Pontifícia Universidade Católica
do Rio de Janeiro

Leonardo Calirman Wandersman

Patience and Brazil's Real Interest Rate Puzzle

Dissertação de Mestrado

Master's dissertation to be presented to the Programa de Pós–graduação em Economia, do Departamento de Economia da PUC-Rio in partial fulfillment of the requirements for the degree of Mestre em Economia.

Advisor : Prof. Yvan Becard
Co-advisor: Prof. Márcio Garcia

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Abstract

Wandersman, Leonardo Calirman; Becard, Yvan (Advisor); Garcia, Marcio (Co-Advisor). **Patience and Brazil's Real Interest Rate Puzzle**. Rio de Janeiro, 2026. 34p. Dissertação de Mestrado – Departamento de Economia, Pontifícia Universidade Católica do Rio de Janeiro.

Brazil has exhibited persistently high real interest rates for decades relative to both advanced and emerging economies, a pattern that standard explanations based on fiscal fragility, sovereign risk, inflation history, and financial distortions do not fully account for. This dissertation investigates a channel that complements this literature: differences in household patience. Using evidence from the Global Preferences Survey, I document that Brazil displays a lower willingness to postpone consumption than the United States. To assess the quantitative relevance of this fact, I use a representative-agent model and, subsequently, a heterogeneous-agent model with incomplete markets, idiosyncratic income risk, and borrowing constraints, based on Aiyagari (1994). The results show that patience has a quantitatively meaningful effect on the equilibrium real interest rate. When Brazil is counterfactually assigned the U.S. level of patience, its real interest rate falls from 9.23% to 7.00%, accounting for about 30.5% of the observed differential between the two countries. In an exercise directly disciplined by the Gallup evidence, differences in the composition of more and less patient households explain about 34% of this gap. I also show that the incidence of hand-to-mouth households constitutes an additional relevant channel: when Brazil is brought closer to the share observed in the United States, the real interest rate falls by a further 1.2 percentage points, accounting for about 16% of the differential. Taken together, the two channels explain approximately 46% of the Brazil–U.S. gap. The results suggest that Brazil's real interest rate reflects not only fiscal, monetary, and institutional factors, but also lower average patience and a higher incidence of hand-to-mouth households.

Keywords

Patience; Real Interest Rate; Heterogeneous Agents; Hand-to-mouth Families; Precautionary Savings.

Resumo

Wandersman, Leonardo Calirman; Becard, Yvan; Garcia, Marcio. **Paciência e a Taxa de Juros Real do Brasil**. Rio de Janeiro, 2026. 34p. Dissertação de Mestrado – Departamento de Economia, Pontifícia Universidade Católica do Rio de Janeiro.

O Brasil exibe, há décadas, taxas reais de juros persistentemente elevadas em relação tanto às economias avançadas quanto às emergentes, um padrão que explicações usuais baseadas em fragilidade fiscal, risco soberano, histórico inflacionário e distorções financeiras não explicam integralmente. Esta dissertação investiga um canal complementar a essa literatura: diferenças na paciência das famílias. Com base em evidências do Global Preferences Survey, documento que o Brasil apresenta menor disposição a postergar consumo do que os Estados Unidos. Para avaliar a relevância quantitativa desse fato, utilizo um modelo com agente representativo e, em seguida, um modelo de agentes heterogêneos com mercados incompletos, risco idiossincrático de renda e restrição de crédito, baseado em Aiyagari (1994). Os resultados mostram que a paciência tem efeito quantitativamente relevante sobre a taxa real de juros de equilíbrio. Quando o Brasil é contrafactualmente dotado do nível de paciência dos Estados Unidos, sua taxa real de juros cai de 9,23% para 7,00%, o que explica cerca de 30,5% do diferencial observado entre os dois países. Em um exercício disciplinado diretamente pelas evidências do Gallup, diferenças na composição entre famílias mais e menos pacientes explicam cerca de 34% desse gap. Mostro ainda que a incidência de famílias hand-to-mouth constitui um canal adicional relevante: ao aproximar o Brasil da participação observada nos Estados Unidos, a taxa real recua em mais 1,2 ponto percentual, respondendo por cerca de 16% do diferencial. Em conjunto, os dois canais explicam aproximadamente 46% do gap Brasil–Estados Unidos. Os resultados sugerem que a taxa real de juros brasileira reflete não apenas fatores fiscais, monetários e institucionais, mas também a menor paciência média e a maior incidência de famílias hand-to-mouth.

Palavras-chave

Paciência; Taxa de Juros Real; Agentes Heterogêneos; Famílias Hand-to-mouth; Poupança Precaucional.

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List of Abbreviations

AR(1)	First-order autoregressive process
CRRA	Constant Relative Risk Aversion
HA	Heterogeneous-Agent
HtM	Hand-to-Mouth
PELI	Preference for Earlier versus Later Income
RA	Representative-Agent

The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design

F. A. Hayek, *The Fatal Conceit: The Errors of Socialism.*

1
Introduction

Brazil has long stood out for its unusually high real interest rates relative to both advanced and emerging economies. This pattern has persisted across different monetary regimes, fiscal conditions, and external environments, making it one of the central puzzles in Brazilian macroeconomics. A broad literature has emphasized fiscal fragility, sovereign risk, inflation history, low domestic saving, and financial distortions as key determinants of this outcome (Segura-Ubiergo, 2012; Barbosa et al., 2016; Ceballos et al., 2024; Pessôa and Lisboa, 2026). While these mechanisms are clearly relevant, they do not fully explain why Brazil has consistently maintained real interest rates far above those observed in benchmark economies such as the United States.

This paper studies a complementary mechanism: cross-country differences in household patience. In intuitive terms, the idea that interest rates are deeply connected to time orientation and the willingness to defer gratification also appears in Giannetti (2005), who discusses the relationship between impatience, the future, and interest in a broader conceptual perspective. The idea is straightforward. In economies where households are less willing to postpone consumption and accumulate assets, desired saving is weaker, which tends to raise the equilibrium real interest rate. If households in Brazil are, on average, less patient than those in the United States, then part of the Brazil–U.S. real interest rate gap may reflect differences in intertemporal preferences rather than only fiscal, monetary, or institutional distortions.

