumption (Sinai and Souleles, 2013), portfolio allocation (Chetty et al., 2017), and labor market mobility (Blanchflower and Oswald, 2013). Our study provides the first causal evidence on how the *discrete transition* from non-ownership to ownership affects economic opportunity—a question with critical policy implications for low-income households, the primary target of affordable housing programs worldwide.

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## Research Questions

We examine how housing access affects economic opportunity through three primary domains:

### 1. Labor Market Risk-Taking and Occupational Mobility

Does housing security enable workers to pursue riskier, higher-return occupations? Economic theory suggests homeownership could affect occupational choice through multiple channels (Sinai and Souleles, 2013): (1) *wealth effects* enabling job search and occupational transitions requiring upfront investment or delayed payoffs; (2) *insurance effects* where secure housing tenure reduces background risk, potentially increasing tolerance for income volatility; (3) *liquidity effects* from eliminated rent payments enabling smoother consumption during job transitions; (4) *immobility costs* where homeownership reduces job search radius and limits responses to distant opportunities (Blanchflower and Oswald, 2013).

We measure labor market outcomes through: (1) employment status and labor force participation; (2) wage trajectories and hourly compensation; (3) occupational mobility across 2,600 occupation categories; (4) transitions to variable-compensation employment (sales, commission-based work); (5) job-to-job mobility and sectoral transitions; and (6) self-employment entry.

### 2. Entrepreneurship and Business Creation

Does housing wealth facilitate business entry and growth? Prior research documents that housing equity increases entrepreneurship through the collateral channel, as home equity enables borrowing for business investment (Schmalz et al., 2017; Adelino et al., 2015). However, these studies focus on homeowners experiencing house price appreciation. Our setting examines the discrete transition from renting to owning among credit-constrained households, potentially operating through distinct mechanisms: (1) *collateral effects* where housing ownership signals creditworthiness even without formal home equity borrowing; (2) *liquidity effects* from reduced housing costs providing working capital; (3) *stability effects* where secure tenure enables long-term business planning; (4) *reduced necessity* where housing security decreases pressure for supplementary income through self-employment.

We measure entrepreneurship through: (1) formal business registration (sole proprietorships via CNPJ); (2) business survival at 1, 3, 5 years; (3) business growth measured by transitions from individual microentrepreneur (MEI, allowing one employee and R$81,000 annual revenue) to microenterprise (ME, allowing 9–19 employees and R$360,000 revenue); (4) employment creation; and (5) industry selection patterns.

### 3. Heterogeneous Effects

We examine how housing effects vary across key dimensions: (1) *age* (younger workers with longer horizons versus older workers nearing retirement); (2) *household composition* (dual-earner versus single-earner households, presence of children); (3) *pre-lottery occupation* (white-collar versus blue-collar workers); (4) *local economic conditions* (municipalities with deep versus shallow labor markets, urban versus rural); (5) *lottery competitiveness* (high versus low selection rates reflecting local housing scarcity); and (6) *industry sectors* for entrepreneurship outcomes (capital-intensive versus service sectors).

## Data and Sample Construction

Our analysis integrates three comprehensive Brazilian government administrative datasets, linked through unique individual tax identifiers (CPF) or social identification numbers (NIS).

First, CDHU lottery records from the São Paulo State Housing Secretariat contain complete participation histories for all 494,319 applicants across 281 lotteries conducted between 2017 and 2024. Critically, these records include each applicant's randomly assigned rank within their lottery and the ranking cutoff determining eligibility for housing offers. For each lottery $\ell$, applicants ranked $r \leq \bar{r}_\ell$ (where $\bar{r}_\ell$ equals the number of available housing units) receive offers, while those ranked $r > \bar{r}_\ell$ do not. The dataset includes application dates, verified household characteristics (income, employment status), lottery identifiers, municipality locations, and house delivery dates for eligible recipients who accepted offers.

Second, the *Relação Anual de Informações Sociais* (RAIS) from the Ministry of Labor contains mandatory employer-submitted records for all formal workers in Brazil. RAIS provides annual snapshots of December 31st employment status including monthly salary, detailed occupation codes (CBO 2002 with approximately 2,600 categories), payment structure (monthly, weekly, hourly, task-based), employer characteristics (size, industry classification, location), and worker demographics (race, gender, education level, date of birth). RAIS enables tracking of job-to-job transitions, wage trajectories, occupational mobility, and labor force participation over time.

Third, the *Cadastro Nacional da Pessoa Jurídica* (CNPJ) from the Ministry of Finance contains comprehensive records for all registered firms in Brazil—both active and inactive businesses. For each firm, CNPJ provides founding date, legal form (sole proprietorship, LLC, corporation), initial equity capital, industry classification (CNAE codes), ownership structure, and current status (active, closed, tax violations). We systematically identify CPF identifiers for sole-proprietorship founders by exploiting patterns in legal names, enabling linkage between business ownership and individual employment histories.

We construct our primary analytical sample by matching lottery applicants to RAIS and CNPJ records via CPF/NIS identifiers. We successfully match approximately 71% of lottery applicants to RAIS (350,000 individuals), creating a balanced panel from three years before lottery application through five years post-lottery for labor market analysis. For entrepreneurship analysis, we identify approximately 30,000 lottery applicants who founded sole-proprietorship firms (9% of matched applicants). This linked dataset enables comprehensive tracking of labor market trajectories, business creation and growth, and human capital investments across the complete housing receipt lifecycle.

## Empirical Strategy

Our identification strategy exploits transparent randomization from Brazil's housing lottery system, providing experimental variation in housing access comparable to a randomized controlled trial. Each lottery assigns ranks to applicants through cryptographically secure random number generation, creating exogenous variation in housing eligibility. We observe individual-level random rankings for all 494,319 applicants across 281 lotteries, enabling multiple complementary identification strategies that leverage both sharp discontinuities at eligibility cutoffs and the broader experimental design.

