

# The Macroeconomic Impact of Paying in Dollars in Emerging Economies

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## Abstract

In emerging economies, household balance sheets are often split across currencies: labor income is mostly in local currency, while many durables and savings instruments are dollar-denominated. I study the mismatch in a partial-equilibrium model with lumpy durable adjustment, exchange-rate risk, and endogenous currency portfolios, estimated with Uruguayan microdata. The model highlights a hedging channel: when the peso depreciates, durable replacement costs and dollar savings rise together. Counterfactuals suggest removing dollar pricing leads to about an 11% welfare loss and restricting dollar access leads to a separate loss of roughly 9%.

**Keywords:** Dollar prices, Durable goods, Lumpy Adjustment.

**JEL Classification:** C63, E21, E22, F31, G51

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# 1 Introduction

In many emerging economies, households live with a split balance sheet: wages and routine spending are denominated in local currency, while durable prices and part of savings are denominated in U.S. dollars. The arrangement creates a mismatch across income, expenditure, and wealth, with potentially large welfare consequences. I quantify how dollar-priced durables and dollar saving jointly transmit exchange-rate risk to household spending, portfolios, and welfare.

In economies like Uruguay, Bolivia, and Peru, the pattern persists even after inflation stabilizes, which suggests that the dollar serves not only as a store of value but also as a hedge against currency risk (Calvo and Vegh, 1992; Levy Yeyati and Ize, 2005; Drenik and Perez, 2021). Durable goods sit at the center of that hedge because they are both consumption goods and stores of value, linking the real and financial sides of the household balance sheet.

When durables are priced in dollars, a peso depreciation raises the local-currency cost of replacement and erodes real wages, but dollar savings appreciate by the same factor, providing insurance when replacement becomes most expensive. Holding dollars, however, is costly for routine peso-denominated purchases, which creates a portfolio trade-off (Cravino and Levchenko, 2017; Castellares and Toma, 2020). How does exchange-rate risk pass through to household behavior in that environment, and what are the welfare stakes?

I develop a quantitative household model that combines three ingredients: (i) lumpy durable adjustment with partial irreversibility, (ii) sticky dollar pricing of durables with exchange-rate pass-through, and (iii) portfolio choice between peso and dollar assets subject to transaction frictions in a small open economy framework. Interaction among the ingredients generates state-dependent saving and adjustment behavior. The model highlights four mechanisms through which dollar pricing shapes household choices:

*Amplified adjustment frictions.* Dollar-denominated costs imply exchange-rate variations directly shift the peso burden of durable adjustment, widening inaction regions and producing infrequent, lumpy purchases.

*Portfolio hedging.* Households face a trade-off between peso assets (liquid for consumption) and dollar assets (illiquid but appreciating exactly when replacement becomes costly). The optimal currency mix depends on exchange-rate volatility and the anticipated timing of durable adjustment.

*State-dependent precaution.* Greater exchange-rate risk induces households to accumulate dollar buffers before anticipated adjustment, stabilizing purchasing power at the cost of delaying replacement.

*Portfolio-durable interaction.* Portfolio and durable-adjustment margins are not independent: households near the adjustment boundary hold more dollars to hedge imminent replacement costs, while households deep in inaction prefer peso liquidity. The interaction generates state-dependent dollarization that co-moves with the durable gap distribution.

I solve the model numerically and estimate key frictions by SMM using microdata from the Uruguayan Household Financial Survey, *Encuesta Financiera de los Hogares Uruguayos* (EFHU), which uniquely reports household holdings of liquid assets by currency. I discipline key parameters—durable adjustment costs and dollar trading frictions—by matching observed durable tenures, dollar-deposit shares, and durable-to-wealth ratios.

I characterize the dynamics following currency shocks through generalized impulse response functions (GIRFs) and conduct counterfactual experiments to isolate the welfare effects of dollar pricing and dollar access. The central finding is straightforward: dollar pricing of durables is *welfare-improving*. Since durable prices and dollar savings co-move with the exchange rate, switching to local-currency pricing would sever the hedge and generate a welfare loss of about 11%. Restricting dollar access would impose a separate welfare loss of about 9%, and higher adjustment frictions would imply a loss above 20%—all in the range of, or above, standard gains from trade in developing economies (Arkolakis et al., 2012).

The results suggest a potential trade-off facing policymakers. Policies that restrict foreign-currency deposits may enhance systemic financial stability, but they could also increase household-level risk exposure by removing a hedging instrument. The welfare implications depend on the relative magnitude of systemic versus idiosyncratic risk, which a partial-equilibrium analysis does not fully capture. A complete policy evaluation would require embedding household behavior in a general-equilibrium framework with financial intermediaries.

The paper contributes to three strands of research. First, it extends the literature on lumpy durable adjustment and household portfolio choice by introducing currency denomination as a new friction (Caballero, 1993; Berger and Vavra, 2015; Kaplan et al., 2020; McKay and Wieland, 2021; Baley and Blanco, 2021; Beraja and Wolf, 2021). Existing work documents how nonconvex adjustment costs generate infrequent, large durable purchases and shape aggregate consumption dynamics, but abstracts from the currency of denomination. I link the adjustment directly to portfolio dollarization, generating empirically testable cross-sectional predictions.

Second, the paper contributes to the quantitative literature on dollarization and currency pricing (Calvo and Vegh, 1992; Levy Yeyati and Ize, 2005; Drenik and Perez, 2021, 2024; Castellares and Toma, 2020; Salomao and Varela, 2022). Prior papers document dollar pricing is pervasive even in low-inflation economies and that foreign-currency holdings respond to exchange-rate risk, but

typically treat portfolio choice and durable investment as separate. I connect them by modeling how dollar-priced durables generate endogenous demand for dollar savings.

Third, the paper is closely related to quantitative heterogeneous-agent models of small open economies. Zhou (2022) studies how exchange-rate movements redistribute wealth across Uruguayan households, using balance-sheet estimates from De Rosa (2019). My approach complements theirs by emphasizing the micro-level portfolio and durable-adjustment margins that determine household exposure to exchange-rate risk.

Section 2 presents the model. Section 3 describes the data and empirical facts. Section 4 covers estimation, fit, and GIRFs. Section 5 presents the counterfactuals, including the central peso-pricing experiment and a robustness exercise on the interaction between dollar access and adjustment frictions. Section 6 concludes.

## 2 Model

I develop a partial equilibrium household model with incomplete markets, lumpy durable adjustment, idiosyncratic earnings risk, and exchange rate shocks in a small open economy framework. The environment builds on Kaplan and Violante (2014); Berger and Vavra (2015); Kaplan et al. (2020) and McKay and Wieland (2021), and introduces two features motivated by South American data.

First, I model durable goods as priced in U.S. dollars with near-complete exchange-rate pass-through. The feature reflects the imported nature of many durables and the prevalence of dollar pricing in retail markets (Gopinath and Itskhoki, 2021; Drenik and Perez, 2021, 2024). Drenik and Perez (2024) document 80–90% of durable listings are dollar-priced, and that dollar-priced items tend to be more expensive and remain longer on the market.

Second, households can hedge exchange-rate risk by holding liquid wealth in dollars, but dollar liquidity is costly or inconvenient for routine non-durable purchases (Kehoe and Nicolini, 2021). The model makes dollarization endogenous through a portfolio choice over currency composition.

A key modeling choice is tractability with endogenous dollarization. Rather than treating peso and dollar deposits as separate dynamic states, I summarize the liquid portfolio by total liquid wealth in local-currency units and model currency composition as a within-period choice. The approach keeps the hedging motive but avoids adding two asset states.

## 2.1 Household maximization problem

Households have CRRA utility over non-durable consumption  $c_t \geq 0$  and their stock of durables  $d_t \geq 0$ :

$$u(c_t, d_t) = \frac{(c_t^\nu d_t^{1-\nu})^{1-\gamma}}{1-\gamma}, \quad (2.1)$$

where  $\nu \in (0, 1)$  controls the expenditure share on non-durables and  $\gamma > 0$  is the coefficient of relative risk aversion.

Log earnings follow an AR(1):

$$\log y_t = \rho_y \log y_{t-1} + \varepsilon_t^y, \quad \varepsilon_t^y \sim \mathcal{N}(0, \sigma_y^2). \quad (2.2)$$

The nominal exchange rate  $e_t$  (local currency per USD) follows

$$\log e_t = \rho_e \log e_{t-1} + \varepsilon_t^e, \quad \varepsilon_t^e \sim \mathcal{N}(0, \sigma_e^2). \quad (2.3)$$

The durable has a sticky USD price  $p_d$ , so its local-currency price is  $P_t^d \equiv e_t p_d$ . The non-durable good is the numeraire.

### 2.1.1 Reduced-state liquid wealth and portfolio choice

Let  $w_t$  denote *total liquid wealth in local-currency units* at the beginning of period  $t$ ,

$$w_t \equiv a_t + e_t a_t^\$,$$

where  $a_t$  are peso deposits and  $a_t^\$$  are USD deposits.

Within the period, households choose a dollar share  $s_t \in [0, 1]$  for their *end-of-period* savings decision. Let  $w'_t \geq 0$  denote savings carried from  $t$  to  $t+1$  (before returns are realized). The household allocates  $w'_t$  across currencies:

$$a'_t = (1 - s_t)w'_t, \quad a_t^{\$'} = \frac{s_t w'_t}{e_t}.$$

Holding USD positions entails a proportional wedge  $\kappa \in (0, 1)$ . It captures ongoing costs of maintaining dollar liquidity—such as account fees, limited merchant acceptance, or the inconvenience of currency conversion for routine purchases. Since  $\kappa$  is proportional to dollar holdings, households with small dollar positions face low costs and may prefer corner solutions at  $s = 0$  or  $s = 1$ ,

generating the bimodal portfolio distribution observed in the data.

The portfolio choice determines next period's liquid wealth:

$$w_{t+1} = (1+r)(1-s_t)w'_t + (1+r^{\$})s_t w'_t \frac{e_{t+1}}{e_t} - \kappa s_t w'_t. \quad (2.4)$$

The formulation makes dollarization endogenous while keeping  $(w_t, d_{t-1}, e_t, y_t)$  as the dynamic state. Finally, I impose a no-borrowing constraint  $w'_t \geq 0$  to isolate the portfolio hedging channel from debt considerations.

### 2.1.2 Durables: depreciation, and adjustment

Durables deliver utility services and depreciate over time. If the household does not adjust, the durable stock evolves according to

$$d_t = (1 - \delta) d_{t-1}, \quad (2.5)$$

where  $\delta \in (0, 1)$  is the baseline depreciation rate.

If the household adjusts, it chooses a new durable stock  $d^* \geq 0$  and liquidates the depreciated stock at a resale value subject to partial irreversibility. Specifically, selling the depreciated stock yields a fraction  $(1 - f)$  of its replacement value, with  $f \in (0, 1)$  interpreted as a resale haircut, which generates inaction regions and lumpy adjustment (Caballero and Engel, 1993).

### 2.1.3 Recursive formulation

The state is

$$S = (w, d_{-1}, e, y).$$

Each period the household chooses non-durable consumption  $c$ , end-of-period savings  $w'$ , a portfolio share  $s$ , and (if adjusting) a new durable stock  $d$ .

The value function is

$$V(S) = \max \left\{ V^{\text{adjust}}(S), V^{\text{noadjust}}(S) \right\}. \quad (2.6)$$

If the household adjusts, it chooses  $(c, w', d, s)$ :

$$V^{\text{adjust}}(S) = \max_{c, w', d, s \in [0,1]} \{u(c, d) + \beta \mathbb{E}[V(S') | S]\}, \quad (2.7)$$

$$\text{s.t.} \quad c + w' + P^d d = y + (1+r)w + (1-f)P^d(1-\delta)d_{-1}, \quad (2.8)$$

$$w^+ = (1+r)(1-s)w' + (1+r^{\$})sw' \frac{e'}{e} - \kappa sw', \quad (2.9)$$

$$c \geq 0, \quad w' \geq 0, \quad d \geq 0.$$

where  $P^d \equiv e p_d$  and  $w^+$  denotes next-period liquid wealth.

If the household does not adjust, durables follow (2.5) and the household chooses  $(c, w', s)$ :

$$V^{\text{noadjust}}(S) = \max_{c, w', s \in [0,1]} \{u(c, (1-\delta)d_{-1}) + \beta \mathbb{E}[V(S') | S]\}, \quad (2.10)$$

$$\text{s.t.} \quad c + w' = y + (1+r)w, \quad (2.11)$$

$$w^+ = (1+r)(1-s)w' + (1+r^{\$})sw' \frac{e'}{e} - \kappa sw', \quad (2.12)$$

$$c \geq 0, \quad w' \geq 0.$$

Earnings and the exchange rate evolve according to (2.2)–(2.3). Expectations are taken over  $(e', y')$  conditional on  $(e, y)$ .

## 2.2 Main Mechanisms

The model features four interconnected mechanisms that link dollar pricing, portfolio choice, and durable adjustment. I describe each in turn and then discuss how they interact.

*Dollar pricing and exchange-rate pass-through.*

I model durable goods as priced in U.S. dollars with near-complete pass-through to local-currency prices:  $P_t = e_t p_d$ . The assumption reflects the imported nature of many durables and the prevalence of dollar pricing in markets documented by Drenik and Perez (2021, 2024). The key implication is that exchange-rate movements directly shift the local-currency cost of durable adjustment. A depreciation (rise in  $e_t$ ) raises the peso cost of replacing durables, effectively tightening the household's budget constraint when it chooses to adjust. It creates an asymmetry: depreciations make adjustment more costly, while appreciations make it cheaper.

*Endogenous dollarization as hedging.*

Households can partially insure against currency risk by holding liquid wealth in dollars. When the peso depreciates, dollar-denominated savings appreciate in local-currency terms, providing resources precisely when durable replacement becomes expensive. The portfolio share  $s_t$  balances the hedging benefit against the proportional wedge  $\kappa$ , which captures the reduced transaction usefulness of dollar assets for everyday peso-denominated consumption. In equilibrium, households tilt toward dollars when exchange-rate volatility is high, but the wedge prevents full dollarization. The mechanism rationalizes the widespread but incomplete dollarization observed in Uruguayan household portfolios.