To discipline this mechanism empirically, I use evidence from the Global Preferences Survey, an experimentally validated cross-country dataset on economic preferences (Falk et al., 2018). The survey suggests that Brazil displays a relatively low level of patience by international standards. I then study the mechanism in a sequence of quantitative exercises. I begin with a representative-agent benchmark to clarify the basic link between patience and the equilibrium real interest rate. I then move to a heterogeneous-agent model with incomplete markets and recover the level of patience consistent with observed real rates in Brazil and the United States. Finally, I use the survey evidence to discipline heterogeneity in patience across households and quantify how much of the Brazil–U.S. real interest rate gap can be explained by patience. I calibrate the model to match key macroeconomic aggregates in Brazil and the United States, including the real interest rate, public debt, and government spending, as well as the share of zero-asset households and the

income Gini.

The main result is that patience has a quantitatively meaningful effect on equilibrium real interest rates. In the model, assigning Brazil the U.S. level of patience lowers its equilibrium real interest rate from 9.23% to 7.00%, accounting for about 30.5% of the observed Brazil–U.S. gap. In a complementary exercise disciplined by the survey evidence, differences in patience account for about 34% of the differential. I also show that the constrained-household margin provides an additional channel: reducing the incidence of hand-to-mouth (HtM) households, i.e., households with zero asset holdings, in Brazil lowers the equilibrium real interest rate by about 1.2 percentage points, accounting for roughly 16% of the observed gap, while the joint exercise accounts for about 46%. These findings suggest that patience is not the whole story, but it is an important part of Brazil's real interest rate puzzle.

Importantly, the argument does not require patience to be the only primitive difference between Brazil and the United States. The model also shows that, even holding preferences fixed, differences in the earnings process and in the mass of constrained households can raise equilibrium real interest rates by weakening effective participation in asset accumulation.

This paper relates to three strands of the literature. First, this paper contributes to the literature on patience and macroeconomic outcomes. Existing work has shown that more patient societies tend to exhibit higher income, greater capital accumulation, and stronger development outcomes (Falk et al., 2018; Sunde et al., 2022). I contribute to this literature by focusing on a different margin: equilibrium real interest rates. Combining cross-country evidence on patience with a quantitative macroeconomic model, I show that differences in patience can account for a meaningful share of the Brazil–U.S. real interest rate gap.

Second, this paper contributes to the literature on Brazil's real interest rate puzzle. This literature has emphasized a range of mechanisms, including fiscal fragility, sovereign risk, inflation history, financial distortions, exchange-rate risk, and jurisdictional uncertainty as central determinants of high real interest rates in Brazil (Arida et al., 2005; Garcia and Didier, 2000; Segura-Ubiergo, 2012; Barbosa et al., 2016; Ceballos et al., 2024; Pessôa and Lisboa, 2026). I contribute by shifting part of the discussion to the household side of the safe-asset market. In the model, Brazil's high real interest rate reflects not only macro-fiscal and institutional forces, but also weaker household demand for safe assets, driven by lower patience and by a larger mass of hand-to-mouth households that remain excluded from asset accumulation. Quantitatively,

these two margins account for a substantial share of the Brazil–U.S. real interest rate gap. The contribution is therefore not to replace the standard explanations, but to show that part of the puzzle can also be understood as reflecting the composition of household balance sheets and intertemporal preferences.

Third, the paper contributes to the heterogeneous-agent literature, where incomplete markets, household heterogeneity, and precautionary behavior play a central role in shaping aggregate outcomes (Kaplan et al., 2018; Auclert, 2019; Auclert et al., 2025). I use an Aiyagari economy with incomplete markets, idiosyncratic income risk, and borrowing constraints to study a cross-country macroeconomic question: how household heterogeneity shapes equilibrium real interest rates. In addition, I allow for heterogeneous discount factors across households in a Gallup-disciplined exercise, which makes it possible to distinguish between two margins: changes in average patience and changes in the composition of households by patience type. This helps show how precautionary motives, borrowing constraints, and preference heterogeneity shape aggregate bond demand and, therefore, equilibrium real interest rates.

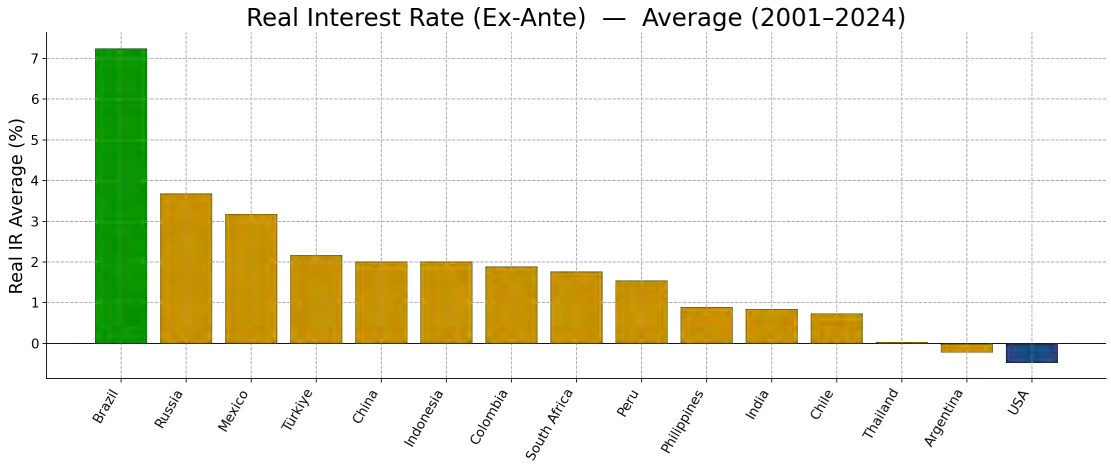
The remainder of the paper is organized as follows. Section 2 presents the motivating empirical facts. Section 3 introduces the theoretical framework. Section 4 discusses the calibration. Section 5 presents the baseline quantitative results. Section 6 studies the patience counterfactuals. Section 7 examines the role of constrained households. Section 8 concludes and discusses directions for future research.