**Lottery Notation and Treatment Assignment**

Let $R_{i\ell}$ denote individual $i$'s randomly assigned rank within lottery $\ell$, and $\bar{R}_\ell$ represent the eligibility cutoff (number of available housing units). The treatment assignment rule is deterministic: individuals ranked $R_{i\ell} \leq \bar{R}_\ell$ receive housing offers, while those ranked $R_{i\ell} > \bar{R}_\ell$ do not. Define eligibility as $E_{i\ell} = \mathbb{1}[R_{i\ell} \leq \bar{R}_\ell]$.

**Primary Specification: Regression Discontinuity Design**

Our primary approach implements sharp Regression Discontinuity exploiting eligibility cutoffs, comparing applicants immediately above and below ranking thresholds:

$$Y_{i\ell t} = \alpha_t + \beta_t^{RDD} \cdot E_{i\ell} + f_t(R_{i\ell} - \bar{R}_\ell) + \gamma_t X_{i\ell} + \varepsilon_{i\ell t} \tag{1}$$

where $Y_{i\ell t}$ represents outcomes for individual $i$ in lottery $\ell$ measured $t$ years post-lottery ($t \in \{1, 2, 3, 5\}$). The function $f_t(R_{i\ell} - \bar{R}_\ell)$ flexibly controls for smooth relationships between rank distance and outcomes, estimated using local linear regressions with triangular kernels and data-driven optimal bandwidth selection (Calonico et al., 2014). We allow separate slopes above and below the cutoff. Baseline characteristics $X_{i\ell}$ (age, gender, education, pre-lottery wages, occupation) improve precision. Standard errors are clustered at the lottery level.

The RDD coefficient $\beta_t^{RDD}$ identifies the Local Average Treatment Effect (LATE) for applicants near eligibility margins—the causal effect of receiving a housing offer for individuals whose eligibility is determined by small differences in lottery rankings. This design compares observationally equivalent individuals differing only in whether they barely qualified for housing offers.

We pool observations across all 281 lotteries, normalizing ranks by distance from lottery-specific cutoffs, which maximizes statistical power while preserving the within-lottery randomization that validates the design. RDD specifications use observations within optimal bandwidths (typically ±50 ranks, approximately 20% of applicants per lottery), balancing precision against bias from functional form assumptions.

**Complementary Specification: Full Lottery Randomization**

To exploit the complete experimental variation beyond near-cutoff comparisons, we implement a lottery-based randomization design using all applicants:

$$Y_{i\ell t} = \alpha_t + \beta_t^{Lottery} \cdot E_{i\ell} + \delta_\ell + \gamma_t X_{i\ell} + \varepsilon_{i\ell t} \tag{2}$$

This specification compares all eligible applicants (ranked $R_{i\ell} \leq \bar{R}_\ell$) to all ineligible applicants (ranked $R_{i\ell} > \bar{R}_\ell$) within each lottery. Lottery fixed effects $\delta_\ell$ absorb all lottery-level variation (timing, location, selection rates, housing characteristics, applicant pool composition), ensuring comparisons occur only within randomization events. This approach trades off the RDD's tight local identification for substantially increased statistical power from using the full sample.

The lottery randomization coefficient $\beta_t^{Lottery}$ identifies the Average Treatment Effect (ATE) of housing eligibility for the full applicant population within each lottery, providing broader external validity than local RDD estimates.

Because random ranking assignment creates balanced treatment and control groups, this specification requires weaker functional form assumptions than RDD—it relies purely on the experimental design.

**Identification Assumptions**

The RDD design requires: (1) *continuity*—potential outcomes vary smoothly with lottery rank absent treatment; (2) *no manipulation*—applicants cannot strategically affect rankings; (3) *local randomization*—ranks near cutoffs are as-good-as-randomly assigned. The lottery-based design requires only: (1) *random ranking*—rank assignment independent of potential outcomes within lotteries; (2) *stable unit treatment value assumption (SUTVA)*—no interference between applicants.

These assumptions are highly credible given the institutional context. Lotteries employ cryptographically secure randomization conducted through public ceremonies or electronically with public audit (Appendix A1). Applicants cannot observe or influence their rankings. The ranking mechanism is transparent and administered by government officials. Oversubscription ratios averaging 16:1 (declining from 8:1 in 2017 to 50:1 in 2024; Figure A2) make strategic manipulation implausible—success probabilities are too low for gaming to be profitable.

**Validation Tests**

We validate identification assumptions through comprehensive robustness checks. First, manipulation tests using the density discontinuity test of Cattaneo et al. (2020) examine whether applicant density shows discontinuities at cutoffs—finding smooth densities confirms no strategic sorting. Second, covariate balance tests verify that pre-lottery characteristics (age, gender, education, wages, occupation, household composition) vary smoothly across cutoffs and are balanced between eligible and ineligible groups within lotteries—confirming randomization created comparable groups. Third, placebo tests using artificial cutoffs away from true thresholds verify no spurious discontinuities, supporting functional form validity. Fourth, timing analysis examines when effects emerge: treatment effects should appear only after house delivery (averaging 18 months post-lottery), not immediately following lottery announcements—confirming actual housing access (not knowledge of eligibility) drives outcomes.

**Advantages Over Prior Research**

Our empirical strategy offers several decisive advantages over prior work. First, unlike studies using house price variation as quasi-experimental shocks (Adelino et al., 2015; Schmalz et al., 2017), we observe clean experimental variation from transparent randomization, eliminating concerns about endogenous price movements or confounding local economic shocks. Second, we examine the discrete transition from non-ownership to ownership among credit-constrained households—isolating the extensive margin effect of acquiring housing wealth that is policy-relevant for affordable housing programs. Third, unlike voucher studies examining rental assistance (Jacob and Ludwig, 2012; Ludwig et al., 2013), we study homeownership with attendant wealth accumulation, stability, and potential collateral effects. Fourth, universal administrative data covering all formal employment and business ownership eliminates attrition, measurement error, and survey non-response that plague household surveys. Fifth, multiple independent lotteries across diverse municipalities enable heterogeneity analysis revealing how local economic conditions moderate housing wealth effects. Finally, comprehensive long-run tracking (8-year panels) distinguishes immediate liquidity effects from gradual wealth and stability effects.