Importantly, the hedging relationship implies dollar pricing of durables creates a natural hedge. When the durable price and the value of dollar savings both co-move with the exchange rate, dollar holdings insure households against the very risk that dollar pricing creates. The complementarity between dollar assets and dollar-priced durables turns out to have first-order welfare implications, which I quantify in Section 5.

*Lumpy adjustment through irreversibility.*

Durable adjustment is infrequent and lumpy due to frictions. Partial irreversibility—modeled as a resale haircut  $f$ —means households selling durables recover only a fraction of replacement value. Partial irreversibility generates asymmetric adjustment: households are reluctant to downsize even when their durable stock exceeds the target. Hence, there are inaction regions in which households tolerate deviations from their optimal durable stock rather than paying adjustment costs. Households delay replacement until the deviation becomes sufficiently large, then make discrete, lumpy changes (Caballero, 1993).

*Portfolio-durable interaction.*

The preceding mechanisms are not independent—they interact through the household’s wealth accumulation. Liquid assets provide self-insurance against both income shocks and exchange-rate risk, while durables provide utility services but are costly to adjust and partially illiquid. The wealth transition equation (2.4) ties portfolio composition to the timing of durable adjustment: households who anticipate adjusting soon have stronger incentives to hold dollars (to hedge replacement costs), while households deep in the inaction region may prefer peso liquidity for consumption smoothing. The interaction generates state-dependent portfolio behavior that varies with the household’s position in the durable gap distribution.

## 2.3 Policy functions

The mechanisms above manifest in the model’s policy functions. Since the state space is four-dimensional, I present two conditional slices in the  $(w, e)$  plane, holding income at its median, to illustrate the main qualitative predictions.

Figure 1 displays the portfolio dollarization decision  $s^*(w, e)$  in  $(w, e)$  space, holding income and durables at their medians. Three zones are distinguished: all-peso ( $s^* = 0$ ), all-dollar ( $s^* = 1$ ), and interior ( $s^* \in (0, 1)$ ). The figure reveals a predominantly binary optimal portfolio choice, consistent with the mass points at zero and one observed in the EFHU data (Figure 5). At low wealth levels households tend to hold pesos, while at medium-to-high wealth the all-dollar solution dominates across most exchange-rate levels. The interior region—where households hold a mixed portfolio—is mostly concentrated near the low-wealth boundary. The predominantly binary pattern arises endogenously: nonlinear hedging demand generated by dollar-priced durables pushes households to corners even under a proportional transaction cost that would otherwise admit smooth interior solutions.

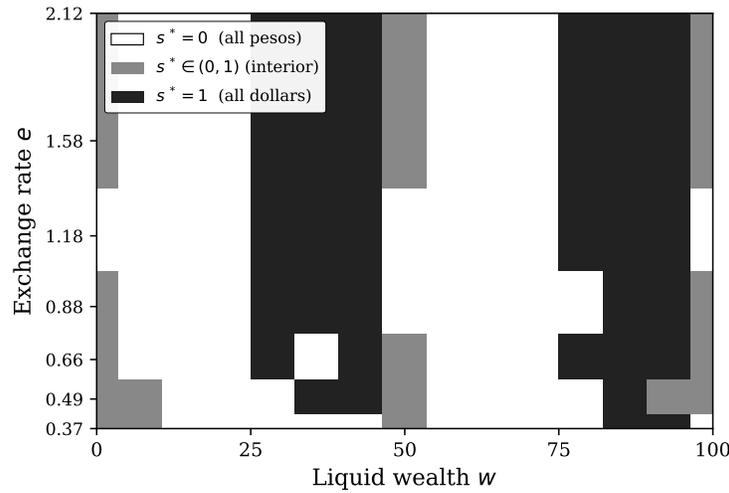


Figure 1: Portfolio dollarization decision in  $(w, e)$  space

*Notes:* The figure plots the optimal portfolio dollarization choice  $s^*(w, e)$  as a function of liquid wealth  $w$  (horizontal axis) and the exchange rate  $e$  (vertical axis), holding income and the durable stock at their median values. White cells indicate the all-peso corner ( $s^* = 0$ ); dark cells indicate the all-dollar corner ( $s^* = 1$ ); gray cells indicate an interior solution ( $s^* \in (0, 1)$ ). The predominantly binary pattern replicates the mass points at zero and one documented in the EFHU survey (Figure 5).

Figure 2 shows the exchange-rate response of the two main policy margins: the durable stock (panel a) and liquid savings (panel b), each comparing adjusting households (solid) to non-adjusting

households (dashed). In panel (a), the reset target  $d^*$  rises with the peso depreciation—a weaker exchange rate raises the peso value of dollar savings and income, relaxing the budget constraint at the adjustment margin—while the depreciated stock  $(1 - \delta)d$  of non-adjusters is independent of  $e$ . The widening gap between the two lines as  $e$  rises captures the strengthening incentive to adjust when the peso is weak. In panel (b), both lines for savings rise with  $e$ , reflecting the balance-sheet appreciation of dollar assets, but adjusting households consistently carry higher savings than non-adjusters, consistent with the selection effect documented above.

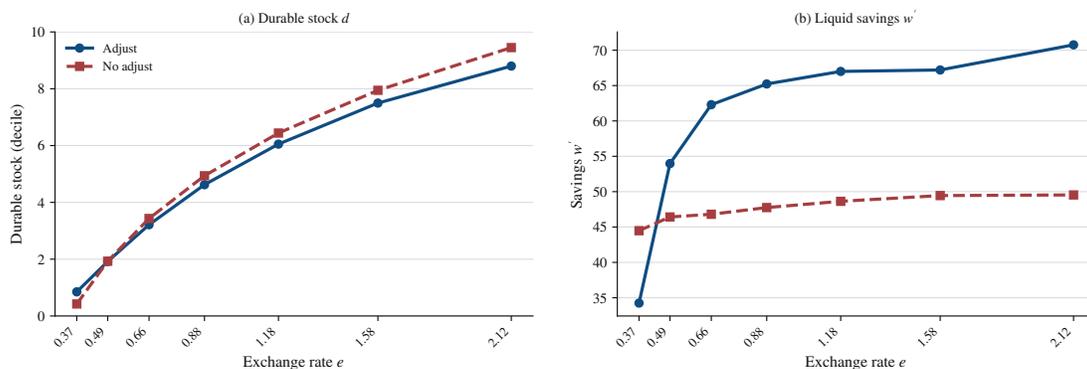


Figure 2: Durable stock and savings as a function of the exchange rate

*Notes:* Each panel plots the conditional mean policy as a function of the exchange rate  $e$ , averaging over all other state variables. Solid line: adjusting households. Dashed line: non-adjusting households. Panel (a): durable stock in wealth deciles—the solid line shows the optimal reset target  $d^*$ ; the dashed line shows the depreciated inherited stock  $(1 - \delta)d$ . Panel (b): next-period liquid savings  $w'$ .

Figure 3 characterizes the savings policy, plotting mean next-period liquid wealth  $w'$  against each state dimension. Two lines distinguish households that adjust their durable stock (solid) from those that do not (dashed). Adjusting households consistently carry *higher* end-of-period savings than non-adjusters—a selection effect: households choose to adjust precisely when they have accumulated sufficient wealth to finance the purchase and still maintain liquid buffers, so adjusters are systematically wealthier *ex ante* than non-adjusters. Panels (b) and (c) display standard precautionary patterns: savings rise steeply with current wealth, while the gap between the two lines widens with the inherited durable stock as households with large existing stocks face weaker incentives to adjust.

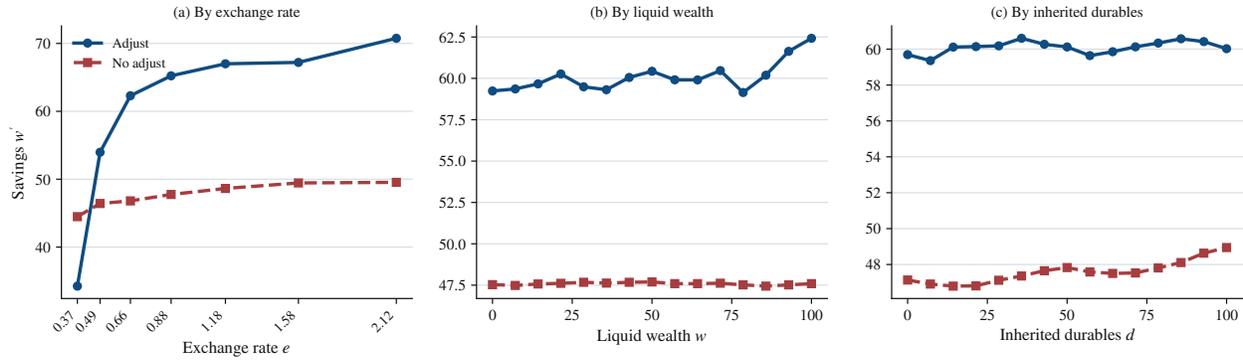


Figure 3: Savings policy by state dimension

*Notes:* Each panel plots the conditional mean of next-period liquid wealth  $w'$  as a function of one state variable, averaging over all other states. Solid line: households that adjust durables. Dashed line: households that do not adjust. Panel (a): savings by exchange rate  $e$ . Panel (b): savings by current liquid wealth  $w$ . Panel (c): savings by inherited durable stock  $d$ .

### 3 Data

I construct the empirical moments using the Uruguayan Household Financial Survey (EFHU, for its Spanish acronym). EFHU was conducted in three waves between 2012 and 2017 by the Universidad de la República. It is nationally representative, covering roughly 20,000 households, and complements Uruguay's recurrent household survey by collecting detailed balance-sheet information.

A distinctive feature of EFHU is that it records liquid asset holdings separately in pesos and U.S. dollars, together with detailed information on debts, durable ownership, values, and the timing of durable purchases. The survey design allows measurement of both the level and the currency composition of household balance sheets, which is central for analyzing household dollarization.

From the survey I construct measures of: (i) liquid savings in pesos and dollars and the implied dollar share of liquid assets; (ii) total household income; and (iii) durable ownership, values, and tenure (years since last upgrade). I harmonize variables across survey waves to ensure consistent definitions.

For reporting and cross-wave comparability, I express all monetary values in U.S. dollars using official exchange rates at the time of each survey wave. Most moments used in the quantitative analysis are ratios (e.g. dollar shares, durable shares, adjustment frequencies) and are therefore invariant to the unit of account.

EFHU consists of repeated cross-sections rather than a true household panel. Accordingly, I compute empirical moments at the cross-sectional level within each wave and pool them using survey weights. All statistics reported in the section use household expansion factors.

To benchmark the survey against macroeconomic aggregates, I complement EFHU with official statistics from the Central Bank of Uruguay on deposit dollarization, inflation, interest rates, and both real and nominal exchange rates. I also use expenditure-flow data for durables and non-durables from the 2016 Encuesta de Gastos e Ingresos de los Hogares (ENGIH). To pin down the average durable price, I rely on external pricing evidence from Drenik and Perez (2021). In Uruguay, non-durable goods and services are mostly quoted in pesos, whereas durable categories—such as vehicles, appliances, and housing improvements—are predominantly quoted in dollars, which motivates modeling durables as dollar-priced.

Figure 4 illustrates a strong negative relationship between durable and liquid wealth shares. Households allocate a roughly fixed total wealth between durables and liquid assets, consistent with lumpy adjustment models and with internal balance-sheet consistency in the EFHU data.

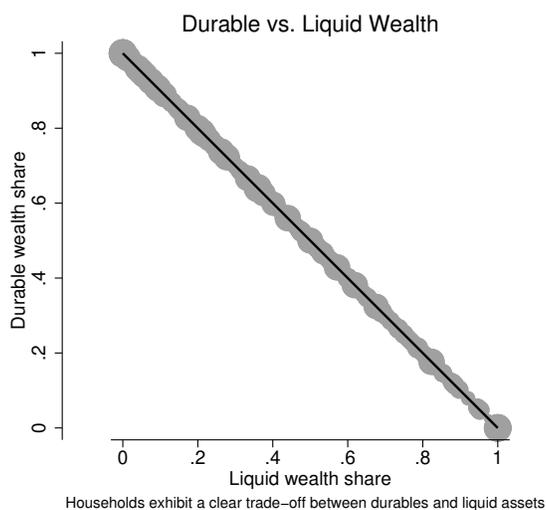


Figure 4: Durable–Liquid Wealth Relationship.

*Notes:* Each point represents one household from the pooled EFHU sample (2012–2017). The horizontal axis shows liquid wealth (peso plus dollar deposits) as a share of total wealth; the vertical axis shows durable wealth (housing plus vehicles) as a share of total wealth. The negative relationship is consistent with lumpy adjustment models in which households substitute between liquid buffers and illiquid durables.  $N = 22,058$  households; survey-weighted.

### 3.1 Empirical facts

I document four empirical facts that motivate the structure of the model and discipline the quantitative analysis.

**Fact 1: Dollar participation is limited, but intensive dollarization is high.** In EFHU Wave 2, the participation margin is 10.6%, while the intensive margin among participants is high: 75.4%. The pattern reconciles micro and macro facts. According to the Central Bank of Uruguay (BCU), roughly one-half to two-thirds of *aggregate* bank deposits are denominated in foreign currency—a concentration result driven by households that do hold dollars and hold them at high shares. At the household level, the unconditional mean dollar share is 8.0% in Wave 2. Figure 5 shows both margins: a large mass at zero in the full sample and a high conditional distribution among participants, with substantial mass near one. The bimodal pattern—a large mass at zero alongside high intensive dollarization—is consistent with threshold behavior driven by proportional transaction costs, as formalized in the model of Section 2.