2
Motivating Facts

This section introduces the empirical patterns that motivate the analysis.

2.1
Brazil's persistently high real interest rates

Brazil has displayed unusually high real interest rates not only relative to advanced economies, but also relative to a broad set of emerging markets. Figure 2.1 shows the average ex-ante real interest rate across selected countries over the 2001–2024 period. Brazil stands out as the country with the highest average real interest rate in the sample, well above both benchmark advanced economies such as the United States and most other emerging economies.



Source: Author's calculations based on IMF World Economic Outlook (October vintages) and national central banks. Note: Ex-ante real interest rates are computed as nominal interest rates minus expected year-end CPI inflation

Figure 2.1: Average ex-ante real interest rate across selected countries, 2001–2024. Brazil stands out as the country with the highest average real interest rate in the sample.

This pattern suggests that explanations based only on cyclical or country-specific episodes may be insufficient. Brazil appears persistently at the top of the international distribution over a sufficiently long sample period, which makes it a natural case for studying whether deeper structural differences in household behavior may affect equilibrium rates.

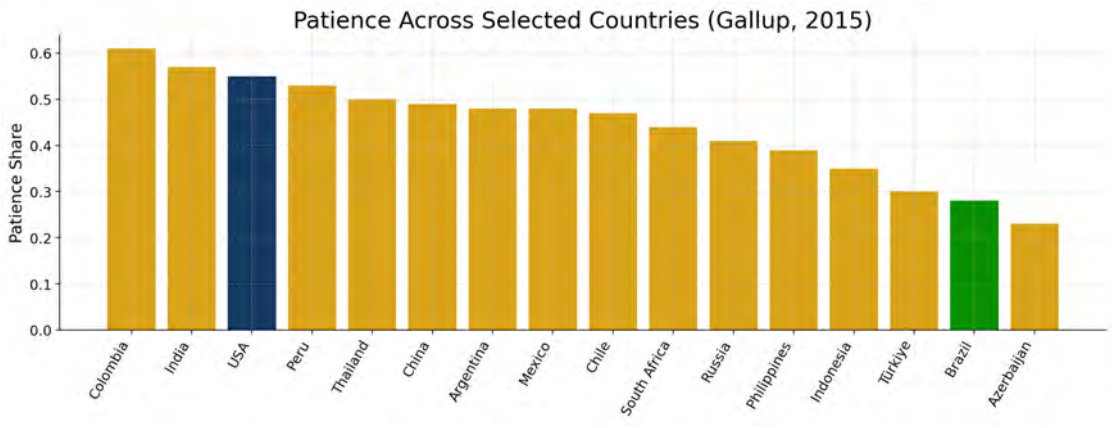
2.2 Cross-country differences in patience

Cross-country survey evidence also suggests that Brazil displays relatively low patience by international standards. Figure 2.2 reports patience measures for a set of selected countries using data from the Gallup End of Year Survey in 2015. Brazil appears near the bottom of the distribution, well below the United States and below most of the countries in the sample.

This fact is directly relevant for the mechanism studied in the paper. If more patient households are more willing to postpone consumption and accumulate assets, then an economy with lower patience should display weaker aggregate saving pressure and, all else equal, a higher equilibrium real interest rate.

Patience is measured using the Preference for Earlier versus Later Income (PELI), implemented in the 2015 Gallup End of Year Survey. Respondents were asked to choose between receiving an extra payment today equal to their normal monthly household income and receiving twice that amount in exactly one year. Individuals choosing the delayed option are classified as patient, while

those choosing the immediate option are classified as impatient. This choice implies a simple threshold: an individual who prefers the immediate payment is effectively revealing an annual discount rate above 100%, since waiting one year yields a gross return of 100%. Because the amounts are expressed relative to each respondent's own household income, the measure is naturally comparable across countries with different currencies and income levels. While 72% of Brazilians chose an extra payment today over twice in a year, only 45% of Americans did the same.