### Hypothesis: Labor Market Outcomes

We anticipate housing access will affect labor market outcomes through opposing channels. Positive effects may emerge from: (1) wealth effects enabling costly job search and career transitions; (2) insurance effects reducing background risk and increasing tolerance for income volatility; (3) liquidity effects enabling consumption smoothing during job transitions; and (4) neighborhood effects if housing developments offer better employment access. Negative effects may arise from: (1) geographic immobility reducing job search radius; (2) time and attention costs of property maintenance; and (3) wealth effects reducing labor supply.

Our primary labor market outcomes include: employment status (formal employment indicator), monthly wages (log real salary), hourly compensation (accounting for part-time work), occupational attainment (using 10 major occupation categories from elementary occupations to managers), job stability (tenure at current employer, job switches), and employment sector (private, public, small firms under SIMPLES Nacional).

Based on prior literature and our institutional context, we anticipate modest positive effects on wages driven by improved job matching and human capital investments enabled by housing stability. We expect stronger effects on occupational mobility, as housing security enables pursuit of higher-return opportunities requiring upfront investment or delayed payoffs. Job stability may increase through eliminated forced separations from housing precarity, though job-to-job mobility could decline if geographic constraints bind. Effects should be larger for younger workers (longer time horizons to recoup investments), households with children (where stability is most valuable), and individuals in municipalities with deeper labor markets offering diverse opportunities.

Timing analysis will distinguish mechanisms: immediate post-lottery effects suggest anticipation or liquidity channels, while effects emerging only post-house-delivery indicate wealth and stability channels. Heterogeneity across housing development characteristics (size, location, distance from urban centers) will separate neighborhood effects from pure wealth transfers.

### Hypothesis: Entrepreneurship Outcomes

Housing access may affect entrepreneurship through distinct mechanisms: collateral effects (housing ownership signaling creditworthiness even without formal home equity loans), wealth effects (security enabling risk-taking and business investment), liquidity effects (freed cash flow from eliminated rent providing working capital), and stability effects (secure tenure enabling long-term business planning). Countervailing forces include reduced necessity entrepreneurship if housing security decreases pressure to generate supplementary income through self-employment.

We anticipate housing access will increase formal business entry, concentrated among marginal entrepreneurs—individuals who would not start businesses absent the housing wealth shock. These businesses likely represent necessity entrepreneurship (smaller initial equity, service sectors, limited growth trajectories) rather than transformational ventures. For individuals who would enter entrepreneurship regardless of housing receipt (inframarginal entrepreneurs), we expect housing improves business performance through reduced financial stress, improved access to working capital, and enhanced stability enabling growth investments. However, effects may be heterogeneous: stronger for businesses in industries where housing ownership signals creditworthiness (construction, trade requiring supplier relationships) versus knowledge-intensive services, and larger in municipalities with deeper entrepreneurial

ecosystems providing access to customers, suppliers, and complementary services.

Timing analysis reveals underlying mechanisms: immediate post-lottery effects suggest liquidity or psychological channels, while effects emerging only post-delivery indicate wealth and collateral channels. Comparing marginal entrepreneurs (entering only due to housing) with inframarginal entrepreneurs distinguishes extensive margin (entry) from intensive margin (performance) effects.

## Policy Implications

This research generates policy-relevant evidence on subsidized homeownership programs across two main dimensions. First, by quantifying labor market returns and entrepreneurship effects simultaneously, we provide comprehensive cost-benefit evidence on affordable housing programs—particularly valuable as developing countries expand social housing provision while developed countries reconsider support for homeownership versus rental assistance. Our focus on the discrete transition from non-ownership to ownership among low-income households directly addresses the primary target population of such programs worldwide.

Second, our findings speak to program design features. Brazil's CDHU program combines asset transfer with income-contingent payments (20% of income) and 0% real interest rates, creating both wealth and liquidity effects. By measuring both channels separately—comparing outcomes immediately post-lottery (liquidity/anticipation) versus post-delivery (wealth/stability)—we identify which design features drive economic opportunity. This informs debates about housing vouchers versus homeownership support, and whether income-contingent repayment structures (increasingly common in student loans and mortgages globally) generate insurance value enabling risk-taking.

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# Appendix

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# A1 Institutional Background: CDHU Housing Program

## A1.1 Program Overview

The Companhia de Desenvolvimento Habitacional e Urbano do Estado de São Paulo (CDHU) is São Paulo state's housing and urban development company, responsible for implementing social housing policy across Brazil's most economically significant state. CDHU operates as the primary vehicle for delivering affordable housing to low- and middle-income families through subsidized homeownership programs.

São Paulo state, with a population of 46 million and GDP of R$2.7 trillion (representing 30% of Brazil's economy), faces substantial housing deficits despite its economic significance. CDHU addresses this gap by constructing standardized housing units and allocating them through public lotteries, ensuring transparent and equitable access to homeownership for families who would otherwise face significant barriers to housing acquisition.