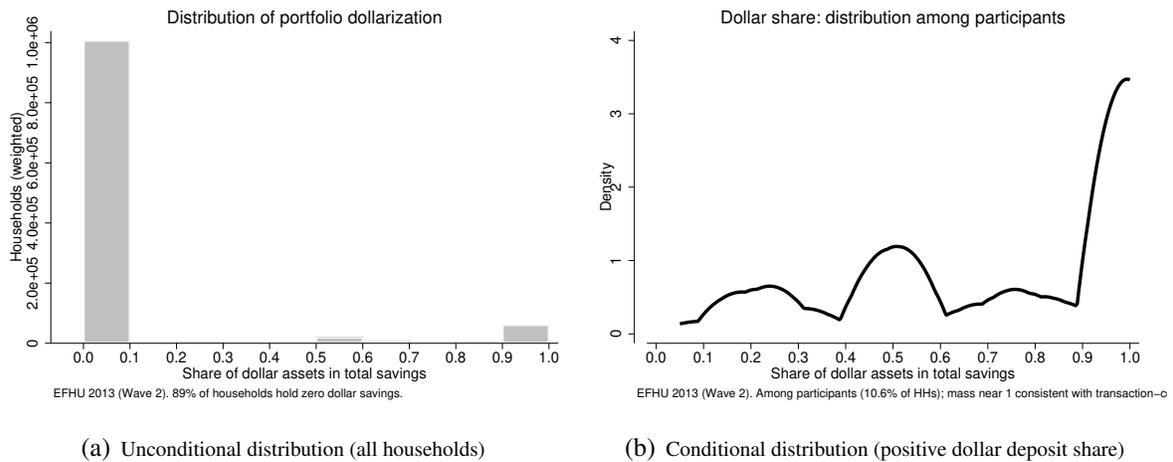


Figure 5: Distribution of portfolio dollarization

*Notes:* Wave 2 (EFHU 2013), survey-weighted. Left panel: unconditional histogram of the household dollar share of liquid assets (dollar deposits / total liquid assets), showing a large mass at zero (non-participation). Right panel: conditional kernel density among households with a positive dollar deposit share, showing high intensive dollarization among participants.  $N = 22,058$  households with positive liquid assets; survey-weighted.

**Fact 2: Dollar pricing of durables.** Durable goods are predominantly quoted in dollars, while non-durables remain peso-denominated. Survey responses on durable values and complementary price data show vehicles, appliances, and housing-related expenditures are largely priced in dollars.

Table 1 places Uruguay in a cross-country perspective: despite low inflation, it combines high deposit dollarization with pervasive dollar pricing of durables, indicating that dollar pricing is a persistent structural feature rather than a purely inflationary phenomenon.

Table 1: Cross-country pricing and deposit dollarization

Country	Non-durables	Vehicles	Real estate	Inflation (%)	Dollar deposits (%)
Argentina	0	9	76	47.6	32
Bolivia	42	67	83	1.5	—
Paraguay	60	57	33	3.2	45
Peru	4	68	54	2.2	40
Uruguay	35	85	88	7.6	75

*Notes:* Entries report the share (in percent) of listed prices denominated in U.S. dollars at the largest retailer in South America. Non-durables correspond to grocery and consumer goods prices, vehicles correspond to used-car listings; real estate corresponds to residential property listings in capital cities (Drenik and Perez, 2021). Inflation is CPI inflation in 2018 (World Bank, 2024). Dollar deposits denote the share of foreign-currency deposits in total bank deposits in 2020, from national central bank statistics. A dash indicates unavailable data.

**Fact 3: Heterogeneity in dollarization across households.** Dollar participation and portfolio shares vary systematically across the income distribution. Dollar saving is not confined to high-income households: middle- and lower-income households also hold dollar assets, though typically in smaller amounts. Figure 6 shows an increasing pattern. The heterogeneity motivates modeling income risk and endogenous portfolio choice.

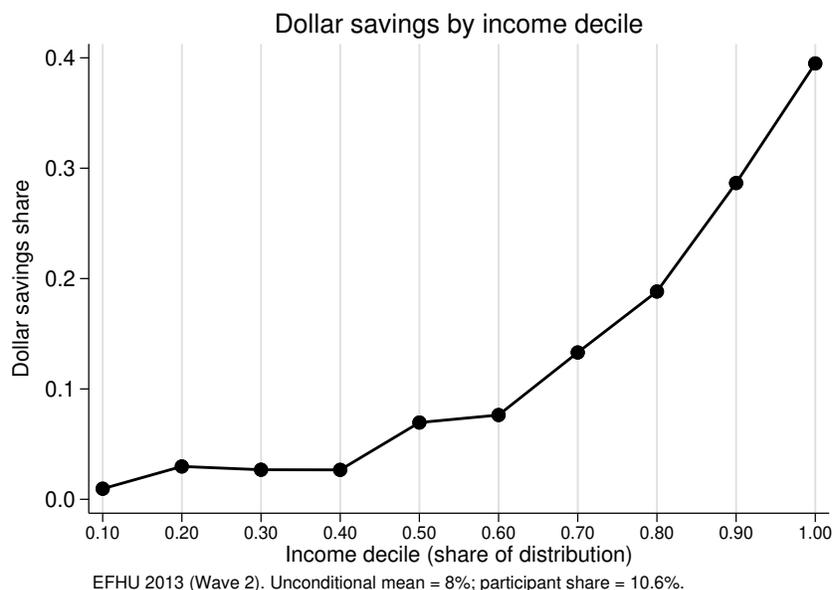


Figure 6: Dollar share of liquid assets by household income decile

*Notes:* Each point reports the mean dollar share of liquid assets for an income decile. Income deciles are built from total household labor income within each EFHU wave (2012, 2014, 2017) and then pooled. The upward slope shows that higher-income households hold larger dollar shares, consistent with fixed participation costs or stronger hedging demand. Sample: (N=22,058) households with positive liquid assets, using survey expansion weights.

**Fact 4: Infrequent durable adjustment.** Durable adjustment is infrequent. Most households report last upgrading their main durable more than a decade ago. Figure 7 shows the distribution of durable tenure (years since last update). Since durables are priced in dollars, exchange-rate movements raise the local-currency cost of replacement and widen inaction regions.

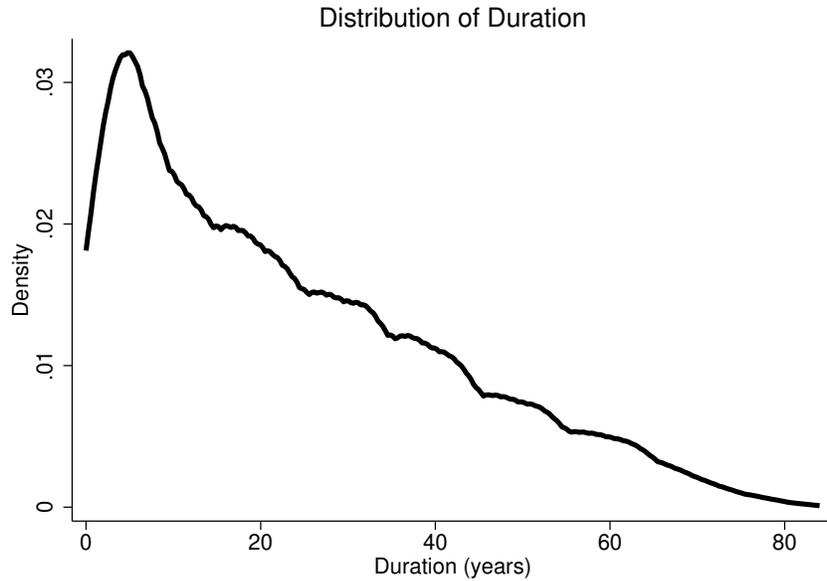


Figure 7: Durable updating is infrequent.

*Notes:* Distribution of years since last durable upgrade, computed from self-reported tenure in EFHU (2012–2017). The median tenure exceeds 20 years, indicating infrequent adjustment. Durables include housing and vehicles. Survey-weighted; sample restricted to households with positive income and non-negative durable holdings.  $N = 22,058$ .

Table 2 reports key descriptive statistics from EFHU. Durables constitute the bulk of household wealth, while dollar deposits account for a substantial share of liquid savings. While the figures and tables document a broad set of empirical regularities, the quantitative estimation targets a subset of moments that map directly into the model’s key margins: (i) durable goods duration, (ii) the mean and dispersion of the durable share of wealth, and (iii) the mean and dispersion of the dollar share of liquid assets. I report additional balance-sheet statistics for context but do not target them in the baseline estimation.

Table 2: Descriptive statistics from EFHU (2012–2017), survey-weighted

<b>Moment (survey-weighted)</b>	<b>Value</b>	<b>Unit</b>
Dollar deposit participation	0.106	ratio
Dollar deposit share, conditional mean	0.754	ratio
Dollar deposit share, unconditional mean	0.08	ratio
Durable value / wealth (mean)	0.83	ratio
Durable value / quarterly income (median)	1.85	ratio
Durable tenure (average years)	23.2	years
Housing value (median)	\$150,000	USD
Vehicle value (median)	\$8,000	USD
Quarterly income (median)	\$4,922	USD

*Notes:* Statistics use EFHU survey weights. Dollar moments come from Wave 2 (EFHU 2013), where the currency-share variable is continuous and comparable to the model. The dollar deposit share equals foreign-currency deposits over total liquid financial assets; participation is the share of households with positive dollar deposits; the conditional mean is computed among participants; and the unconditional mean is computed across all households. Durable value includes housing and vehicles at self-reported market values. Wealth equals liquid financial assets plus durables, income is total quarterly household income, and all monetary values are converted to U.S. dollars using contemporaneous exchange rates.

Taken together, the facts show dollarization in Uruguay is simultaneously a portfolio phenomenon, a pricing phenomenon, and a heterogeneous one. The combination of detailed microdata, stable inflation, and salient exchange-rate risk provides a sharp empirical environment to identify the interaction between dollar pricing, portfolio choice, and lumpy durable adjustment. The empirical regularities motivate the following quantitative exercise and counterfactuals.

## 4 Quantitative Framework

This section maps the model to Uruguayan data and describes how each parameter enters the targeted moments.

### 4.1 Calibration

I calibrate outside the model all parameters that are standard in the quantitative household literature or directly observable from aggregate data. I estimate by simulation the remaining parameters that govern portfolio choice and durable adjustment frictions in quarterly frequency.

I set  $\beta = 0.986$ , calibrated to match the average quarterly real peso deposit return from BCU data,

and  $\gamma = 2$ , a standard value in the quantitative household literature. These parameters facilitate comparability with the existing literature.

Household labor income follows an AR(1) process. I calibrate the income process by converting the annual estimates of Berger and Vavra (2015) to quarterly frequency. Therefore, I obtain a persistence  $\rho_y = 0.975$  and std. deviation  $\sigma_y = 0.10$ .

The nominal peso–dollar exchange rate follows an AR(1) process with persistence  $\rho_e$  and volatility  $\sigma_e$ . To calibrate the parameters I use the daily nominal UYU/USD spot rate from the Central Bank, converted to quarterly averages. Since the log nominal rate exhibits a persistent depreciation trend and a near-unit root in levels, I remove the trend component using the Hamilton 2018 filter and estimate an AR(1) on the residuals via OLS. The procedure yields  $\rho_e \approx 0.85$  and  $\sigma_e \approx 0.063$  (quarterly), which I round to the values in Table 3<sup>1</sup>.

I calibrate the non-durable utility share  $\nu$  using the 2016 Encuesta de Gastos e Ingresos de los Hogares (ENGIH 2016), Uruguay’s official household expenditure survey<sup>2</sup>. I set  $\nu = 0.88$ , consistent with the benchmark of Berger and Vavra (2015), using U.S. NIPA data, and Kaplan and Violante (2014), who use  $\nu = 0.85$ . Appendix B reports additional moments from ENGIH — including the durable investment rate and household savings rate — as non-targeted checks.

In the model, durable goods carry U.S. dollar prices with full pass-through to local-currency prices, consistent with the evidence documented in Section 3. The non-durable good is the numeraire. I set the risk-free return on local liquid assets to ensure consistency with the discount factor. The local interest rate  $r$  is the average real return on peso deposits, computed as the nominal deposit rate minus CPI inflation. The dollar interest rate  $r^{\$}$  is the average real return on dollar deposits, computed as the nominal deposit rate minus U.S. CPI inflation. Both rates are at quarterly frequency and expressed in real terms.

Finally, I set the durable price parameter  $p_d$  to match the median durable value in EFHU relative to median quarterly income, which gives  $p_d = 5.0$  in normalized units (Drenik and Perez, 2021). The parameter captures the typical cost of replacing durables relative to income and is central for quantifying the exchange-rate pass-through mechanism.

Table 3 summarizes the calibrated parameters and the estimated parameters.

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<sup>1</sup>The Hamilton filter is preferred over the HP filter because it avoids endpoint bias and spurious low-frequency dynamics (Hamilton, 2018). As a robustness check, HP filtering with  $\lambda = 1600$  gives similar values ( $\rho_e \approx 0.72$ ,  $\sigma_e \approx 0.054$ ).

<sup>2</sup>I aggregate monthly-equivalent household expenditure by division: furnishings and household equipment and transport including vehicles together account for 11.6% of consumption expenditure on average (median: 8.7%), implying a non-durable share of approximately 88%.

Table 3: Model parameters: calibration and estimation

Parameter	Description	Value	Source / target
<i>Calibrated</i>			
$\beta$	Discount factor	0.986	BCU data
$\gamma$	Risk aversion	2.00	Standard
$\delta$	Durable depreciation	0.0125	Standard
$r$	Local interest rate	0.0142	BCU data
$r^{\$}$	Dollar interest rate	0.011	BCU data
$\rho_y$	Income persistence	0.975	Berger and Vavra (2015)
$\sigma_y$	Income innovation SD	0.10	Berger and Vavra (2015)
$\rho_e$	Exchange-rate persistence	0.85	BCU data, Hamilton filter
$\sigma_e$	Exchange-rate volatility	0.063	BCU data, Hamilton filter
$p_d$	Durable price (USD)	5.0	Drenik and Perez (2021)
$v$	Non-durable utility share	0.88	ENGIH 2016
<i>Estimated by SMM</i>			
$f$	Resale haircut (irrevers.)	0.0204 (0.0001)	Duration + durable wealth mean
$\kappa$	Dollar portfolio wedge	0.0246 (0.0230)	Dollar share moment

*Notes:*  $v$  is calibrated from ENGIH 2016 household expenditure data (not estimated). Estimated parameters are reported with delta-method standard errors in parentheses. All parameters are at quarterly frequency. Income process: annual estimates from Berger and Vavra (2015). Exchange-rate parameters ( $\rho_e, \sigma_e$ ) are estimated by OLS on the cyclical component of the quarterly log nominal UYU/USD rate, extracted using the Hamilton (2018) filter ( $h = 8$  quarters). Interest rates are quarterly and expressed in real terms. The durable price is denominated in U.S. dollars.