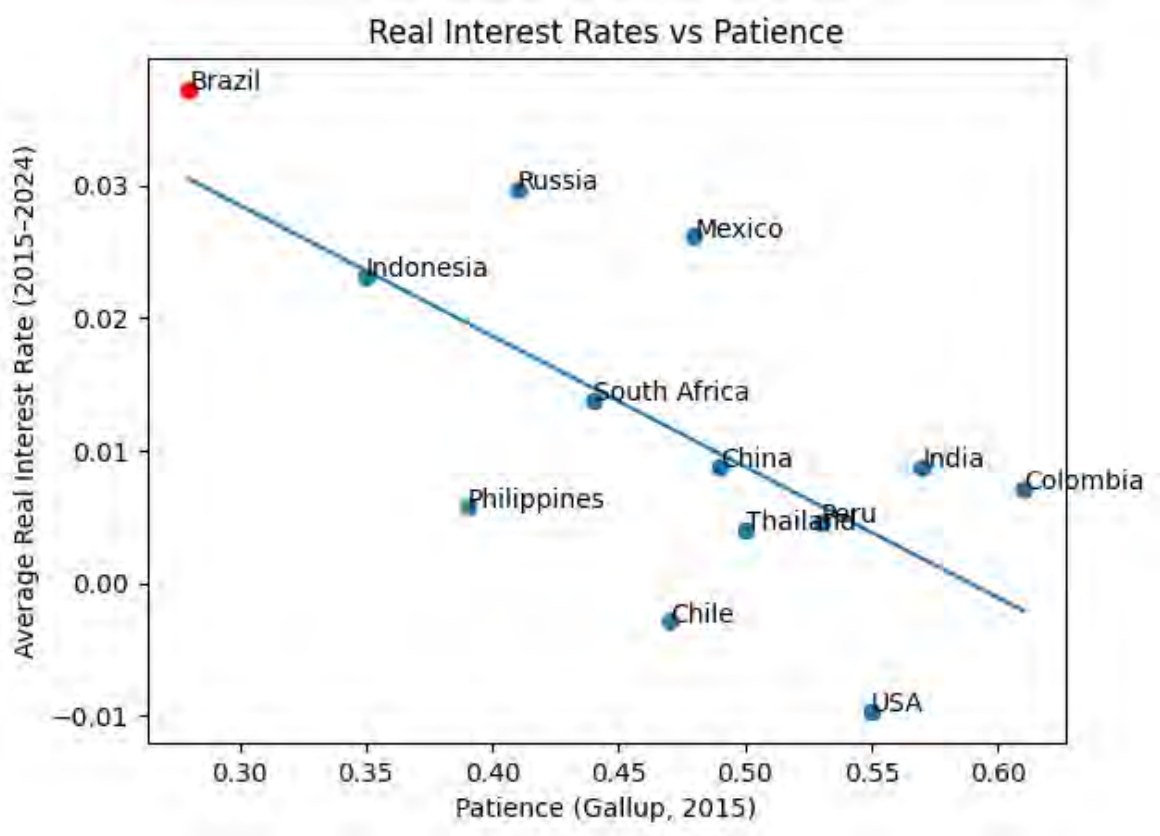


Source: Gallup End of Year Survey (2015).

Figure 2.2: Patience across selected countries, based on the Gallup End of Year Survey (2015). Brazil appears near the bottom of the sample distribution, while the United States lies substantially higher.

2.3 A suggestive cross-country relationship

A broader cross-country comparison also suggests a negative relationship between patience and real interest rates. While this evidence is only descriptive, it is consistent with the mechanism explored in the model. In the 13-country sample shown in Figure 2.3, patience and average real interest rates display a correlation of -0.68, and the corresponding simple cross-sectional regression yields an R^2 of 0.46. Using the same Gallup data, Burro et al. (2022) also document a significant negative correlation (-0.50) between patience and real interest rates.



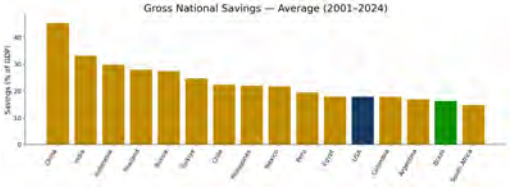
Source: IMF, national central banks, Gallup End of Year Survey (2015) and author's calculations.

Figure 2.3: Real interest rates and patience across countries

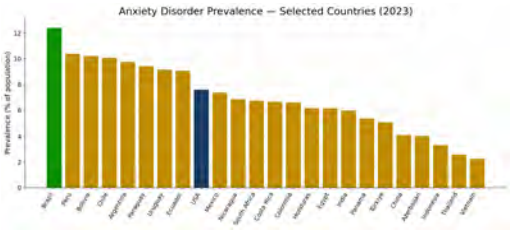
2.4 Additional suggestive evidence on short-term behavior

Other cross-country indicators point in a direction consistent with the mechanism studied in this paper. Relative to the countries used in the comparison, Brazil combines relatively low saving with high anxiety, heavy internet use, and comparatively high online gambling participation. These variables are not part of the model and are not interpreted as causal determinants of the real interest rate. Rather, they are presented only as suggestive evidence that Brazil may display a broader environment associated with weaker intertemporal orientation than benchmark economies.

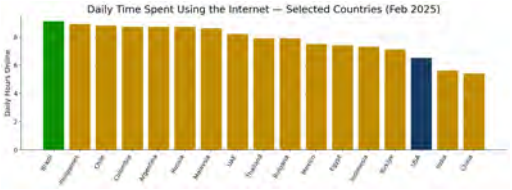
Figure 2.4 summarizes these cross-country patterns. Taken together, these indicators do not identify the mechanism on their own, but they reinforce the idea that Brazil stands out not only in real interest rates, but also in several variables plausibly related to weaker intertemporal orientation.



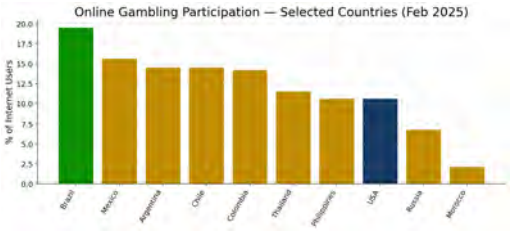
(a) Gross national savings



(b) Anxiety disorder prevalence



(c) Daily time spent using the internet



(d) Online gambling participation

Figure 2.4: Additional cross-country indicators related to short-term behavior. Brazil combines relatively low saving with high anxiety, heavy internet use, and high online gambling participation compared with benchmark economies. These indicators are suggestive and are not interpreted as causal determinants of the equilibrium real interest rate. *Sources*: IMF, GBD, and DataReportal.

3
Model

I begin with a representative-agent benchmark to clarify the basic mapping between patience and the equilibrium real interest rate. I then move to a heterogeneous-agent economy with incomplete markets, idiosyncratic income risk, and borrowing constraints, in which this mapping breaks down because households accumulate assets for precautionary reasons. In both environments, the relevant asset is a one-period risk-free government bond.

3.1
Representative-agent benchmark

Consider a closed economy with a representative household, a single risk-free government bond, no idiosyncratic risk, and no borrowing constraints:

$$\max_{\{c_t, a_{t+1}\}} \sum_{t=0}^{\infty} \beta^t u(c_t) \quad \text{s.t.} \quad c_t + a_{t+1} = (1+r)a_t + (1-\tau)w.$$

The steady-state Euler equation is

$$1 = \beta(1 + r),$$

which implies

$$\beta^{RA} = \frac{1}{1 + r}.$$

Thus, in the representative-agent benchmark, the equilibrium real interest rate is pinned down entirely by intertemporal substitution. This benchmark provides a useful reference point, but it abstracts from borrowing constraints and precautionary savings.