## A1.2 Program Structure and Partnerships

CDHU housing programs operate through a multi-institutional framework:

- **State Level:** São Paulo State Secretariat of Housing (Secretaria Estadual da Habitação) sets policy; CDHU is the implementing agency responsible for construction, beneficiary selection, and contract administration.
- **Federal Partnership:** Caixa Econômica Federal, Brazil's federal savings bank, serves as financial agent and provides financing infrastructure. Federal housing subsidies supplement state programs.
- **Municipal Level:** Cities partner in program implementation, assist with beneficiary verification, and often provide land or complementary infrastructure.
- **Funding:** Housing construction and financing utilize FGTS (Fundo de Garantia do Tempo de Serviço—worker severance fund) and SBPE (Sistema Brasileiro de Poupança e Empréstimo—savings-based lending system).

This multi-level governance structure reflects Brazil's federalist housing policy framework, where state and federal governments share responsibility for social housing provision.

## A1.3 Program Scale and Geographic Distribution

Between 2017 and 2024, CDHU conducted 281 housing lotteries across 250 municipalities in São Paulo state. Figure A1 displays the geographic distribution and program intensity across the state. Panel A shows lottery frequency by municipality, with concentration in interior (countryside) municipalities rather than the capital region. Panel B displays total housing units allocated—while some large cities received substantial allocations, the program extends throughout the state. Panel C normalizes allocations by local population (units per 1,000 residents), revealing relative program intensity independent of city size. Panel D shows housing units per R$1,000 GDP per capita, demonstrating how program allocation relates to local economic capacity. This geographic variation enables analysis of heterogeneous treatment effects across different economic contexts.

Figure A2 presents program activity over time, showing substantial fluctuation across the sample period. Panel A documents that lottery frequency peaked in 2020 with 118 lotteries, declining sharply in 2021 before modest recovery. Panel B shows housing unit allocation followed a similar pattern, peaking at 12 thousand units in 2020. This variation reflects both construction completion timing and state budgetary cycles. Panel C documents total applicants, reaching nearly 245 thousand in 2020—the peak demand year. Critically, Panel D shows selection rates (probability of winning) varied from 12% in 2017–2018 to as low as 2% in 2024, indicating substantial and growing

excess demand. This oversubscription validates the lottery mechanism as genuine randomization—applicants cannot strategically manipulate selection when success probability is so low.

## A1.4 Eligibility Requirements and Selection Process

### A1.4.1 Quota System and Eligibility Categories

CDHU employs a quota-based allocation system, reserving units for specific demographic groups. Figure A3 Panel A shows the distribution of eligibility categories. The largest category, "Anyone Up to 10 MW" (48%), has minimal restrictions beyond income. However, 39% of units have income restrictions, 5% reserve for elderly applicants (60+ years), 5% for individuals with disabilities, and 2% for other specialized categories including police officers and correctional staff.

Quota systems serve dual purposes: (1) ensuring housing access for particularly vulnerable populations (elderly, disabled), and (2) income-targeting to maximize social welfare impact by prioritizing lowest-income eligible families. Importantly, quotas create multiple sub-lotteries within each housing development, each with independent random selection.

### A1.4.2 Income Requirements

Within the income restriction category, CDHU programs target families with monthly gross income between one and ten minimum wages (R$1,518 to R$15,180 in 2025). Panel B shows the detailed breakdown of income restrictions: 92% of income-restricted lotteries target the 1–3 minimum wage bracket (R$1,518–R$4,554), with only 4% targeting 3–5 MW and 3% targeting 5–10 MW brackets. This income targeting focuses the program on lower-middle-income families who face the most severe credit constraints and housing access barriers.

Income verification occurs through formal employment records (RAIS for wage workers, tax returns for self-employed) or municipal social services for informal workers. Applicants must demonstrate stable income sufficient to afford the 20% monthly payment commitment.

### A1.4.3 Development Size

Panel C shows the distribution of housing development sizes. Most lotteries (37%) involve developments of 50–100 units, with 23% offering fewer than 50 units, 17% offering 100–150 units, 9% offering 150–200 units, and 14% exceeding 200 units. Development size affects community formation—larger developments create new neighborhoods with substantial concentrations of lottery winners, while smaller developments integrate winners into existing communities.

### A1.4.4 Lottery Competitiveness

Panel D shows selection rates (probability of winning) across lotteries. Most lotteries (50%) have selection rates between 5–15%, indicating moderate competition, while 24% have extremely competitive selection rates under 5%. This variation in competitiveness across lotteries provides additional empirical leverage—we can test whether treatment effects differ by lottery competitiveness.

### A1.4.5 Additional Eligibility Restrictions

Beyond income and quota requirements, applicants must meet:

- **First-Time Homeownership:** Applicants cannot own or have previously owned residential property anywhere in Brazil. This restriction, verified through national property registries, ensures the program serves genuinely housing-insecure families.
- **Local Residency:** Applicants must demonstrate five years of residency or employment in the lottery municipality. This ensures housing allocation serves local residents with established community ties.
- **Family Unity:** Only one lottery entry permitted per family unit (spouses and dependent children cannot apply separately). This prevents multiple entries and ensures equitable selection probabilities.

These restrictions are verifiable through administrative records and prevent strategic manipulation of the lottery.

### A1.4.6 Selection Mechanism

Beneficiary selection occurs through public lotteries employing cryptographically secure random number generation. Lotteries are conducted either electronically (with public audit) or in physical public ceremonies attended by municipal officials, lottery oversight boards, and applicants.

The lottery process follows this sequence:

1. **Application Period:** 4–6 month window for eligible families to register
2. **Verification:** Municipal officials verify eligibility and assign applicants to appropriate quota categories
3. **Random Selection:** Public lottery draws winners and ranked alternates for each quota
4. **Notification:** Winners contacted and given 30 days to confirm acceptance
5. **Contract Signing:** Winners complete financing contracts with detailed terms
6. **House Delivery:** Typically 12 months post-lottery (average 18 months total from application)

Lottery rankings are preserved—if a winner declines, the next-ranked alternate receives the offer. This ranking structure enables regression discontinuity designs using cutoff positions as an alternative identification strategy.