## 4.2 Solution and simulation

The dynamic state is  $S_t = (w_t, d_{t-1}, e_t, y_t)$ , where  $w_t$  denotes liquid wealth,  $d_{t-1}$  the inherited stock of durables, and  $(e_t, y_t)$  follow exogenous AR(1) processes. I normalize all real variables by the median quarterly household income in the survey, which serves as the numeraire. In normalized units, liquid wealth and durables are expressed in multiples of median income, improving numerical stability and facilitating interpretation.

I discretize liquid wealth on  $[0, \bar{w}]$  and durables on  $[0, \bar{d}]$  using an analogous grid. I set upper bounds  $\bar{w}$  and  $\bar{d}$  high enough to keep the probability of hitting the upper bound negligible. I discretize the exchange-rate and income processes using Tauchen's method, matching the AR(1) specifications in (2.2)–(2.3). I construct the joint transition matrix for  $(e_t, y_t)$  as the Kronecker product of the individual Markov chains.

I solve the household problem with value function iteration. At each grid point, I evaluate both the

adjustment and no-adjustment branches and take the maximum. Within each branch, the household chooses the optimal dollar share  $s_t \in [0, 1]$  to maximize expected continuation value, accounting for the state-contingent realization of next-period wealth under exchange-rate risk. Iteration continues until the maximum absolute change in the value function falls below  $10^{-4}$ .

Given the converged policy functions, I simulate a panel of  $N = 500$  households for  $T = 1,500$  quarters, discarding the first 250 as burn-in. For each household–period, I record consumption, savings, portfolio composition, durable holdings, and the adjustment indicator. I compute simulated moments from the ergodic distribution of the simulated panel and compare them to their empirical counterparts.

### 4.3 Estimation

I estimate the remaining parameters using the Simulated Method of Moments (SMM). For a given parameter vector, I solve the household problem, simulate a large cross-section of households from the stationary distribution, and compute simulated moments. I choose parameters to minimize

$$\hat{\theta} = \arg \min_{\theta} \left( m^{\text{data}} - m^{\text{model}}(\theta) \right)' W \left( m^{\text{data}} - m^{\text{model}}(\theta) \right),$$

where  $W$  is a diagonal weighting matrix.

I minimize the SMM objective with a multistart random search. For each start, I draw parameter vectors uniformly from the admissible bounds, evaluate the objective function repeatedly, and retain the best candidate. I then repeat the search across many starts with different seeds and initial points, yielding tens of thousands of objective-function evaluations overall. Finally, I compute standard errors with the delta method, using a numerical Jacobian of simulated moments evaluated at the final estimate.

Since EFHU consists of repeated cross-sections rather than household panels, I compute all empirical moments at the cross-sectional level. Accordingly, I evaluate the model in its stationary distribution, and I construct simulated moments to mirror the survey moments.

The baseline estimation targets three moments that discipline the model’s two central margins: durable adjustment and portfolio dollarization. Specifically, the targeted moments include:

1. the mean duration since last durable adjustment;
2. the mean durable share of total household wealth;
3. the mean dollar share of liquid assets.

The moments jointly identify the two estimated parameters. The resale haircut  $f$  is primarily disciplined by durable tenure and the mean durable wealth share, while the portfolio wedge  $\kappa$  is primarily disciplined by the dollar-share moment. With two parameters and three moments, the model is over-identified by one restriction.

## 4.4 Model fit

Table 4: Targeted moments: data and model

Moment	Data	Model	Gap (Model–Data)
Mean years since last adjustment	23.178	20.069	-3.110
Mean durable share of wealth	0.829	0.462	-0.367
Mean dollar share of liquid assets	0.080	0.143	0.063

*Notes:* Data moments are computed from pooled EFHU waves (2012, 2014, 2017) using survey weights. “Years since last adjustment” is self-reported tenure since last housing or vehicle upgrade. “Dollar share” equals dollar deposits divided by total liquid assets (peso plus dollar deposits). “Durable share of wealth” equals the value of durables (housing plus vehicles at self-reported values) divided by total household wealth (durables plus liquid assets). Model moments are computed from the stationary distribution of 500 simulated households over 1,500 quarters (250-quarter burn-in), evaluated at the multistart estimate  $(\hat{f}, \hat{\kappa}) = (0.0204, 0.0246)$ .

Table 4 compares the targeted empirical moments to their simulated counterparts. The fit is mixed. The model slightly under-predicts duration (20.1 vs. 23.2 years), materially under-predicts the durable wealth share (0.462 vs. 0.829), and overshoots the dollar share (0.143 vs. 0.080 in the data), though the absolute gap on the dollar share is smaller than on the durable share.

Parameter-level inference indicates asymmetric identification strength across frictions. The estimate of  $f$  is tightly estimated ( $\hat{f} = 0.0204$ , s.e. = 0.0001; large  $t$ -statistic), while  $\kappa$  is weakly identified ( $\hat{\kappa} = 0.0246$ , s.e. = 0.0230;  $t \approx 1.07$ ). The estimate of  $f$  also lies below the Berger-Vavra range (0.043–0.068), but the comparison is not one-for-one. In this model, households jointly choose durable adjustment and currency composition, so the effective friction is not captured by  $f$  alone. Part of the adjustment friction that would appear as a higher fixed cost in a one-asset durable model can instead be absorbed by the interaction of a lower  $f$  with a positive portfolio wedge  $\kappa$ . The pattern is consistent with the moment mapping: durable-adjustment moments strongly discipline  $f$ , while a single dollar-share moment provides limited curvature for  $\kappa$ . The over-identifying restriction is not rejected at conventional levels under the current specification ( $J \approx 0.199$ ,  $p \approx 0.656$ , with one over-identifying degree of freedom). Since  $\kappa$  is weakly identified, policy experiments that move dollar-saving costs are more uncertain than experiments that operate

through durable adjustment costs.

Two implications of the fit deserve emphasis before proceeding to the counterfactuals. First, the large gap in the durable wealth share (0.46 vs. 0.83) suggests the model understates the importance of durables in household balance sheets. If households actually hold durables more intensively than the model implies, welfare costs associated with durable frictions and peso pricing are likely understated: the mechanism relies on the durable adjustment margin, so understating durable intensity biases the estimated CEV toward zero. Second, the asymmetry in identification sharpens the hierarchy of findings: the peso-pricing counterfactual (CEV  $\approx -11\%$ ) is the most precisely identified result because it operates primarily through  $f$ , which is tightly estimated; the dollar-access counterfactual (CEV  $\approx -9\%$ ) should be read as indicative given weak identification of  $\kappa$ .

I use the estimated model to characterize the stationary distribution of household portfolios and the aggregate dynamics; both serve as internal validation of the model's mechanisms.

Figure 8 plots the model-implied distribution of the durable share of total household wealth. The distribution is not concentrated at the corners; instead, it features a dominant interior mode and a smaller upper-share mode. This pattern indicates substantial heterogeneity in portfolio composition across households and is consistent with endogenous sorting between more liquid-wealth-intensive and more durable-wealth-intensive balance sheets.

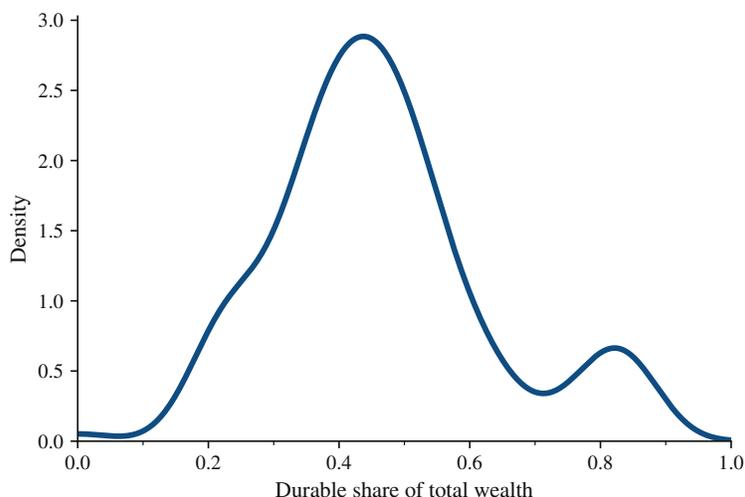


Figure 8: Distribution of the durable share of total household wealth

*Notes:* Kernel density of the durable share of total wealth in the simulated stationary distribution, where the durable share is durable value/(durable value + liquid wealth). The density has a dominant interior mode (around mid-range durable shares) and a smaller upper-share mode, indicating substantial heterogeneity in household portfolio composition.

Figure 9 decomposes this heterogeneity by total-wealth decile. The mean durable share increases overall across the wealth distribution, with a pronounced rise in the top decile; the dashed bands show meaningful within-decile dispersion throughout. In model terms, richer households hold higher average durable shares, while dispersion within each decile reflects variation in adjustment timing and portfolio composition.

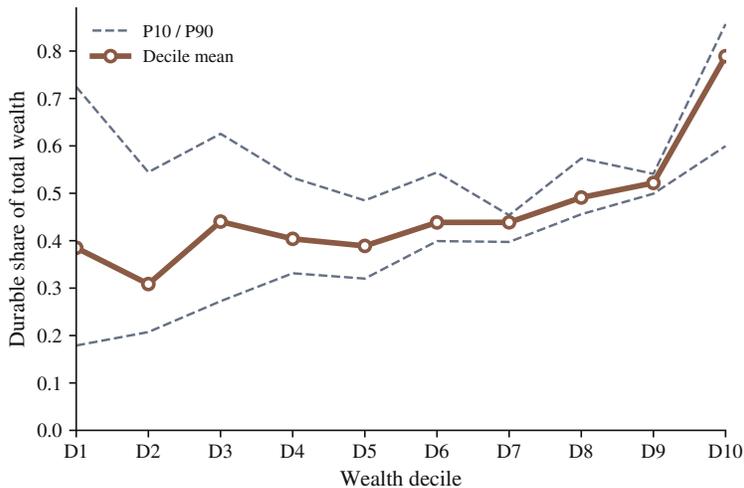


Figure 9: Durable share of wealth by total wealth decile

*Notes:* Mean durable share of total wealth by wealth decile in the simulated stationary distribution. The solid line reports the decile mean; dashed lines show within-decile dispersion. The durable share rises overall across the wealth distribution and increases sharply in the top decile.

## 4.5 Generalized Impulse Response Functions

Since the model features discrete adjustment decisions and nonlinear policy functions, I compute generalized impulse response functions (GIRFs) following Koop et al. (1996). The GIRF to an exchange-rate shock is defined as

$$\text{GIRF}(h) = \mathbb{E}[x_{t+h} | \varepsilon_t^e = \delta] - \mathbb{E}[x_{t+h}],$$

where expectations are taken over the ergodic distribution of initial states and the realizations of future shocks. I implement the simulation by simulating 500 histories, each starting from a state drawn from the stationary distribution. For each history, I compare the path following a depreciation shock to the path without the shock, holding the sequence of future income and exchange-rate innovations fixed. The reported GIRF is the average difference across histories, with confidence bands reflecting simulation uncertainty.

Figure 10 reports probability-scaled GIRFs for a one-standard-deviation exchange-rate depreciation under the estimated process ( $\rho_e = 0.85$ ,  $\sigma_e = 0.063$  quarterly). The plotted paths equal the conditional GIRF multiplied by a quarterly arrival probability of 0.10, so the figure should be read as an expected flow response rather than a pure conditional shock path. Each line is the difference between the shocked path and an otherwise identical no-shock path with the same future innovations, averaged over initial states from the ergodic distribution. Relative to that no-shock benchmark, consumption falls modestly on impact, durables fall, liquid wealth jumps, and the dollar share declines.

The impact responses reflect the model's balance-sheet mechanics. The depreciation raises the peso replacement cost of durables, which leads households to defer adjustment and redirect resources toward precautionary saving rather than current spending, so non-durable consumption falls slightly on impact. At the same time, the peso value of existing dollar assets rises, which boosts measured liquid wealth. After impact, as the shock mean-reverts and households reoptimize, the responses converge quickly: liquid wealth remains above baseline for several quarters because households postpone some durable adjustment and carry larger buffers, while the dollar-share response is short-lived because valuation effects dominate immediately and subsequent portfolio rebalancing offsets the initial composition shift.