3.2 Heterogeneous-agent model

I now extend the benchmark to a heterogeneous-agent economy with incomplete markets, idiosyncratic income risk, and borrowing constraints. Households differ in their asset holdings and labor-income realizations. Preferences are isoelastic,

$$u(c) = \frac{c^{1-1/\psi}}{1 - 1/\psi}, \quad \psi > 0,$$

with log utility obtained as the limiting case when $\psi = 1$, where ψ denotes the intertemporal elasticity of substitution. The implied CRRA is $1/\psi$.

Each household solves

$$V(a, e) = \max_{c, a'} \Big\{ u(c) + \beta E\Big[V(a', e') \mid e \Big] \Big\}$$

subject to

$$c + a' = (1 - \tau) we + (1 + r)a, \qquad a' \geq a_{\min}.$$

Idiosyncratic labor productivity follows a continuous AR(1) process,

$$\log e' = \rho_e \log e + \varepsilon, \qquad \varepsilon \sim N(0, \sigma_e^2),$$

with $E[e] = 1$. In the quantitative implementation, this process is approximated by a finite-state Markov chain.

Let $g(a, e)$ denote the policy function for next-period assets. For unconstrained households, $g(a, e) > a_{\min}$, so the Euler equation holds with equality:

$$u_c(c) = \beta(1 + r)E[u_c(c') \mid e].$$

In the baseline calibration, $a_{\min} = 0$. Households with $g(a, e) = 0$ choose to remain at the borrowing limit next period, in which case

$$c = (1 - \tau)we + (1 + r)a.$$

Hand-to-mouth households, however, are defined as those with zero current asset holdings in the stationary distribution, that is, households with $a = 0$. Thus, a hand-to-mouth household that also remains at the borrowing limit satisfies

$$c = (1 - \tau)we.$$

The model uses three related but distinct objects. First, the hand-to-mouth share is the mass of households with zero current assets,

$$HtM \equiv \mu(\{(a, e) : a = 0\}).$$

Second, gross household saving is the positive component of net asset accumulation, scaled by output,

$$GS \equiv \frac{E[\max(a' - a, 0)]}{Y}.$$

Third, the share of net savers is the mass of households with positive net asset accumulation,

$$NS \equiv \mu(\{(a, e) : a' > a\}).$$

A household may therefore be hand-to-mouth today and still be a net saver if it chooses $a' > 0$.

On the production side, a representative firm operates a linear technology,

$$Y = L,$$

so the wage is constant and equal to $w = 1$.

The government spends a constant fraction of output and issues one-period risk-free bonds B. Its budget constraint is

$$G_t + (1 + r_t)B_{t-1} = \tau Y_t + B_t,$$

which in steady state becomes

$$G + rB = \tau Y.$$

A stationary equilibrium is a tuple (V, g, μ, r, τ) such that: (i) V and $g(a, e)$ solve the household problem; (ii) μ is the invariant distribution induced by the policy function and the income process; (iii) the government budget constraint holds; and (iv) the bond market clears,

$$\int g(a, e)\, d\mu(a, e) = B.$$

Relative to the representative-agent benchmark, idiosyncratic risk and borrowing constraints generate precautionary savings and a non-degenerate wealth distribution. These forces break the one-to-one mapping between the equilibrium real interest rate and the discount factor that holds in the representative-agent economy.

In the baseline calibration, households within each country share a common discount factor. Section 6.2 extends the framework by allowing for heterogeneous discount factors across households.

4
Calibration

4.1
Calibration strategy and targets

The calibration is designed to isolate the two household-side margins emphasized in the paper: patience and the incidence of constrained households. It proceeds in three steps. First, a common set of parameters is fixed across countries. Second, country-specific fiscal objects, namely the debt-to-output ratio and the government spending share, are set directly from the data. Third, the preference and income-process parameters are chosen to discipline the key moments most closely related to the mechanisms of interest.

The discount factor is recovered so as to match the observed average real interest rate in each country. This pins down the patience channel. The income process is then chosen to match the incidence of hand-to-mouth households, which disciplines the constrained-household margin emphasized later in the paper. The income Gini is reported as an auxiliary, non-targeted moment.

For each country, the debt object is constructed as total public debt scaled by the share held by domestic residents, so that the relevant bond supply in the model corresponds to the stock of public debt effectively absorbed by the domestic household sector. This choice is important because the model is concerned with the equilibrium return on the stock of safe assets held domestically rather than with the total gross public debt outstanding.

The parameter ψ governs intertemporal substitution. Since preferences are isoelastic, the implied coefficient of relative risk aversion is $1/\psi$; thus the baseline value $\psi = 0.80$ corresponds to relative risk aversion equal to 1.25.

Table 4.1: Parameter values

Parameter	Symbol	Brazil	United States
Intertemporal elasticity of substitution	ψ	0.80	0.80
Std. of income shocks	σ_e	1.10	0.85
Income persistence	ρ_e	0.992	0.970
Number of income states	n_e	13	13
Asset lower bound	$a_{\min}$	0.0	0.0
Asset upper bound	$a_{\max}$	250	350
Number of asset grid points	n_a	150	150

Table 4.2: Steady-state properties: model and data

Variable	Symbol	BR (Model)	BR (Data)	US (Model)	US (Data)
Macroeconomic aggregates					
Output	Y	1.00	1.00	1.00	1.00
Debt-to-output ratio	B/Y	0.70	0.70	0.85	0.85
Government spending	G/Y	0.20	0.19	0.20	0.23
Real interest rate (%)	r	9.23	9.23	1.91	1.91
Distributional variables					
Hand-to-mouth share	HtM	0.61	0.61	0.33	0.33
Income Gini	G_y	0.56	0.52	0.46	0.42

Sources: Government spending share and income Gini: World Bank. Real interest rate: IMF, national central banks, and author's calculations. Hand-to-mouth share: Ipsos (Brazil) and Brookings Institution (United States). The debt-to-output ratio refers to public debt held by domestic residents and is based on World Bank data and author's calculations. Output is normalized to one by construction.