## A1.5 Housing Characteristics

### A1.5.1 Unit Specifications

CDHU constructs standardized housing units with minimal variation in design, ensuring comparability across lotteries and municipalities. Figure A4 shows typical units: single-story detached or semi-detached houses with approximately 38–40 square meters (409–431 square feet) of living space. Panel A displays a ground-level view of typical units, while Panel B presents an aerial view of a completed development in Franca, São Paulo, showing how developments create new residential neighborhoods.

Figure A5 displays the standard floor plan used across most CDHU developments. Units feature:

- Two bedrooms (quartos) of approximately 6–8 square meters each
- Combined living and dining area (sala de estar/jantar)
- Kitchen (cozinha) with space for basic appliances

- Bathroom (banho) with shower, toilet, and sink
- Laundry area (lavanderia)
- Small front and rear yards (for detached units)

All units include basic infrastructure: water, sewage, electricity, and paved street access. Construction uses concrete block walls with ceramic tile roofs. While small by developed-country standards, these units provide substantial upgrade over informal housing (favelas) or precarious rental situations facing many applicants. Standardization serves both cost-efficiency and research purposes. Minimal variation in housing quality across lotteries ensures that treatment effects reflect homeownership and financing terms rather than heterogeneous housing characteristics.

#### A1.5.2 Community Context and Infrastructure

CDHU developments typically include basic community infrastructure: elementary schools, health clinics, community centers, and commercial areas (for larger developments). However, developments are not fully self-contained—residents typically commute to existing urban centers for work and services. This integration with existing economic activity is important for our entrepreneurship analysis, as business creation likely depends on access to customer bases and supply chains in established commercial areas.

### A1.6 Financing Structure

#### A1.6.1 Pricing and Subsidies

Housing unit prices vary with construction costs and location. Our sample shows:

- **Countryside Municipalities:** Typical range R$140,000–165,000 (e.g., Araraquara R$149,000)
- **São Paulo Metro Area:** Higher costs reaching R$180,000+ due to land prices and construction expenses

Recipients receive direct government subsidies ranging R$10,000–R$40,000 depending on family income and program funding. These subsidies reduce the financed amount, lowering monthly payment burden.

#### A1.6.2 Payment Structure and Interest Rates

The financing contract establishes monthly payments as **20% of verified family income**, adjusted annually with minimum wage increases. This payment structure has several implications:

- **Income-Contingent:** Payments rise with income, providing automatic insurance against income shocks (though payments cannot fall below inflation-adjusted minimum)
- **Below-Market Terms:** Interest rates are 0% real (0% + IPCA inflation) for families earning 1–5 minimum wages, and 4% real + IPCA for 5–10 MW families. Market mortgage rates in Brazil typically exceed 10–12% real, making these terms extraordinarily favorable.
- **Long Maturity:** 30-year (360-month) term provides affordability through extended amortization

Table A1 provides detailed financial analysis for a typical 2-minimum-wage household. The financing structure transfers substantial wealth: beneficiaries acquire a R$165,000 asset for present-value payments of R$113,050, while simultaneously avoiding R$184,420 in rent payments (present value). The net household benefit of R$236,370 represents 6.5 years of annual income—a transformative wealth shock for low-income families.

### A1.6.3 Prepayment and Default

Beneficiaries may prepay without penalties at any time. Prepayment amortizes principal and reduces either loan term or monthly payment (beneficiary chooses). However, CDHU reports that nearly all beneficiaries maintain the 30-year term, suggesting liquidity constraints bind for this population—they prefer lower monthly payments over accelerated homeownership.

For late payments, CDHU implements a graduated enforcement process:

- **30-day grace period:** Automatic for all beneficiaries
- **After 30 days:** Notification and invitation to renegotiate
- **After 12 months arrears:** Extra-judicial notice and potential court proceedings for repossession

This lenient default policy reflects both social welfare objectives (housing stability) and practical constraints (repossession is costly and politically sensitive). The forbearance provides insurance value—beneficiaries retain housing even during temporary income disruptions—which may affect risk-taking and entrepreneurship decisions.

### A1.6.4 Property Transfer and Asset Building

Upon completing all payments, beneficiaries receive full legal title (escritura) to the property with no restrictions on sale or transfer. During the payment period, beneficiaries effectively own the property (can renovate, pass to heirs) but cannot sell without CDHU approval. This structure creates a 30-year path to unencumbered homeownership and substantial asset accumulation for families with limited alternative wealth-building opportunities.

## A1.7 Program Timeline and Compliance

The typical timeline from application to occupancy spans approximately 18 months:

- **Months 0–6:** Application period and eligibility verification
- **Month 6:** Public lottery and winner notification
- **Months 6–8:** Contract signing and final documentation
- **Months 8–18:** Construction completion and finishing (for developments not yet complete) or immediate occupancy (for completed developments)
- **Month 18:** House delivery and key ceremony
- **Month 18+:** Payment obligations begin

This timeline creates identifiable treatment timing for our analysis. Lottery date provides the randomization point, while house delivery marks treatment realization. The 12-month average gap between lottery and occupancy allows us to test for anticipation effects—do winners adjust behavior immediately upon learning lottery results, or only upon actually receiving housing?

Figure A6 shows housing key delivery ceremonies attended by São Paulo State Governor Tarcísio de Freitas, illustrating the political salience and public transparency of the program. Panel A shows a lottery winner in Lençóis Paulista receiving the symbolic CDHU key from state officials, while Panel B shows a recipient celebrating at a housing ceremony in Flórida Paulista. These ceremonies represent the final stage of the lottery process, where selected families officially receive ownership of their new homes.