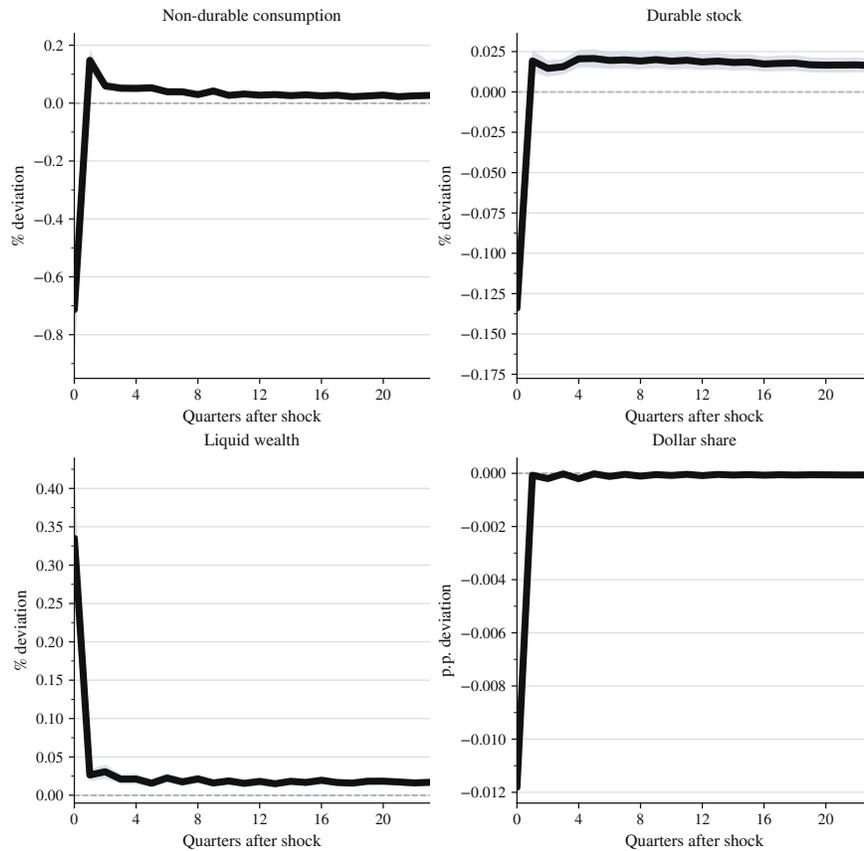


Figure 10: Impulse Response Functions

*Notes:* Probability-scaled generalized impulse response functions to a one-standard-deviation exchange-rate depreciation, computed following Koop et al. (1996). The plotted response equals the conditional GIRF multiplied by a quarterly arrival probability of 0.10. Each response is the average difference between shocked and no-shock paths using common random numbers for future innovations. The sample includes 5,000 households per history and 500 histories drawn from the ergodic distribution (more households per history than the estimation panel to reduce simulation noise in GIRF averages). Shaded bands are  $\pm 1.96$  standard errors across histories (95% simulation bands). Horizontal axis: quarters after shock.

The GIRF dynamics—deferred adjustment, elevated liquid buffers, and short-lived dollar-share responses—motivate the welfare experiments in Section 5. They identify which margins absorb the exchange-rate shock in the estimated model and, by extension, which structural frictions carry the largest welfare stakes.

## 5 Counterfactuals

I use counterfactual experiments to isolate the mechanisms through which (i) nonconvex durable adjustment and (ii) access to dollar saving shape portfolio choice, expenditure dynamics, and welfare. I focus the main quantitative comparison on a core set of stationary counterfactuals and examine how the two frictions interact when dollar access is already restricted; GIRF-based event welfare is reported in Appendix G.3. In each exercise, I change one parameter or component of the shock process while holding all other parameters fixed at their estimated values.

Let  $V^{\text{base}}(S)$  and  $V^{\text{cf}}(S)$  denote the value functions in the baseline and counterfactual economies. Let  $\mu^{\text{base}}$  denote the stationary distribution of states in the baseline. I summarize welfare by the stationary-average value,

$$\bar{v}^j \equiv \int V^j(S) d\mu^{\text{base}}(S),$$

and compute the consumption-equivalent variation (CEV),

$$\lambda = \left( \frac{\bar{v}^{\text{cf}}}{\bar{v}^{\text{base}}} \right)^{\frac{1}{1-\gamma}} - 1. \quad (5.1)$$

With  $\gamma > 1$  and value functions negative,  $\lambda > 0$  denotes a welfare *gain* in the counterfactual relative to the baseline;  $\lambda < 0$  denotes a welfare loss (Lucas, 1987). Throughout, welfare comparisons hold fixed the baseline stationary distribution, so changes reflect pure policy-function effects rather than compositional shifts.

To benchmark the effects, I compare them to standard welfare estimates. The welfare cost of U.S. business cycles is commonly estimated at 0.05–0.1% of consumption (Lucas, 1987; Imrohoroğlu, 1989), while gains from trade liberalization for small open economies are often in the range of 1–5% (Arkolakis et al., 2012; Caliendo and Parro, 2015). Table 5 reports the core welfare counterfactuals and associated moment changes.

Since the analysis is partial equilibrium, these welfare effects should be interpreted as upper bounds: the model holds aggregate prices and equilibrium feedbacks fixed, so it does not capture potential offsetting adjustments in prices, wages, or financial intermediation.

### 5.1 Durable adjustment frictions

I increase the resale haircut from its estimated value of  $f = 0.0204$  to  $f = 0.043$ , the lower end of the Berger-Vavra range, to discipline the magnitude of the friction. The baseline parameter

matches observed replacement frequencies in the data; the counterfactual raises irreversibility to levels comparable to high transaction-cost environments or thin secondary markets for durable goods (Lacetera et al., 2012; Berger and Vavra, 2015; Piazzesi and Schneider, 2016).

Relative to the baseline, higher adjustment costs reduce the frequency of durable replacement and lengthen spells between updates. Conditional on adjustment, households undertake larger discrete changes in the durable stock. The increased rigidity raises the value of liquid buffers and tilts portfolios toward assets that hedge the dollar-denominated replacement cost of durables.

Quantitatively, the counterfactual implies a CEV of  $-22.06\%$ , the largest welfare loss among the core stationary experiments in Table 5. Relative to baseline, durable-expenditure volatility drops sharply from about 4.02 to 0.427, and consumption volatility declines from 0.536 to 0.455. The reduction in  $\sigma(\Delta d)$  reflects a lower frequency of large durable updates when adjustment frictions are higher<sup>3</sup>.

## 5.2 Dollar pricing as a natural hedge: local-currency pricing counterfactual

The counterfactual directly addresses the paper’s central question: what is the welfare consequence of durable goods being denominated in dollars? I replace dollar pricing with local-currency pricing, so the peso price of durables stays fixed and does not respond to exchange-rate movements. Dollar savings continue to carry exchange-rate risk. I hold all other parameters at their estimated values.

The resulting CEV of  $-11.08\%$  suggests households would be worse off when durables are peso-priced. The negative sign is counterintuitive at first glance. One might expect insulating durable prices from exchange-rate fluctuations to help households. The mechanism runs the other way.

Under dollar pricing, the local-currency cost of durable replacement and the local-currency value of dollar savings both increase proportionally when the peso depreciates. The durable price satisfies  $P_t^d = e_t p_d$ , while the peso return on dollar savings includes the term  $(1 + r^{\$}) \frac{e_{t+1}}{e_t}$ . Both quantities scale with  $e_t$ , so they move together. As a result, the household’s effective real cost of durable replacement—measured in units of dollar savings—is partially insulated from exchange-rate movements. A depreciating peso raises durable prices, but it simultaneously raises the peso value of dollar assets by the same factor. The household’s hedging position is built-in by denomination.

Under peso pricing, the covariance disappears. Durable prices no longer rise with a depreciation,

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<sup>3</sup>Setting  $\delta$  arbitrarily close to one nearly shuts down the durable channel and produces a much larger loss. Once durable adjustment effectively disappears, the welfare consequences become dramatically larger, which underscores that durables are central to the model’s transmission.

but neither does the real cost of durable adjustment fall with an appreciation. More importantly, the motive to hold dollar assets is weakened: dollars no longer serve as a durable-price hedge, because the durable price is not dollar-denominated. As a result, households shift toward peso assets, losing the hedging channel. The loss of the natural hedge is larger than the gain from smoothing durable prices, producing a net welfare loss.

The volatility moments in Table 5 also align with the mechanism. Relative to baseline, durable-expenditure volatility remains lower (4.02 to 1.633), but consumption volatility rises materially (0.536 to 0.623). This pattern is consistent with weaker currency hedging in liquid portfolios once durables are no longer dollar-priced. The cross-steady-state CEV reported in the appendix (Table 8) is also negative, consistent with further erosion of the hedge once households re-optimize in the new stationary distribution.

Two implications follow for policy. First, simply pegging or fixing durable prices in local currency does not necessarily improve household welfare if it destroys the hedging complementarity between dollar assets and dollar-priced durables. Second, the primary welfare cost of dollar denomination is not the price volatility it creates, but the insurance it enables—a distinction that is invisible to frameworks that abstract from household portfolio choice.

### 5.3 Restrictions on dollar saving

I increase the portfolio wedge from its estimated baseline value of  $\kappa = 0.0246$  to  $\kappa = 0.05$ , roughly a two-fold increase in the proportional cost of foreign-currency saving. Relative to the baseline, a higher  $\kappa$  reduces equilibrium dollarization and weakens households' ability to hedge the dollar price of durable replacement.

Portfolios shift toward peso assets, increasing exposure to exchange-rate movements. The experiment approximates regimes of capital controls, or severe financial repression, such as Argentina's 2001–2002 (Reinhart and Sbrancia, 2015). The magnitude effectively shuts down the hedging channel while preserving model structure.

The implied welfare loss of 8.93% would be economically large and comparable to standard gains from trade, underscoring the importance of the dollar hedging channel: when households cannot dollarize their portfolio, they would lose the principal instrument for insuring the dollar price of durable replacement. Relative to baseline, both volatility margins increase, with  $\sigma(\Delta d)$  rising from 4.02 to 4.690 and  $\sigma(\log c)$  rising from 0.536 to 0.653. Limiting access to dollar saving therefore generates first-order welfare costs.

Table 5: Core stationary counterfactuals: welfare and volatility

<b>Counterfactual</b>	<b>CEV (%)</b>	$\sigma(\Delta d)$	$\sigma(\log c)$
Baseline	—	4.016	0.536
Higher durable adj. cost	-22.06	0.427	0.455
Peso-priced durables	-11.08	1.633	0.623
Restricted dollar saving ( $\kappa = 0.05$ )	-8.93	4.690	0.653

*Notes:* CEV denotes the consumption-equivalent variation ( $CEV_{A \rightarrow B}$ , %) required to make a household in baseline economy  $A$  indifferent to living in counterfactual economy  $B$ , holding fixed the baseline stationary distribution  $\mu^A$ . Positive values indicate welfare gains; negative values indicate welfare losses.  $\sigma(\Delta d)$  is the standard deviation of net durable investment  $d_t - d_{t-1}(1 - \delta)$  in the counterfactual stationary distribution.  $\sigma(\log c)$  is the standard deviation of log non-durable consumption in the counterfactual stationary distribution.

## 5.4 Interaction between Dollar Access and Adjustment Frictions

The experiments in Section 5 evaluate welfare losses from changing one friction at a time, starting from an economy in which households have full access to dollar saving at the estimated cost  $\kappa$ . A complementary question is whether the costs are amplified or attenuated when dollar access is already restricted. If households cannot dollarize, they lose a key hedging instrument. Exchange-rate risk and durable illiquidity may then become considerably more damaging because the insurance channel is blocked.

To examine the issue, I construct a restricted baseline economy in which I hold all parameters at their estimated values except the portfolio wedge, which I raise to  $\kappa = 0.05$  (from the estimated  $\kappa = 0.0246$ ). At the chosen level, the cost of holding dollar assets is substantially elevated, and equilibrium dollarization falls sharply. The calibration approximates an economy with moderate capital controls or financial repression—policies observed in several emerging markets (Reinhart and Sbrancia, 2015). I hold all other parameters, including the exchange-rate process, durable prices, and income dynamics, constant so the restricted baseline and the estimated baseline differ only in household access to dollar saving.

Starting from the restricted baseline, I apply the same core counterfactuals as in Section 5: higher durable adjustment costs and peso-priced durables. Since the restricted baseline already has  $\kappa = 0.05$ , the dollar-restriction counterfactual from Section 5 has no natural counterpart here. Table 6 reports the results and compares them to the baseline experiments from Table 5.

Table 6: Welfare and volatility effects under restricted dollar access ( $\kappa = 0.05$ )

Counterfactual	Baseline ( $\kappa = 0.0246$ )			Restricted baseline ( $\kappa = 0.05$ )		
	CEV (%)	$\sigma(\Delta d)$	$\sigma(\log c)$	CEV (%)	$\sigma(\Delta d)$	$\sigma(\log c)$
Higher durable adj. cost	-22.06	0.427	0.455	-19.84	5.601	1.051
Peso-priced durables	-11.08	1.633	0.623	-14.12	1.014	0.660

*Notes:* Each row reports the CEV (%) and volatility measures in the counterfactual economy, relative to the respective baseline. Left panel (baseline,  $\kappa = 0.0246$ ): reproduces the relevant entry from Table 5. Right panel (restricted baseline,  $\kappa = 0.05$ ): the starting economy has substantially elevated dollar saving costs; all other parameters held at estimated values.  $\sigma(\Delta d)$  is the standard deviation of net durable investment  $d_t - d_{t-1}(1 - \delta)$ ;  $\sigma(\log c)$  is the standard deviation of log non-durable consumption.

The comparison across columns is informative about the interaction between dollar access and durable illiquidity. Since  $f$  and  $\kappa$  are orthogonal in the model, differences in the welfare cost of higher  $f$  across columns reflect indirect effects operating through portfolio re-optimization rather than a direct channel; Appendix G.2 reports additional welfare-measure decompositions for the counterfactuals.

The higher adjustment cost row shows partial attenuation: the welfare loss falls from  $-22.06\%$  in the estimated baseline to  $-19.84\%$  under restricted dollar access. When dollar saving is already expensive, households have pre-adjusted toward less liquid durable positions, so the marginal cost of tightening the resale constraint further is somewhat smaller. The two frictions are therefore partial substitutes rather than complements.

The peso-pricing row shows an amplification pattern: switching durables from dollar to peso denomination is more costly when dollar access is already restricted (CEV falls from  $-11.08\%$  to  $-14.12\%$ ), consistent with a weaker hedging margin in the restricted baseline.

## 6 Conclusion

The paper studies how dollar pricing of durable goods shapes household behavior in small open economies. I develop a quantitative household model that combines lumpy durable adjustment, exchange-rate risk, and portfolio choice between peso and dollar assets. The model highlights how the denomination of durable prices interacts with portfolio frictions to jointly determine consumption smoothing, saving composition, and the timing of durable purchases.

Dollar pricing of durables would be welfare-improving when households have access to dollar saving. The two sides of the balance sheet share a common denomination: durable replacement costs

and dollar savings both appreciate with the exchange rate, providing a natural hedge. Removing dollar pricing by switching to local-currency denomination would sever the hedge and generate a model-implied welfare loss of about 11%. The result reframes the policy question: the concern is not dollar pricing per se, but ensuring households can access the dollar assets that make dollar pricing beneficial.