5
Baseline Results: The Precautionary Wedge

This section compares the representative-agent benchmark to the heterogeneous-agent economy. The goal is to show how incomplete markets, idiosyncratic income risk, and borrowing constraints modify the discount factor required to sustain a given equilibrium real interest rate.

5.1
From the RA benchmark to the HA calibration

In the representative-agent economy, the discount factor consistent with a given equilibrium real interest rate follows mechanically from the steady-state Euler equation. Once the model is extended to an Aiyagari environment, this one-to-one mapping breaks down. With incomplete markets, uninsured idiosyncratic income risk, and borrowing constraints, households accumulate assets not only for intertemporal smoothing but also for precautionary reasons. For a given discount factor, desired bond holdings are therefore higher in the heterogeneous-agent economy than in the representative-agent benchmark.

As a result, matching a given equilibrium real interest rate requires a lower discount factor in the HA model than in the RA benchmark. Otherwise, precautionary savings would generate excess demand for safe assets and push

the equilibrium interest rate below its target. Table 5.1 reports the size of this precautionary wedge in Brazil and the United States.

5.2 The precautionary wedge: RA vs. HA discount factors

Table 5.1: The precautionary wedge and household saving in the HA model

Country	Target r	RA benchmark	HA model	Gross saving / Y	Share of net savers
Brazil	9.23%	0.916	0.895	0.86%	17.1%
United States	1.91%	0.981	0.913	4.88%	28.4%

Table 5.1 shows that the discount factor recovered in the Aiyagari model is lower in both countries, confirming the presence of a precautionary wedge. In Brazil, the discount factor falls from 0.916 in the representative-agent benchmark to 0.895 in the heterogeneous-agent economy. In the United States, it falls from 0.981 to 0.913. The wedge is therefore substantially larger in the United States.

The table also reports two model-based measures of household saving behavior in the HA economy. Gross household saving, defined as the positive component of asset accumulation relative to output, is much lower in Brazil than in the United States: 0.86% of output against 4.88%. Likewise, the share of net savers is smaller in Brazil, at 17.1%, compared with 28.4% in the United States.

This difference is economically intuitive. In both countries, incomplete markets and borrowing constraints raise the demand for safe assets through precautionary motives. But this force is much stronger in the United States, where the lower equilibrium real interest rate is consistent with a much higher representative-agent discount factor to begin with.

5.3 Why is the wedge smaller in Brazil?

The precautionary wedge is smaller in Brazil for two related reasons.

First, the representative-agent benchmark starts from a lower discount factor, since the target real interest rate is already high. This matters because precautionary savings are not independent of patience: self-insurance through asset accumulation is only strong when households value future consumption sufficiently. When the baseline discount factor is already low, households are less willing to transfer resources into the future, so introducing uninsured

income risk generates a smaller increase in desired bond holdings than it would in a more patient economy.

In other words, the move from the RA benchmark to the Aiyagari economy adds a weaker precautionary-saving motive in Brazil than in the United States. In the U.S., by contrast, the low target real interest rate implies a representative-agent discount factor much closer to one. Starting from that more patient benchmark, incomplete markets generate a much larger increase in asset demand, which makes the RA–HA wedge larger.

Second, a higher real interest rate raises debt-service costs in equilibrium. Given public debt and government spending, this implies a higher labor tax through the government budget constraint,

$$G + rB = \tau Y.$$

The higher tax reduces disposable labor income and weakens households' ability to accumulate assets. This effect is particularly strong when a large mass of households is already close to the borrowing constraint. As a result, aggregate bond demand responds less to patience in Brazil than in the United States.

Taken together, these forces make the RA–HA wedge smaller in Brazil. In the United States, by contrast, the lower target interest rate implies a much higher RA discount factor, while the lower tax burden and smaller mass of constrained households allow the HA economy to generate a much stronger increase in asset demand relative to the RA benchmark. Figure 5.1 summarizes the two mechanisms that make the precautionary wedge smaller in Brazil.

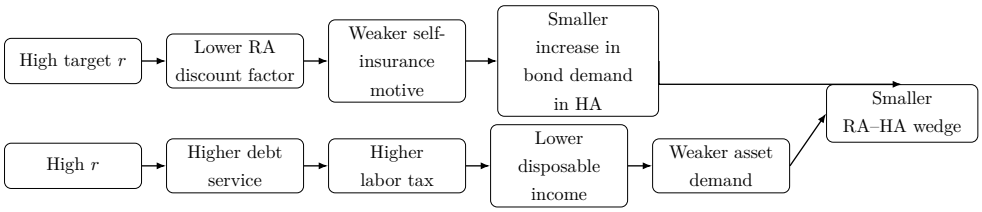


Figure 5.1: Why is the precautionary wedge smaller in Brazil? Two reinforcing channels.

6
Patience Counterfactuals

This section quantifies how much of the Brazil–U.S. real interest rate gap can be explained by differences in patience. I consider two versions of the model. In the first, each country is characterized by a single discount factor,

so cross-country differences in patience operate through the overall level of β within each economy. In the second, the model allows for discount-factor heterogeneity, with patient and impatient households coexisting within each country. This distinction is useful because it separates two margins: the effect of changing average patience and the effect of changing the composition of households by patience type.

I proceed in two steps. First, I perform a model-based counterfactual in which Brazil is assigned the discount factor recovered for the United States, while keeping the Brazilian fiscal structure and domestic bond supply fixed. Second, I consider a Gallup-disciplined version of the model with discount-factor heterogeneity, in which the two discount factors are held fixed across countries and only the population shares of patient and impatient households are allowed to differ. These two exercises provide complementary measures of the quantitative importance of patience.

6.1 Counterfactual 1: Giving Brazil the U.S. discount factor

The first counterfactual asks a simple question: what would Brazil's equilibrium real interest rate be if Brazilian households had the same patience as U.S. households? To answer this, I keep Brazil's fiscal structure and domestic bond supply unchanged and replace the calibrated Brazilian discount factor, $\beta_{BR} = 0.895$, with the U.S. value, $\beta_{US} = 0.913$. I then solve for the new steady state.