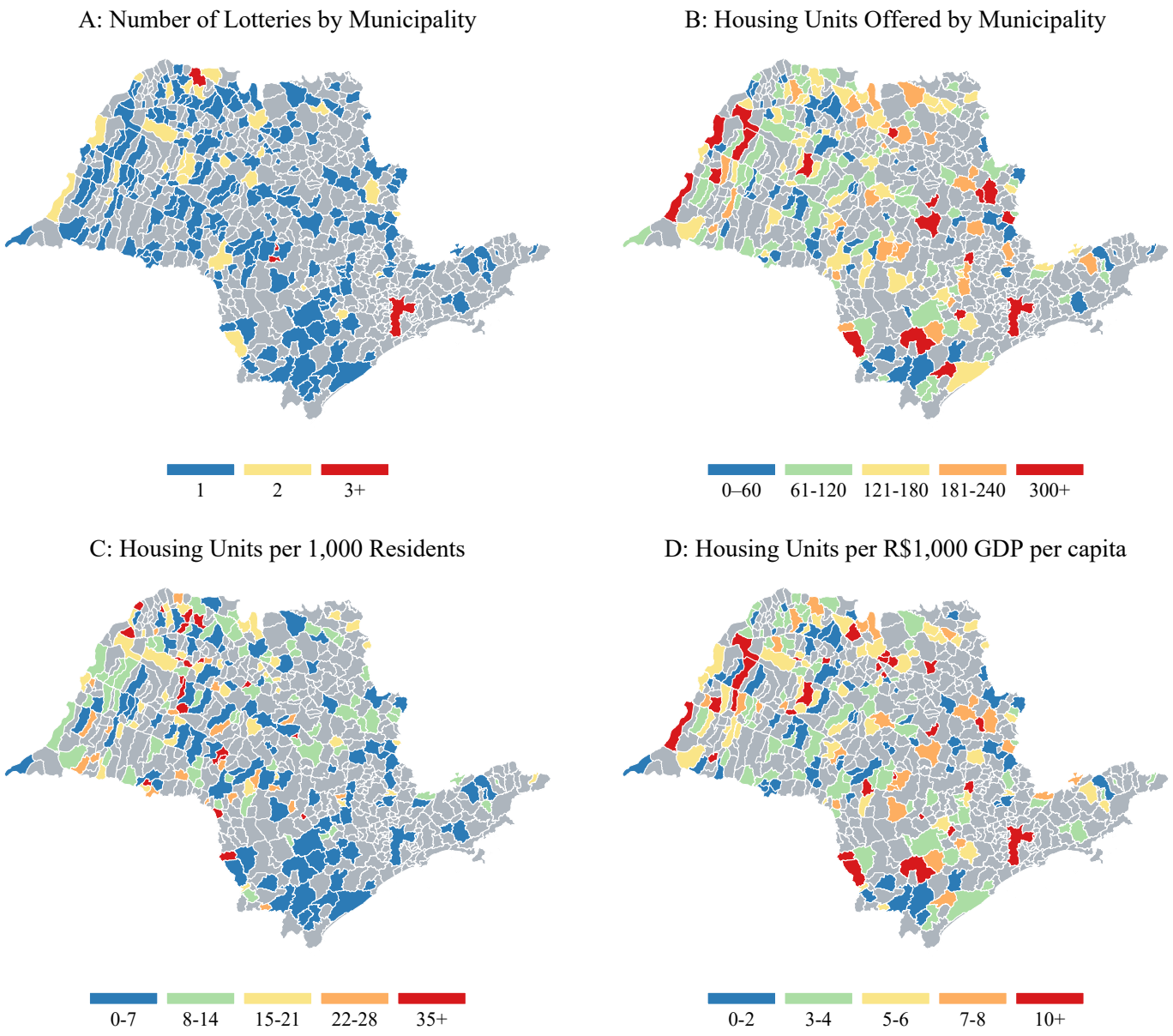
# A2 Exhibits

Table A1: Economic Impact of Housing Lottery: Illustrative Case

| **Outcome** | **Value (R$)** | **Description** |
|---|---|---|
| *Panel A: Household Profile (Typical 2 Minimum Wage Recipient)* | | |
| Monthly Household Income | 3,036 | 2 minimum wages at R$1,518 (2025) |
| Monthly Program Payment | 607 | 20% of income, adjusted annually with MW |
| Market Rent (Counterfactual) | 990 | Estimated rent for equivalent unit (0.6% of value) |
| **Monthly Liquidity Gain** | **383** | **Disposable income increase vs. renting** |
| *Panel B: Housing Asset Acquisition* | | |
| Housing Market Value | 165,000 | Current market value of typical unit |
| Direct Government Subsidy | 20,000 | Upfront subsidy (range: R$10K–R$40K) |
| Amount Financed | 145,000 | Housing value minus direct subsidy |
| Program Interest Rate | 0% + IPCA | Real interest rate for 1–5 MW bracket |
| Financing Term | 30 years | 360 monthly payments |
| *Panel C: Present Value Analysis (5% Real Discount Rate)* | | |
| PV of Housing Payments | 113,050 | Discounted value of 360 monthly payments |
| PV of Market Rent (Alternative) | 184,420 | Discounted rent payments if not in program |
| PV of Housing Asset Value | 165,000 | Asset acquired at end of payments |
| **Net Household Benefit** | **236,370** | **PV of Asset + Rent Saved − Payments** |
| *Panel D: Economic Significance* | | |
| Benefit / Annual Income | 6.5 years | Total benefit as multiple of annual income |
| Housing Value / Annual Income | 4.5× | Asset value relative to annual earnings |
| Monthly Cash Flow Gain / Income | 12.6% | Liquidity improvement as share of income |