The remaining counterfactuals confirm the importance of the hedging channel. Restricting dollar access would impose a welfare cost near 9%, and higher durable adjustment frictions would generate a welfare loss above 20%—both in the range of or above standard trade liberalization estimates. Four mechanisms jointly produce the effects: amplified adjustment frictions, portfolio hedging trade-offs, state-dependent precaution, and the interaction between portfolio composition and adjustment timing.

On the quantitative side, the model under-predicts durable wealth shares (0.46 vs. 0.83) while duration is matched reasonably closely (20.1 vs. 23.2 years). The over-identifying restriction is not rejected at conventional levels, but inference indicates  $\kappa$  is weakly identified relative to  $f$ . The pattern points to institutional frictions—minimum-balance requirements, limited dollar merchant acceptance, regulatory constraints on foreign-currency accounts— which would improve identification and fit. Importantly, uncertainty around  $\kappa$  implies welfare effects from dollar-saving restrictions should be interpreted as less precisely estimated.

The results suggest that household dollarization is an endogenous response to pricing frictions and exchange-rate risk in partially dollarized economies. Policies aimed at reducing dollarization face a fundamental trade-off: while they may enhance systemic financial stability, they shift exchange-rate risk onto households and remove the hedging instrument that makes dollar-priced durables affordable. An alternative approach is to reduce the underlying demand for dollar hedging by promoting credible monetary policy and developing deep local-currency financial markets, rather than restricting the supply of dollar assets.

More broadly, the partial-equilibrium frame places the welfare estimates in a specific interpretive context. In a general-equilibrium extension, a depreciation that raises the peso cost of durable adjustment would also compress real wages and affect the aggregate price level, partially restoring purchasing power. Aggregate dollar saving by households would interact with the domestic financial system, potentially affecting credit supply and domestic interest rates. These economy-wide feedbacks are absent here: the household bears the full price and portfolio shock in isolation. The CEV estimates are therefore likely upper bounds on the true household-level welfare costs.

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# Appendix

The appendix follows the paper’s sequence: data construction and survey details (A), supplementary expenditure moments (B), computation and estimation details (C–D), model theory and mechanism intuition (E–F), welfare robustness (G), and comparative statics (H).

## A Data Appendix: EFHU Construction and Measurement

This section describes the Uruguayan Household Financial Survey (EFHU), the sample and variable definitions used to build empirical moments, and the measurement conventions that align the data with the model.

**Survey structure.** EFHU is a nationally representative household financial survey administered in Uruguay in three waves between 2012 and 2017. The survey is a repeated cross-section rather than a panel. It reports detailed household balance-sheet information, including liquid assets by currency, durable holdings, debts, and self-reported values for major assets. The currency breakdown of liquid assets is the feature that makes EFHU especially useful for studying household dollarization.

**Sample construction.** I pool the available waves and use household expansion factors throughout. For moments involving portfolio shares, I restrict the sample to households with positive liquid financial assets so the dollar share is well defined. For moments involving durable holdings, I use housing and vehicle values as the empirical counterpart to the model’s composite durable stock. For duration moments, I use the self-reported time since the last housing or vehicle upgrade.

**Currencies and timing.** I express all monetary variables in U.S. dollars. For each EFHU wave  $w$  conducted in calendar year  $t$ , I convert peso-denominated variables  $X_{it}^{UY}$  using the contemporaneous nominal exchange rate  $e_t$  (pesos per dollar):

$$X_{it}^{USD} = \frac{X_{it}^{UY}}{e_t}.$$

The convention aligns the data with the model’s pricing structure, in which durable goods are priced in dollars and have local-currency prices  $P_t^d = e_t p_d$ . All empirical moments used for estimation are ratios or shares and are therefore invariant to the choice of numeraire.

**Income concept.** To match the model’s normalization of durable holdings by income, I use labor income only. I construct quarterly labor income as

$$y_{it}^{\text{lab}} \equiv 3 \times \text{monthly labor income},$$

winsorized by wave to limit the influence of extreme values. All moments involving durable-to-income ratios in the data use  $y_{it}^{\text{lab}}$  as the denominator, and I construct simulated moments using the same definition.

**Durable definitions.** In the baseline specification, I define the household durable stock as the sum of housing and vehicle values. The distinction is relevant because depreciation rates and resale frictions differ across components, while the model abstracts from component-level heterogeneity by using a single composite durable good.

**Wave alignment.** Not all variables are measured equally across waves. In particular, the continuous currency-share variable that maps most closely into the model is available in Wave 2, so the baseline dollar-share target uses EFHU 2013 for direct comparability. Other balance-sheet moments use the pooled cross-sections to improve precision. This is why the paper treats the dollar-share target and the durable-balance-sheet targets slightly differently.

**Moment mapping.** The baseline SMM targets are: (i) the mean years since the last durable adjustment, (ii) the mean durable share of total household wealth, and (iii) the unconditional mean dollar share of liquid assets. I compute each target to mirror the model objects as closely as possible: the durable share uses housing plus vehicles over total wealth, and the dollar share uses foreign-currency deposits over total liquid assets. Since EFHU is cross-sectional, I compare these moments to the model’s stationary distribution rather than to panel transitions.

**Survey design and inference.** I compute the descriptive statistics and empirical moments using household survey weights. I construct standard errors and the SMM weighting matrix using a household-level block bootstrap, resampling households with replacement to preserve cross-variable dependence within households.

## B ENGIH 2016: Expenditure Moments and Non-Targeted Validation

The appendix describes how I construct moments from the 2016 Encuesta de Gastos e Ingresos de los Hogares (ENGIH 2016) and report their values. The moments are not targeted in the SMM estimation but serve two purposes: (i) they discipline the calibration of  $v$  and (ii) they provide an external check on the model's predicted allocation between durable and non-durable expenditure and on household savings behavior.

**Data and measurement.** ENGIH 2016 is a nationally representative household expenditure survey conducted by the Instituto Nacional de Estadística (INE), covering 6,889 Uruguayan households. I use expenditure items recorded at the transaction level with an 8-digit COICOP article code, a 2-digit division code (`DIVISION`), and the monthly-equivalent expenditure value (`VALORCONTM`). I compute all moments using household survey expansion weights (`peso`). The household income variable `HT11` is total household income including imputed rent, expressed in monthly Uruguayan pesos.

**Durable and non-durable classification.** I classify expenditure into durables and non-durables by COICOP division:

- *Non-durables*: divisions 01 (food), 02 (beverages/tobacco), 03 (clothing), 04 (housing and utilities), 06 (health), 08 (communications), 09 (recreation), 10 (education), 11 (restaurants), 12 (miscellaneous).
- *Durables*: division 05 (furnishings and household equipment) and division 07 (transport, including vehicle purchases and associated costs).
- Divisions 13–17 (taxes, financial charges, and imputed transfers) are excluded from the consumption denominator as they are not consumption expenditure.

Monthly-equivalent values are used throughout to ensure comparability across items with different reference periods.

**Moments.** Table 7 reports the main moments computed from ENGIH 2016. The non-durable budget share (88.5% mean, 91.3% median) directly supports the calibration  $v = 0.88$ . The durable

investment rate and savings moments are not targeted by the SMM estimator but serve as informal checks on the model’s predictions.

Table 7: ENGIH 2016 expenditure moments (non-targeted)

<b>Moment</b>	<b>Mean</b>	<b>Median</b>
<i>Budget shares (share of consumption expenditure, DIV 01–12)</i>		
Non-durable budget share	0.885	0.913
Durable budget share (DIV 05+07)	0.116	0.087
<i>Durable investment (monthly-equivalent expenditure / income)</i>		
Durable investment rate (DIV 05+07)	0.121	0.073
Share of HHs with positive durable expenditure	97.5%	
Vehicle purchase rate (reference period)	7.3%	
<i>Savings (income – non-durable consumption) / income</i>		
Household savings rate	0.066	0.161
Share with positive savings	69.1%	
p10 savings rate	–0.356	
p90 savings rate	0.459	
<i>Asset ownership</i>		
Vehicle ownership rate	46.2%	
Homeownership rate	59.2%	

*Notes:* All moments are survey-weighted using household expansion weights ( $p_{eso}$ ). Consumption expenditure is defined as the sum of monthly-equivalent values ( $VALORCONTM$ ) across COICOP divisions 01–12. Income is total household income including imputed rent ( $HT11$ ). Savings rate is  $(HT11 - \text{non-durable exp})/HT11$ ; negative values correspond to households whose non-durable expenditure exceeds reported income. Vehicle ownership from household roster variable  $D21\_18$ . Homeownership from tenure variable  $D8\_1$  (categories 1–4 = owner).  $N = 6,889$  households.

**Interpretation.** The model’s non-durable utility share  $v = 0.88$  matches the survey mean budget share of 88.5% closely. The durable investment rate of 12.1% (mean) and 7.3% (median) of household income reflects both routine durable maintenance included in division 07 and lumpy vehicle and appliance purchases. The wide dispersion of the savings rate (p10 = –35.6%, p90 = +45.9%) is consistent with the model’s prediction that households with large durable adjustment episodes show negative savings rates in the adjustment period, while non-adjusting households accumulate liquid wealth. Vehicle ownership of 46.2% provides a cross-sectional benchmark for the ergodic share of durable holders in the simulated economy.

## C Computational Procedure

**Discretization.** I solve the model on a finite grid for the state variables  $(w, d, e, y)$ . I approximate idiosyncratic income and exchange-rate processes by  $n_y$ - and  $n_e$ -state Markov chains using Tauchen’s method. Asset and durable grids are nonlinearly spaced to concentrate points near borrowing constraints and low durable holdings; the baseline grid sizes are  $n_w = 15$  and  $n_d = 21$ . Durables depreciate deterministically at rate  $\delta$ .

**Solution method.** For each state-grid point, I solve the Bellman equations associated with the adjustment and no-adjustment branches,  $V^{\text{adjust}}(S)$  and  $V^{\text{noadjust}}(S)$ . I handle off-grid choices by interpolation, and I take expectations over the discrete transition matrices for  $(e', y')$ . Value function iteration proceeds until convergence,  $\|V^{(k+1)} - V^{(k)}\|_\infty < 10^{-4}$ . I store optimal policy functions for consumption, portfolio choice, and durable adjustment for simulation.

**Simulation.** Given parameter vector  $\theta$ , I simulate the model forward for  $T = 1,500$  periods, discarding the first 250 as burn-in. I compute moments from the ergodic distribution of simulated households and align them with their empirical counterparts (means, dispersions, ratios, and adjustment frequencies). I use common random numbers across parameter evaluations to reduce Monte Carlo noise in the SMM objective.

**Estimation routine.** Estimation uses a multistart random global search over the parameter bounds. Within each start, I draw candidate parameter vectors uniformly from the admissible region and retain the best candidate found. I then repeat the search across many starts with different random seeds and initial draws, which yields tens of thousands of objective-function evaluations overall. The approach is robust to the non-smooth objective surface induced by discrete durable adjustment, which makes gradient-based methods unreliable. I checkpoint the search throughout, so the best candidate found is always preserved.

**Weighting matrix and inference.** I construct the optimal SMM weighting matrix  $W^*$  from the empirical covariance of moments, estimated via influence functions and a block bootstrap clustered by survey wave. After re-estimation under  $W^*$ , I quantify parameter uncertainty using the delta method as described in Appendix D.

**Diagnostics and robustness.** I verify that simulated ergodic distributions replicate the targeted data moments and report the over-identifying  $J$ -statistic. All results are robust to alternative random seeds, grid densities, and simulation horizons. Sensitivity checks for key parameters confirm policy functions and moment matches are locally stable.

## D Estimation

**Objective.** I estimate parameters by Simulated Method of Moments (SMM). Let  $m^{\text{data}}$  denote the vector of empirical moments and  $m(\theta)$  the corresponding simulated moments generated by the model under parameter vector  $\theta$ . The estimator solves

$$\hat{\theta} = \arg \min_{\theta} Q(\theta), \quad Q(\theta) = [m(\theta) - m^{\text{data}}]^{\top} W [m(\theta) - m^{\text{data}}].$$

I initialize the procedure with a diagonal weighting matrix

$$W_0 = \text{diag} \left( 1 / \widehat{\text{Var}}(m_k^{\text{data}}) \right).$$

After an initial pass, I estimate the covariance matrix of the empirical moments using influence functions and a block bootstrap clustered by survey wave. The efficient weighting matrix is then  $W^* = \widehat{\Sigma}^{-1}$ , where  $\widehat{\Sigma}$  denotes the estimated covariance of  $m^{\text{data}}$ . I re-estimate parameters using  $W^*$  and report the over-identifying  $J$ -statistic and its associated  $p$ -value.

**Simulation and optimization.** I compute simulated expectations by forward simulation under the estimated Markov processes for income and exchange rates. I use common random numbers across parameter evaluations to reduce simulation noise and ensure smoothness of the objective function.

I perform optimization via a multistart random global search over the parameter bounds. Within each start, I draw candidate parameter vectors uniformly from the admissible region, evaluate  $Q(\theta)$  repeatedly, and retain the best candidate found. I then repeat the search across many starts with different random seeds and initial draws, which yields tens of thousands of objective-function evaluations overall. I save the incumbent best candidate throughout the search. The procedure is computationally intensive but avoids reliance on gradient information, which is unreliable given the non-smooth objective induced by discrete durable adjustment.

**Inference and robustness.** I quantify parameter uncertainty using the delta method. Let  $G = \partial m(\theta) / \partial \theta^\top |_{\hat{\theta}}$  denote the Jacobian of simulated moments evaluated at the estimate. The asymptotic covariance matrix is

$$\widehat{\text{Var}}(\hat{\theta}) = (G^\top W^* G)^{-1} G^\top W^* \widehat{\Sigma} W^* G (G^\top W^* G)^{-1}.$$

I report standard errors as square roots of the diagonal elements.

I assess numerical robustness by varying simulation horizons, random seeds, and initial conditions, and by reporting sensitivity profiles for key structural parameters  $(f, \kappa)$ .

## E Durable adjustment with dollar pricing: gaps, inaction, and hedging

The appendix provides intuition for the household's durable adjustment decision in the presence of dollar pricing and exchange-rate risk. The discussion is illustrative and focuses on the reduced-form environment used in the quantitative model.