Under this counterfactual, Brazil's real interest rate falls from 9.23% to 7.00%. This decline of about 2.23 percentage points implies that differences in patience explain roughly 30.5% of the observed Brazil–U.S. real interest rate gap. The mechanism is straightforward: a higher discount factor raises desired saving, increases demand for safe assets, and lowers the equilibrium return required for market clearing.

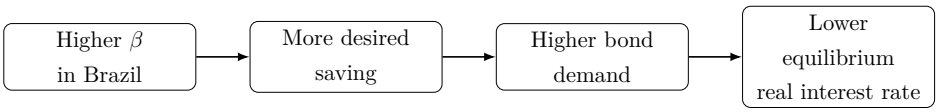


Figure 6.1: Transmission channel of the patience counterfactual.

Table 6.1: Patience counterfactual: Brazil with the U.S. discount factor

	Brazil baseline	Counterfactual
Discount factor β	0.895	0.913
Real interest rate r	9.23%	7.00%
Labor tax τ	26.5%	24.9%
HtM share	61%	72%
Gross saving / Y	0.86%	0.91%
Share of net savers	17.07%	12.81%

This result shows that patience is quantitatively important, but not sufficient alone. Even after assigning the U.S. discount factor to Brazil, the counterfactual real interest rate remains well above the U.S. benchmark, indicating that other structural forces are also at work.

Note that the hand-to-mouth share rises in the counterfactual, from 61% to 72%. This reflects a general-equilibrium effect: although a higher discount factor increases desired asset demand, it also lowers the equilibrium real interest rate. The lower return weakens the incentive to move away from the borrowing constraint, so a larger mass of households remains hand-to-mouth in equilibrium. Consistent with this mechanism, changing only the discount factor has only a limited effect on the model-implied saving flow, because the lower equilibrium return offsets part of the stronger intertemporal motive: gross household saving rises only from 0.86% to 0.91% of output.

6.2 Counterfactual 2: Discount-factor heterogeneity with Gallup patience shares

The second exercise brings the model closer to the survey evidence presented in Section 2 by introducing discount-factor heterogeneity within each country. Instead of using the country-specific discount factors recovered in the baseline calibration, I assign the same two discount factors in both countries, $\beta_{low} = 0.88$ and $\beta_{high} = 0.96$, and allow only the population shares of patient and impatient households to differ across countries. These shares are taken directly from the Gallup evidence: 28% patient in Brazil and 55% in the United States.

This exercise is useful because it isolates the composition channel. The underlying discount factors are held fixed across countries, so the cross-country difference operates only through the relative mass of patient and impatient households.

Table 6.2: Gallup-based patience composition counterfactual

	Brazil	United States
Patient share	28%	55%
β_{low}	0.88	0.88
β_{high}	0.96	0.96
Real interest rate r	6.63%	4.12%
Labor tax τ	24.6%	22.9%
HtM share	58%	46%

Under this restriction, the model generates a real interest rate of 6.63% for Brazil and 4.12% for the United States, implying a Brazil–U.S. gap of 2.51 percentage points. This corresponds to about 34% of the observed differential. In other words, differences in patience composition alone generate a sizable fraction of the cross-country gap, even when the underlying discount factors are identical across countries.

6.3 Interpretation

Taken together, the two counterfactuals point to the same conclusion. Whether patience is introduced through the country-specific discount factors recovered by the model or through the Gallup-based composition of patient and impatient households, the quantitative effect is substantial. Differences in patience explain about one third of the Brazil–U.S. real interest rate gap.

At the same time, the fact that the gap does not disappear entirely suggests that patience should be viewed as one important channel rather than a complete explanation. This motivates the next section, which turns to a complementary margin: the incidence of constrained households.

7 Constrained Households and the Real Interest Rate

This section studies a complementary channel to patience: the incidence of constrained households. In the model, the key margin is not income risk per se, but how the earnings process shapes the mass of households that remain at the borrowing constraint. A larger hand-to-mouth (HtM) population reduces effective participation in asset markets, weakens aggregate bond demand, and raises the equilibrium real interest rate. The purpose of this section is therefore to quantify how much of the Brazil–U.S. real rate gap can be accounted for

by differences in the incidence of constrained households, as captured by the HtM margin.

In the model, the HtM share is not an independent primitive. It is an equilibrium outcome induced by the earnings process, the borrowing constraint, and the interest rate. The counterfactual in this section should therefore be interpreted as changing the income-risk environment so as to reduce the mass of households that remain at the borrowing constraint.

7.1 Counterfactual: matching the U.S. HtM share within Brazil

I keep Brazil's fiscal structure and discount factor fixed and modify the earnings process so that the Brazilian economy reproduces an HtM share close to that observed in the United States. This exercise does not simply replace Brazil's income process with the U.S. one. Instead, it recalibrates the volatility and persistence of idiosyncratic income risk so that, holding β_{BR} fixed, the model matches the U.S.-level incidence of constrained households within the Brazilian economy.

Table 7.1: Constrained-household counterfactual: Brazil with U.S.-level HtM incidence

	Brazil baseline	Counterfactual
σ_e	1.10	0.50
ρ_e	0.992	0.922
β	0.895	0.895
Real interest rate r	9.23%	8.07%
Labor tax τ	26.5%	25.6%
HtM share	61%	33%
Gross saving / Y	0.86%	2.87%
Share of net savers	17.07%	32.88%

Under this counterfactual, Brazil's equilibrium real interest rate falls from 9.23% to 8.07%, a decline of 1.16 percentage points. Relative to the observed Brazil–U.S. gap, this corresponds to about 16% of the differential. The exercise is tightly disciplined by the distributional moment most directly connected to the mechanism: the share of households at the borrowing constraint.

7.2 Mechanism

The mechanism starts directly from constrained households. When the earnings process becomes less fragile, fewer households remain stuck at the borrowing limit and the HtM share falls sharply. This increases equilibrium asset demand because constrained households do not actively accumulate bonds, whereas unconstrained households do. Once a larger mass of households moves away from the constraint, aggregate demand for safe assets rises, bond prices increase, and the equilibrium real interest rate falls.