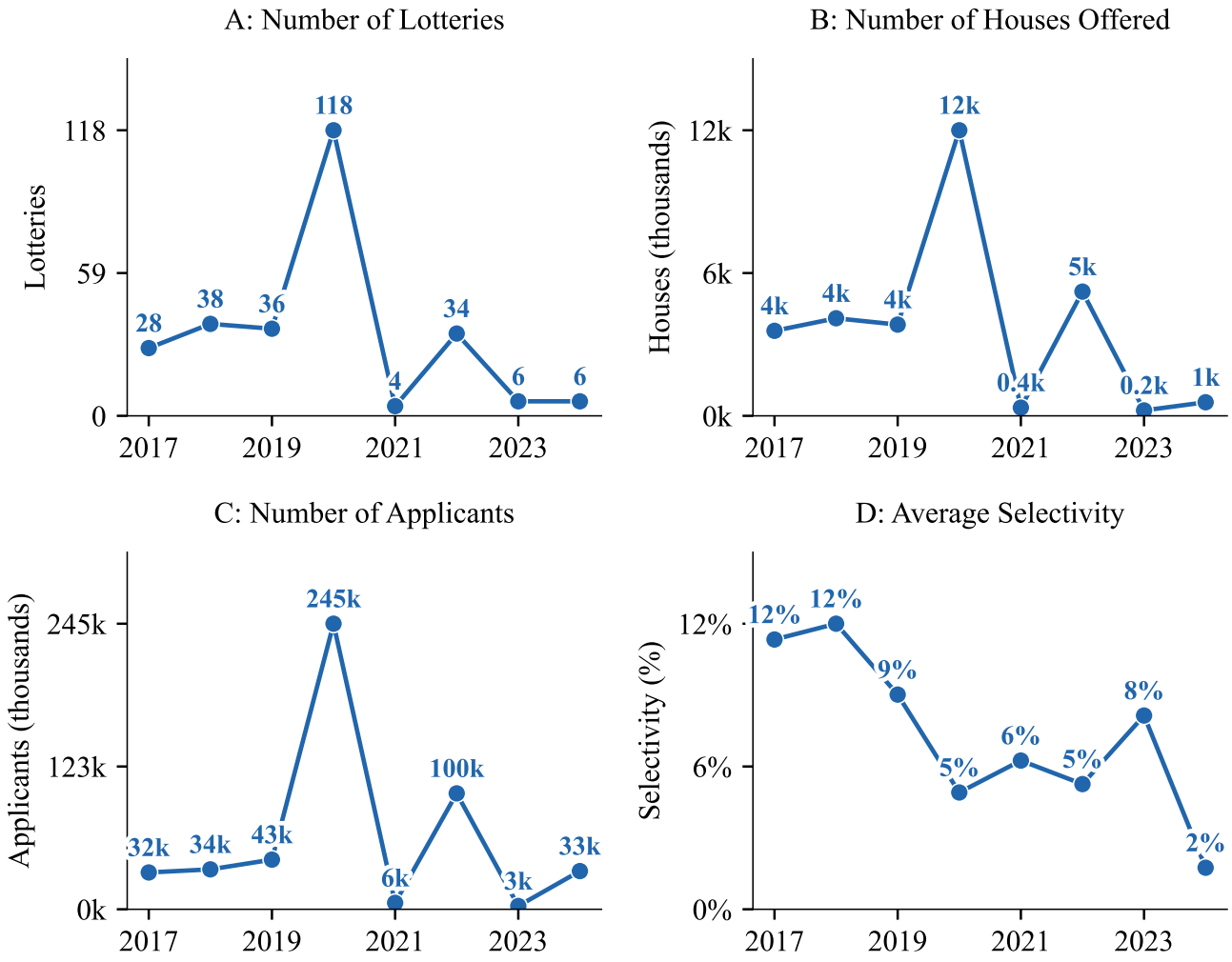
*Notes:* This table presents an illustrative case for a household earning 2 minimum wages (R$3,036 monthly in 2025), the typical program recipient. Panel A shows monthly cash flows. Program payment is 20% of verified income, adjusted annually as minimum wage increases. Market rent estimated as 0.6% of housing value per month. Panel B describes the housing financing structure. Recipients in the 1–5 minimum wage bracket pay 0% real interest (0% + IPCA inflation indexation). Direct subsidy of R$20,000 is assumed (subsidies range R$10,000–R$40,000). Panel C calculates present values at 5% real discount rate. PV of payments assumes real income grows at 1% annually (historical average real MW growth), so real payment burden slightly declines over time. Panel D expresses benefits relative to income.