**Environment.** The household state is

$$s_t = (w_t, d_{t-1}, e_t, y_t),$$

where  $w_t$  is total liquid wealth in local-currency units,  $d_{t-1}$  is the beginning-of-period durable stock,  $e_t$  is the nominal exchange rate (local currency per USD), and  $y_t$  is an idiosyncratic income shifter. Preferences are

$$u(c_t, d_t) = \frac{(c_t^\nu d_t^{1-\nu})^{1-\gamma}}{1-\gamma}, \quad \nu \in (0, 1), \gamma > 0.$$

Durables are priced in dollars at price  $p_d$ , so the local replacement cost is  $P_t^d = e_t p_d$ .

Durable adjustment is lumpy due to partial irreversibility. If the household does not adjust, the durable stock evolves as

$$d_t = (1 - \delta) d_{t-1}.$$

If the household adjusts, it chooses a new durable stock  $d_t$  and liquidates the depreciated stock at a resale value subject to a haircut  $f \in (0, 1)$ .

## Frictionless target and normalized gap

Absent adjustment frictions, the optimal durable choice satisfies the intratemporal condition

$$\frac{u_d(c_t, d_t)}{u_c(c_t, d_t)} = P_t^d,$$

which implies the frictionless target

$$d_t^* = \frac{1 - v}{v} \cdot \frac{c_t}{e_t p_d}.$$

Define the normalized durable gap as

$$z_t \equiv \frac{(1 - \delta) d_{t-1}}{d_t^*} = \frac{(1 - \delta) v}{\underbrace{1 - v}_{\xi}} \cdot \frac{e_t p_d d_{t-1}}{c_t}.$$

Values  $z_t > 1$  correspond to an excessive durable stock relative to the target, while  $z_t < 1$  indicates underaccumulation.

Exchange-rate movements directly affect the gap: a depreciation raises  $e_t p_d$ , increasing  $z_t$  and pushing households toward delaying replacement or downsizing.

## Inaction and asymmetric adjustment

Since adjusting involves resale losses, households tolerate deviations from the frictionless target. The value gain from adjustment is decreasing in  $|z_t - 1|$  near the target and increasing when the gap becomes large. The friction generates an inaction region in  $z_t$ .

Unlike fixed-cost S-s models, partial irreversibility implies asymmetric inaction:

- When  $z_t > 1$  (excess durable stock), selling is costly due to the resale haircut, so households tolerate relatively large deviations.
- When  $z_t < 1$  (insufficient durable stock), buying is less distorted, leading to a narrower inaction region.

As a result, the effective inaction set is wider on the “sell” side than on the “buy” side, consistent with infrequent durable replacement and long observed tenures.

## Dollar saving and hedging

Households allocate end-of-period savings across peso and dollar assets. Let  $s_t$  denote the dollar share of savings. The next-period liquid wealth is

$$w_{t+1} = (1+r)(1-s_t)w'_t + (1+r^{\$})s_t w'_t \frac{e_{t+1}}{e_t} - \kappa s_t w'_t,$$

where  $\kappa$  captures the reduced liquidity of dollar saving.

Dollar assets hedge exchange-rate risk: when  $e_{t+1}$  rises, the local-currency value of dollar savings increases, partially offsetting the higher replacement cost of durables. By stabilizing future consumption relative to durable needs, dollar saving reduces the volatility of the marginal rate of substitution between  $c$  and  $d$ .

*Remark E.1 (Hedging and inaction).* Policies or environments that increase the effectiveness of dollar saving as a hedge against exchange-rate risk reduce the volatility of the normalized gap  $z_t$  and shrink the effective inaction region.

## Analytical comparative statics

Locally, the normalized gap satisfies

$$z_t \propto \frac{e_t p_d d_{t-1}}{c_t}.$$

Hence:

$$\frac{\partial z_t}{\partial e_t} > 0 \quad \text{and} \quad \frac{\partial z_t}{\partial y_t} < 0.$$

Depreciations push households toward inaction or downsizing, while positive income shocks encourage upgrading. Increases in irreversibility ( $f$ ) widen the inaction region, whereas improved hedging opportunities through dollar saving narrow it.

The mechanism clarifies how dollar pricing, exchange-rate risk, and portfolio choice jointly shape durable adjustment behavior in the quantitative model.

Figure 11 connects the analytical gap object to the simulated stationary distribution. The figure reports only the stationary density of the durable gap, focusing on the economically relevant range from  $-5$  to  $5$  log points. Most mass lies close to zero, where households remain near their target durable stock and adjustment is infrequent. The thin tails indicate that large misalignments are uncommon in the stationary distribution, consistent with a model in which households eventually pay the nonconvex adjustment cost when the gap becomes too large.

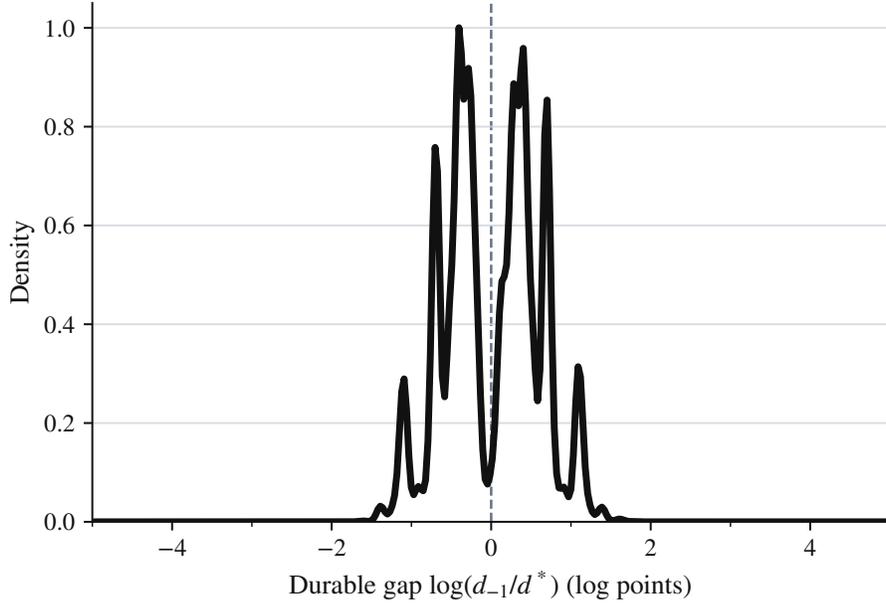


Figure 11: Stationary density of the durable gap

*Notes:* The figure plots the stationary density of the durable gap over the interval  $[-5, 5]$  log points. The concentration of mass near zero indicates that most households remain relatively close to their target durable stock in the stationary distribution.

## F Convex Durable Adjustment Model

The section presents a convex-adjustment benchmark that clarifies the interaction between exchange-rate risk, dollar assets, and durable investment. The environment abstracts from nonconvex adjustment costs and partial irreversibility, allowing for smooth durable adjustment. The purpose is interpretive: to isolate how dollar pricing mechanically links portfolio choice and durable investment through Euler equations.

**Environment.** Households choose consumption  $c_t$ , liquid wealth, dollar assets, and durable investment  $x_t \equiv d_t - (1 - \delta)d_{t-1}$ . Durables are priced in dollars at price  $p_d$ , so the local-currency purchase price is  $e_t p_d$ . Adjustment costs are quadratic:

$$\frac{\phi}{2} x_t^2.$$

Let  $\lambda_t$  denote the multiplier on the budget constraint and  $\mu_t$  the multiplier on durable accumulation.

(i) **USD asset Euler.** The optimality condition for dollar-denominated liquid assets is

$$1 = \mathbb{E}_t \left[ \beta (1 + r^{\$}) \frac{\lambda_{t+1}}{\lambda_t} \frac{e_{t+1}}{e_t} \right].$$

Dollar assets pay off in local currency through exchange-rate revaluation. Hence, exchange-rate risk enters directly into the intertemporal trade-off.

(ii) **Durable Euler (Tobin's  $q$ ).** Define Tobin's  $q_t$  as the shadow value of installed durables relative to their replacement cost:

$$q_t \equiv \frac{\mu_t}{\lambda_t e_t p_d}.$$

With quadratic adjustment costs, the investment rule is linear:

$$q_t = 1 + \phi x_t.$$

The forward-looking Euler equation for  $q_t$  is

$$q_t = \frac{u_d(c_t, d_t)}{\lambda_t e_t p_d} + \mathbb{E}_t \left[ \beta (1 - \delta) \frac{\lambda_{t+1}}{\lambda_t} \frac{e_{t+1}}{e_t} q_{t+1} \right].$$

(iii) **Intratemporal MRS.** Preferences imply

$$\frac{u_d}{u_c} = \frac{1 - v}{v} \frac{c_t}{d_t}.$$

**Interpretation.** Tobin's  $q_t$  measures the marginal value of an additional unit of durable relative to its dollar replacement cost. Exchange-rate risk enters both Euler equations symmetrically through the term  $e_{t+1}/e_t$ :

- In the *portfolio Euler*, dollar assets hedge depreciations by delivering higher local-currency payoffs.
- In the *durable Euler*, depreciations raise the future replacement cost, increasing the continuation value of installed capital.

As a result, exchange-rate movements jointly affect saving in dollar assets and the incentive to invest in durables. Dollar assets hedge precisely the states in which durable replacement becomes expensive. The convex benchmark makes clear the interaction between currency choice and durable investment arises even absent nonconvexities.

In the full model, nonconvex adjustment costs and irreversibility transform smooth responses into infrequent, state-dependent adjustment episodes, but the underlying hedging logic remains the same.

## G Additional Welfare Counterfactuals and Robustness

### G.1 Welfare Measure Robustness

The main text reports welfare effects using the standard ex-ante consumption equivalent variation (CEV), defined as the fraction  $\lambda$  of baseline consumption that leaves a household indifferent between the baseline and the counterfactual economy:

$$\lambda = \left( \frac{\mathcal{W}^{BA}}{\mathcal{W}^{AA}} \right)^{\frac{1}{1-\gamma}} - 1,$$

where  $\mathcal{W}^{AA} = \sum_s v^A(s) \mu^A(s)$  is the baseline value function integrated over the baseline ergodic distribution  $\mu^A$ , and  $\mathcal{W}^{BA} = \sum_s v^B(s) \mu^A(s)$  evaluates the counterfactual value function at the same baseline distribution. A positive  $\lambda$  indicates a welfare gain from the counterfactual.

The measure is standard in the macroeconomics literature (Lucas, 1987; Aiyagari, 1994; Heathcote et al., 2008) and captures the combined effect of changes in mean consumption levels and changes in risk exposure. To assess robustness and disentangle the two components, Table 8 reports three alternative measures.

**Cross-steady-state CEV ( $\lambda^{SS}$ ).** The measure compares the two ergodic steady states directly:

$$\lambda^{SS} = \left( \frac{\mathcal{W}^{BB}}{\mathcal{W}^{AA}} \right)^{\frac{1}{1-\gamma}} - 1,$$

where  $\mathcal{W}^{BB} = \sum_s v^B(s) \mu^B(s)$  uses both the counterfactual value function and the counterfactual ergodic distribution. Relative to  $\lambda$ , the measure includes the welfare effect of households re-optimizing their portfolios and durable holdings under the new policy environment.

**Lucas variance approximation ( $\lambda^{\text{Lucas}}$ ).** Following Lucas (1987), welfare costs can be approximated by

$$\lambda^{\text{Lucas}} = -\frac{1}{2} \gamma [\text{Var}(\log c^{CF}) - \text{Var}(\log c^{\text{base}})].$$

The measure isolates the *insurance* or *variance* channel, abstracting from level effects in mean consumption. It is the most conservative of the three, as it ignores portfolio reoptimization and mean wealth effects. Positive values indicate that the counterfactual reduces consumption volatility.

**Mean consumption level change ( $\Delta\bar{c}$ ).** The complement to  $\lambda^{\text{Lucas}}$  is the pure level effect:

$$\Delta\bar{c} = \frac{\mathbb{E}^B[c]}{\mathbb{E}^A[c]} - 1.$$

Together,  $\lambda^{\text{Lucas}}$  and  $\Delta\bar{c}$  decompose the total welfare effect into a risk-reduction component and a level component. When the two measures disagree in sign with the primary CEV, it signals that the level and variance effects work in opposite directions.

**Interpretation of CEV estimates.** Counterfactual CEVs combine mean-consumption and risk channels. The Lucas approximation  $\lambda^{\text{Lucas}}$  isolates the variance channel and serves as a conservative lower bound. Results in the main tables are best interpreted alongside  $\lambda^{\text{Lucas}}$  and  $\Delta\bar{c}$ .

## G.2 Additional Counterfactuals

Table 8 reports welfare decompositions for counterfactuals retained in the main text, using all four measures.

Table 8: Welfare decompositions for selected counterfactuals

Counterfactual	Welfare measures				Consumption volatility	
	$\lambda$ (%)	$\lambda^{SS}$ (%)	$\lambda^{\text{Lucas}}$ (%)	$\Delta\bar{c}$ (%)	$\sigma(\log c)$ base	$\sigma(\log c)$ CF
<i>A. Durable pricing denomination</i>						
Peso-priced durables	-11.08	-13.64	-9.84	+38.18	0.543	0.627
<i>B. Rare disaster benchmark</i>						
Barro-style rare disaster benchmark	-0.40	-0.34	+0.80	-2.13	0.543	0.535

*Notes:*  $\lambda$  is the ex-ante CEV at the baseline ergodic distribution (primary measure, (5.1)).  $\lambda^{SS}$  is the cross-steady-state CEV.  $\lambda^{\text{Lucas}} = -\frac{1}{2}\gamma[\text{Var}(\log c^{CF}) - \text{Var}(\log c^{\text{base}})]$  isolates the variance channel only.  $\Delta\bar{c} = \mathbb{E}^B[c]/\mathbb{E}^A[c] - 1$  captures the pure mean consumption level effect. Positive values indicate a welfare gain in the counterfactual economy. All experiments use estimated baseline parameters. Row A uses a modified model in which the durable purchase and sale price is denominated in pesos rather than dollars, so that the peso cost of durables does not co-vary with the exchange rate. Dollar savings still bear exchange-rate risk. Row B reports a Barro-style rare-disaster benchmark: a low-probability tail event in the spirit of Barro (2006), implemented here as a large exchange-rate depreciation.