In this sense, the relevant transmission channel is summarized in Figure 7.1.

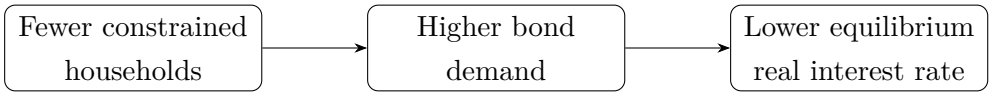


Figure 7.1: Transmission channel of the constrained-household margin.

7.3 Joint counterfactual: patience and constrained households

The final exercise combines the patience channel from Section 6 with the constrained-household channel developed here. I keep Brazil's fiscal structure fixed, assign the U.S. discount factor, and recalibrate the earnings process so that the HtM share remains close to the U.S. benchmark under the higher level of patience.

Table 7.2: Joint counterfactual: patience and constrained-household channel

	Baseline	β only	HtM channel only	Joint
β	0.895	0.913	0.895	0.913
σ_e	1.10	1.10	0.50	0.50
ρ_e	0.992	0.992	0.922	0.920
Real interest rate r	9.23%	7.00%	8.07%	5.86%
Labor tax τ	26.5%	25.0%	25.6%	24.1%
HtM share	61%	72%	33%	33%
Gross saving / Y	0.86%	0.91%	2.87%	3.08%
Share of net savers	17.07%	12.81%	32.88%	32.88%

The joint counterfactual lowers Brazil's real interest rate from 9.23% to 5.86%, a decline of 3.37 percentage points. This corresponds to about 46% of the Brazil–U.S. real interest rate gap. Quantitatively, the two channels are close

to additive: patience explains about 30.5% of the gap, while the constrained-household channel explains about 16%, and the joint exercise delivers roughly the sum of the two.

7.4 Interpretation

The main message of this section is not that the constrained-household margin should replace patience as the central explanation. Rather, the two are complementary forces. Patience determines how strongly households want to transfer resources into the future, while the constrained-household margin determines how many households are actually able to do so.

The relevant contrast between Brazil and the United States is therefore not only that Brazilian households appear less patient, but also that the Brazilian economy leaves a much larger fraction of households unable to participate in asset accumulation. Brazil's high real interest rate reflects both forces. Together, they account for a substantial share of the observed Brazil–U.S. real interest rate differential.

Programs that stabilize household income or relax short-term liquidity constraints, such as targeted cash transfers like Bolsa Família, may also affect this margin by reducing the mass of households that remain at the borrowing constraint. At the same time, the net effect on saving is not obvious ex ante, since such programs may both ease financial exclusion and reduce precautionary motives. Studying this interaction is beyond the scope of this paper, but it is a promising direction for future research.

8 Conclusion

Brazil's real interest rate puzzle is usually framed as a problem of institutions, fiscal dynamics, or monetary credibility. This paper has argued that part of the answer lies elsewhere: in household-side forces that shape the demand for safe assets. In particular, I have focused on two complementary margins: household patience and the incidence of constrained households. The broader implication is that Brazil's high real interest rate is partly behavioral and partly structural in a precise sense. It reflects both weaker willingness to defer consumption and a weaker ability to accumulate assets, the latter associated with a much higher incidence of households close to the borrowing constraint.

The first channel operates through patience. In economies where households are less willing to postpone consumption, aggregate saving demand is

weaker, which sustains a higher equilibrium real interest rate. In the model, assigning Brazil the U.S. level of patience lowers its equilibrium real interest rate from 9.23% to 7.00%, explaining about 30.5% of the observed Brazil–U.S. gap. A complementary exercise disciplined directly by the Gallup evidence delivers a similar message: differences in the composition of more and less patient households explain about 34% of the differential. These results suggest that patience is quantitatively important, even if it is not the whole story.

The second channel operates through constrained households. The key issue is not income risk in the abstract, but how the earnings process shapes the mass of households that remain at the borrowing constraint and therefore do not actively accumulate assets. When Brazil's hand-to-mouth share is brought down to the U.S. level, the equilibrium real interest rate falls by an additional 1.2 percentage points, accounting for about 16% of the differential. When both channels are combined, the model explains about 46% of the Brazil–U.S. real interest rate gap. Quantitatively, the two effects are close to additive, which suggests that they operate through related but distinct margins.

This interpretation suggests that Brazil's high real interest rate reflects not only lower average patience, but also a much higher incidence of households effectively excluded from asset accumulation. A more patient Brazil with the same large mass of constrained households would still remain a high-interest-rate economy. This interpretation helps shift part of the discussion from purely fiscal or monetary explanations toward a broader view in which preferences, household balance-sheet positions, and households' ability to accumulate assets also matter for equilibrium interest rates.

The closed-economy assumption is deliberately stark. It allows the analysis to isolate the domestic household-side demand for safe assets, but it abstracts from foreign investors, country-risk premia, exchange-rate risk, international reserves, and CDS spreads. In an open-economy extension, the domestic real interest rate would also reflect the global risk-free rate and external risk premia. The results should therefore be interpreted as quantifying a domestic household-side component of Brazil's high real interest rate, not as a complete decomposition of the observed rate. A related limitation is that the isoelastic specification is homothetic and output is normalized to one in both economies. This abstracts from income-level effects that may matter for patience, liquidity constraints, and asset accumulation. In particular, short-term behavior may reflect not only low patience as a preference parameter, but also low income, subsistence constraints, and limited access to financial buffers.

Several directions remain open for future research. The most important is identification: the mechanisms studied here are disciplined by aggregate and distributional moments, but a richer account would require micro-level evidence linking patience, hand-to-mouth status, income dynamics, and asset accumulation within Brazil. A second direction is to incorporate private debt and a more realistic upper tail of the wealth distribution. A third is to embed these household-side channels in a richer institutional and open-economy environment, including credit market distortions, financial intermediation, cash transfers, political economy, and external risk premia. This paper provides a quantitative starting point for that agenda.

9
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