Figure A1: Housing Lottery Programs in São Paulo State



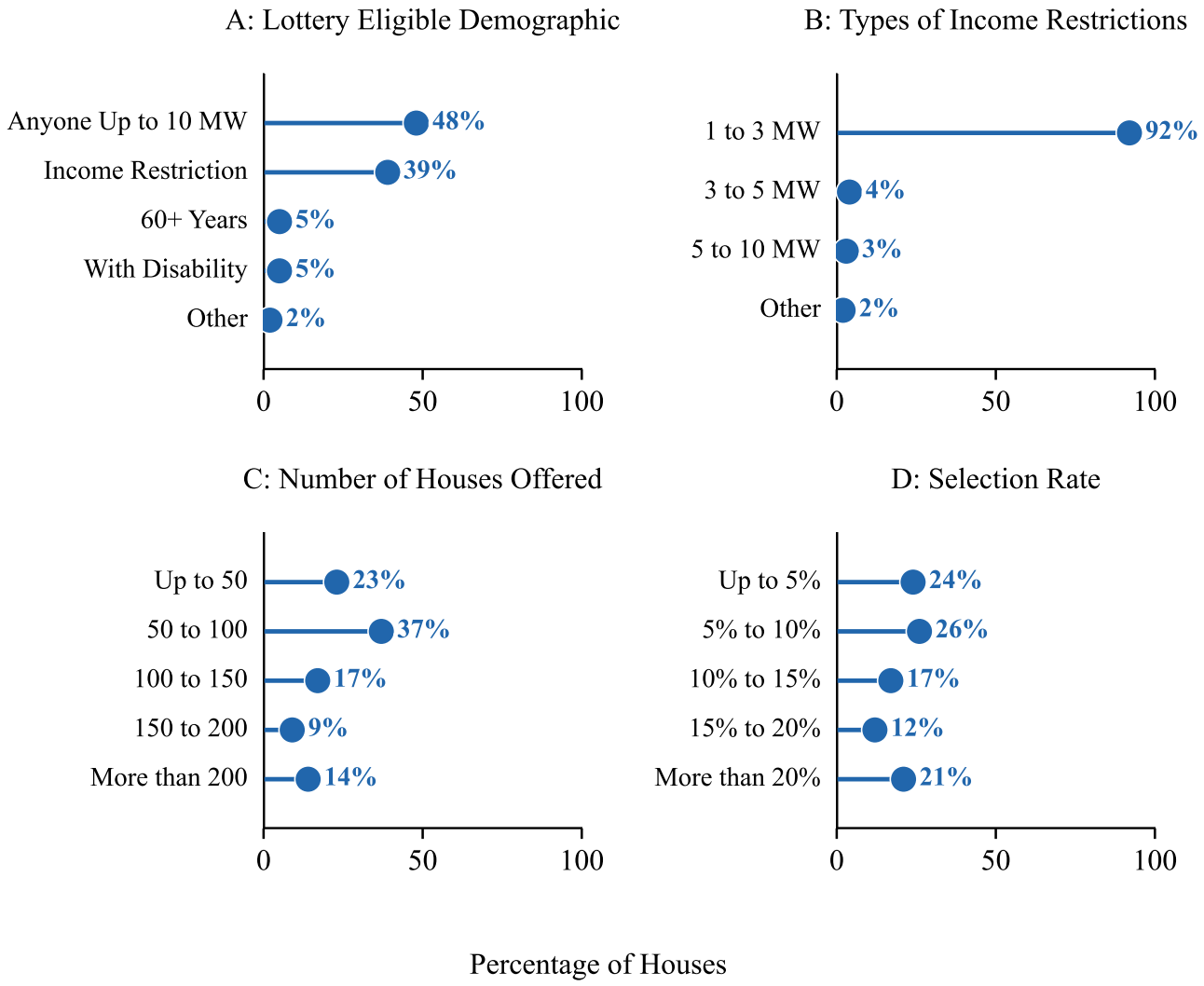

This figure shows the geographic distribution of CDHU housing lottery programs across municipalities in São Paulo state from 2017-2022. Panel A displays the number of lotteries conducted in each municipality. Panel B shows the total housing units allocated through the program. Panel C presents housing units per 1,000 residents, measuring the relative program intensity. Panel D shows housing units per R$1,000 GDP per capita, reflecting program allocation relative to local economic capacity. Municipalities without lotteries are displayed in light gray.

Figure A2: Yearly Housing Program Statistics in São Paulo State




This figure presents the annual statistics of CDHU housing lottery programs in São Paulo state from 2017-2022. Panel A shows the number of lotteries conducted each year. Panel B displays the total housing units awarded annually through the program. Panel C presents the total number of applicants participating in the lotteries each year. Panel D shows the average selectivity rate (housing units as a percentage of applicants), indicating the competitiveness of the program over time.

Figure A3: Lottery Characteristics in São Paulo's Housing Program




This figure presents key administrative characteristics of São Paulo state's housing lottery programs from 2017 to 2022. Panel A shows the distribution of lottery eligibility categories as defined by program rules, including general eligibility (Anyone Up to 10 MW), targeted income restrictions, age-based eligibility (60+ Years), disability status, and other specialized demographic categories (including single individuals and households with children). Panel B displays the detailed breakdown of income restriction types, categorized by different minimum wage (MW) thresholds (1 to 3 MW, 3 to 5 MW, 5 to 10 MW, and Other). Panel C presents the distribution of housing developments by size, showing the percentage of lotteries offering different numbers of housing units across five size categories, from small developments (up to 50 units) to large-scale projects (more than 200 units). Panel D shows the percentage of lotteries with different selection rates (housing units as a percentage of applicants), ranging from highly competitive (under 5% selection rate) to more accessible lotteries.

Figure A4: Visual Examples of CDHU Housing Units in São Paulo State

A: Ground-Level View of Housing Units



B: Aerial View of a Housing Development



This figure shows examples of standardized housing units provided through São Paulo's public housing lottery program. Panel A displays a ground-level view of typical units. These single-story homes typically feature similar floor plans. Panel B presents an aerial view of a completed housing development in Franca, São Paulo.

Figure A5: Typical Floor Plan of CDHU Housing Units




This figure shows the standard floor plan used for CDHU housing units in São Paulo state, with approximately 38-40 square meters (409-431 square feet) of living space. The layout features two bedrooms ("QUARTO"), a combined living and dining area ("SALA DE ESTAR / JANTAR"), a kitchen ("COZINHA"), a bathroom ("BANHO"), and a laundry area ("LAVANDERIA"). The numbers indicate room dimensions in meters. All housing units constructed through the lottery program follow similar floor plans with minor variations.

Figure A6: Housing Lottery's Key Delivery Ceremonies in São Paulo State

A: Housing Recipient Celebration in Lençóis Paulista




B: Housing Recipient Celebration in Flórida Paulista




This figure shows housing key delivery ceremonies held in São Paulo state in 2024. Panel A shows a lottery winner in Lençóis Paulista receiving the symbolic CDHU key from state officials. Panel B shows a recipient celebrating at a housing ceremony in Flórida Paulista. Both events were attended by São Paulo State Governor Tarcísio de Freitas (in blue and dark blue shirt, respectively), highlighting the political significance of these housing programs. These ceremonies represent the final stage of the lottery process, where selected families officially receive ownership of their new homes.