**Peso-priced durables.** In the counterfactual, the peso price of durables is fixed and does not respond to exchange-rate movements; dollar savings continue to bear exchange-rate risk. The estimate  $\lambda = -11.08\%$  indicates a welfare loss from removing dollar pricing in the model. The decomposition remains informative: while  $\Delta\bar{c}$  is positive, consumption risk rises and the Lucas component is negative, consistent with the loss of the denomination hedge. Quantitatively, components in the decomposition should be interpreted with caution because they are sensitive to model fit and to how portfolios re-optimize across regimes.

**Barro-style rare disaster benchmark.** The rare-disaster row implies a small negative CEV. In the model, the welfare effect remains modest because the low arrival rate keeps the tail event from dominating stationary behavior. The decomposition indicates that mean-consumption losses outweigh a modest volatility reduction, which leaves a net welfare loss close to zero in magnitude.

**Distributional incidence.** The distributional incidence of both counterfactuals is a natural object of interest: for the restricted dollar saving experiment, it reveals whether dollar access disproportionately benefits wealthier households (who hold more dollar assets) or poorer households (who may rely on dollars as a precautionary buffer); for the higher adjustment cost experiment, it shows which households bear the largest burden from durable illiquidity. A careful welfare decomposition by wealth quintile requires a reliable mapping between the model’s wealth distribution and the CEV formula, which in turn depends on the model’s ability to match the empirical wealth distribution. Given the current model fit limitations discussed in Section 4, distributional welfare estimates are deferred to future work with a richer model specification.

### G.3 Exchange-rate welfare accounting from GIRFs

To complement the stationary welfare comparisons, I compute event-level welfare from GIRFs using the method described in Section 4.5. The GIRF-based welfare object captures the consumption-equivalent cost of a single depreciation episode and its transition dynamics. It is distinct from the stationary CEVs, which compare ergodic distributions; the GIRF measure isolates the dynamics following a specific shock, integrated from the ergodic distribution of initial states.

The method constructs shocked and unshocked paths using common future innovations, computes the finite-horizon consumption-equivalent difference along each path, and averages across initial states. I then scale by an assumed quarterly arrival probability  $\pi_q$  to convert the event-level cost into an annualized flow-equivalent welfare measure.

For a one-standard-deviation depreciation ( $1\sigma_e$ ), the event-level CEV is 0.51%. Under  $\pi_q = 0.10$  (roughly once every 2.5 years), the estimate maps into 0.05% per quarter, or approximately 0.20% annualized. The estimate places recurrent exchange-rate risk above the typical welfare cost of U.S. business cycles (0.05–0.1%; Lucas, 1987; Imrohoroğlu, 1989) but well below the stationary welfare effects of removing dollar pricing or restricting dollar access. The ordering is intuitive: the household can partially self-insure against individual shocks through the portfolio, but cannot undo the structural consequences of removing the hedging instrument entirely.

## H Comparative statics

The following figures vary each structural parameter one at a time, holding all others fixed at their estimated values, and trace the response of all five moments: mean durable duration, mean and variance of the durable wealth share, mean dollar share, and dollar-share volatility. The exercise provides a visual check on identification and on the model's internal consistency.

**Resale haircut  $f$ .** Higher  $f$  widens the inaction region: households tolerate larger deviations from their target before paying the adjustment cost, raising duration and increasing durable wealth concentration. The dollar share rises in tandem, reflecting the stronger precautionary motive to hold dollar assets when replacement becomes more costly. The complementarity between  $f$  and the dollar share underpins the identification of the resale haircut in the SMM.

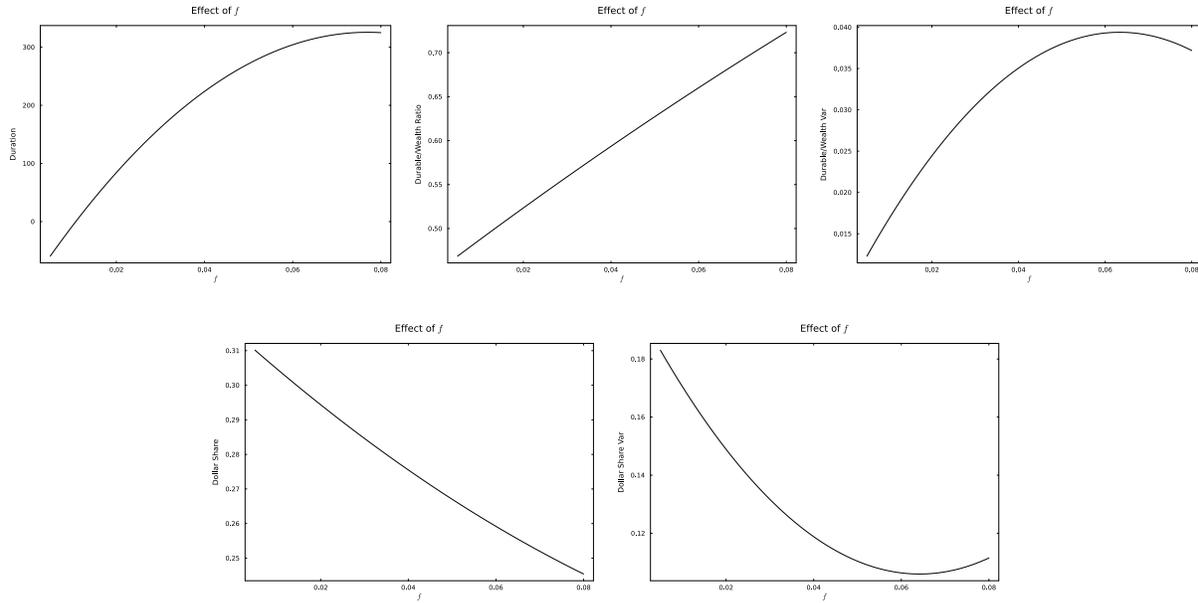


Figure 12: Comparative statics: resale haircut  $f$

**Portfolio wedge  $\kappa$ .** Higher  $\kappa$  raises the cost of holding dollar assets, directly reducing the equilibrium dollar share and its cross-sectional dispersion. Effects on durable moments are indirect: by weakening the hedging channel, a higher wedge alters the timing and size of durable adjustments, shifting duration and the durable wealth distribution.

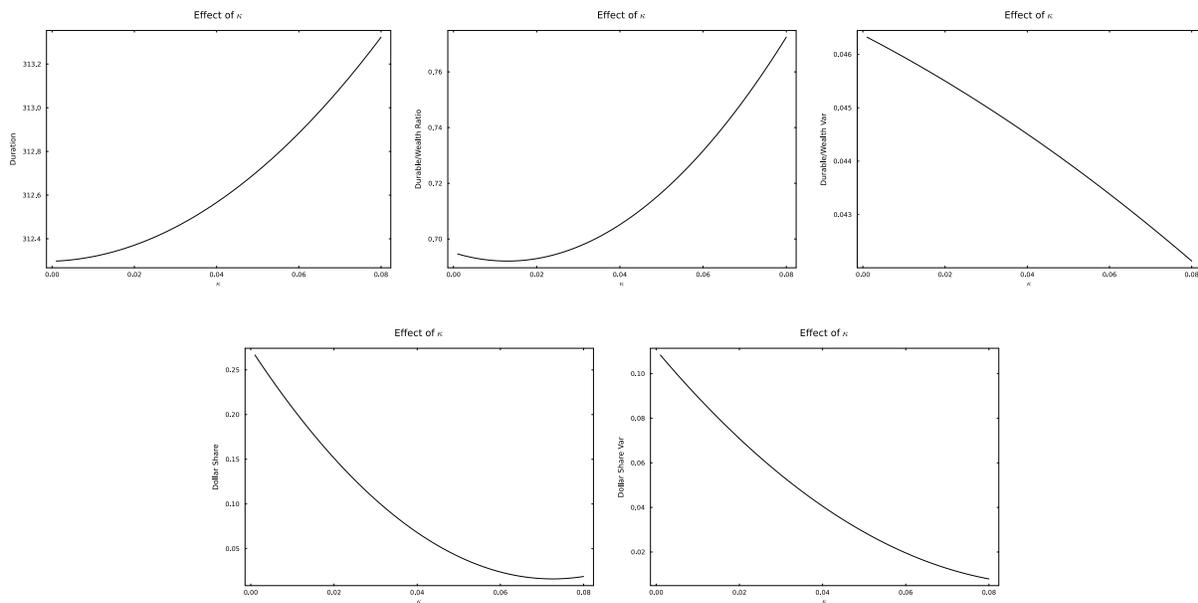


Figure 13: Comparative statics: portfolio wedge  $\kappa$

**Exchange-rate volatility  $\sigma_e$ .** Greater exchange-rate uncertainty strengthens the hedging motive, raising the equilibrium dollar share and its volatility. Durable moments respond through the pass-through channel: higher  $\sigma_e$  increases the variance of the local-currency replacement cost, widening the inaction region and lengthening duration.

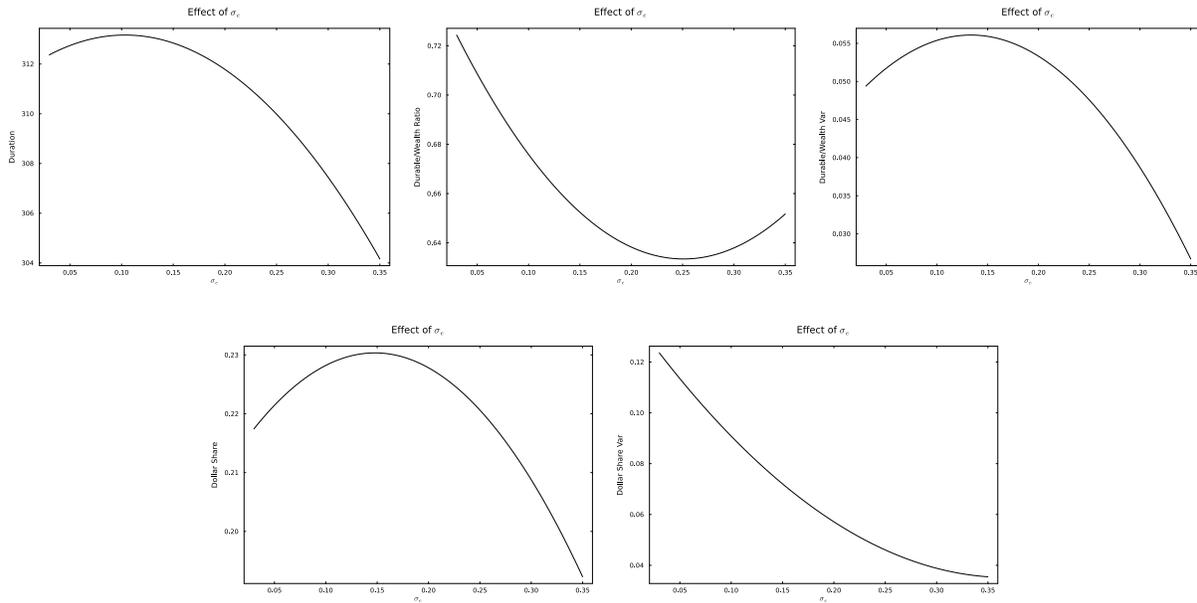


Figure 14: Comparative statics: exchange-rate volatility  $\sigma_e$

**Depreciation rate  $\delta$ .** Faster depreciation mechanically shortens durable tenure and raises the durable investment rate by compressing the effective life of each durable purchase. Portfolio moments respond indirectly: a higher  $\delta$  increases the frequency of adjustment episodes, which in turn shifts the demand for dollar assets as a hedge against replacement costs.

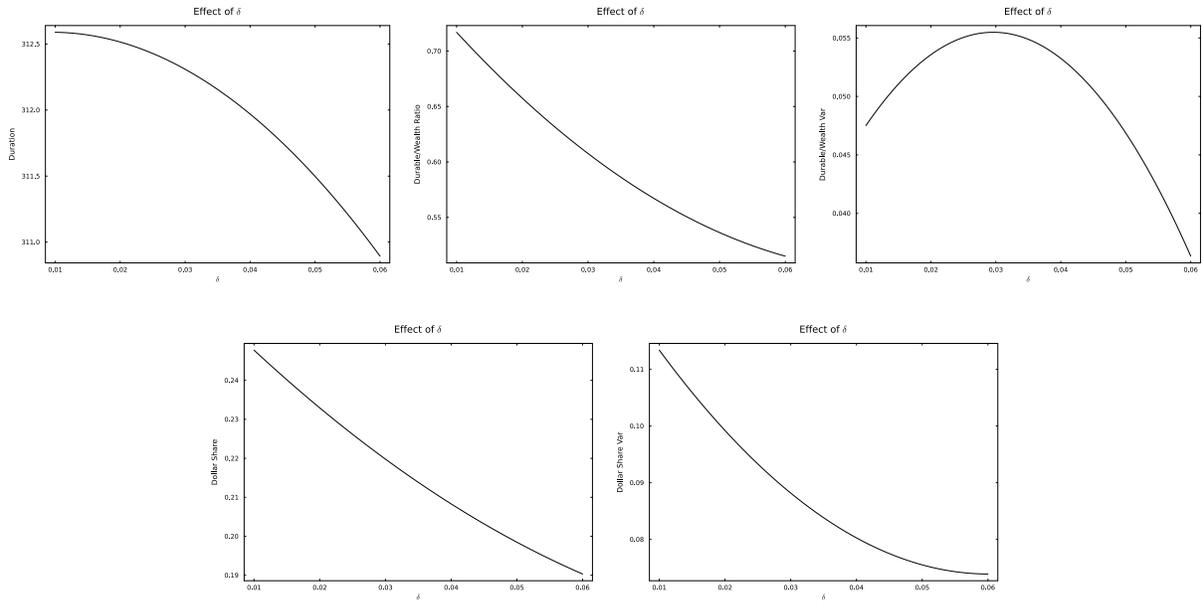


Figure 15: Comparative statics: depreciation rate  $\delta$