2. Mortgage finance and money in a Benigno framework

This chapter reconstructs the analysis developed in the 13 September 2026 discussion of the mortgage securitisation manuscript, using the household portfolio structure of Chapter 4 of Benigno (2025). The central comparison is between two economies with the same mortgage contracts and real allocation, but different arrangements for holding the mortgages. When households are satiated in liquidity, a bank deposit and a non-liquid mortgage security with the same safe payoff can be held interchangeably at the margin. Mortgage retention can then change measured bank money without changing mortgage credit or the underlying allocation.

The earlier discussion proposed this equivalence as a benchmark, rather than solving a complete model of borrowers and housing. We preserve that distinction here: the result is a conditional implementation argument, starting from a feasible equilibrium and changing its financial implementation. It does not establish existence or uniqueness of a housing equilibrium, or a causal effect of securitisation in the data. The broader critique and research plan are in Mortgage finance regimes and money.

2.1 Sources and relation to Benigno

The original analysis was the final exchange in *Paper critique request*, dated 13 September 2026, in response to the suggestion that households might be indifferent between deposits and mortgage securities if deposits paid interest. It used the Chapter 4 materials in the Monetary-Economics teaching repository. For this reconstruction, the household conditions and intermediary backing requirements were also checked against the locally supplied book chapter, especially printed pages 96–100 and equations (4.1)–(4.11). The original exchange and a provenance note are retained locally under `source-material/benigno-mortgage-regimes/`.

Benigno's household receives liquidity services from public liabilities and privately issued safe debt. In his notation, the liquidity argument is $(B_t + S_t)/P_t$. Here we use D_t for the privately issued liquid claim, interpreted as bank deposits, and reserve S_t for mortgage securities that supply no liquidity services in the baseline. This is a modification of Benigno's model, not a claim that his Chapter 4 directly models mortgage securitisation.

The distinction between statistical money and liquidity services must also remain explicit. Excluding MBS from a monetary aggregate does not itself prove that they supply no collateral or liquidity services. Their exclusion from the utility function is an economic assumption that we can later relax.

2.2 Assets, timing, and the household problem

Let t denote the date at which assets are acquired at par and $t + 1$ their payoff date. For the baseline, mortgages are one-period nominal claims that repay principal and interest without default. Long-term mortgages, prepayment risk, and maturity transformation are left for extensions.

Symbol	Meaning
B_t	Liquid public claims held by savers
D_t	Bank deposits held by savers
S_t	Mortgage claims held outside banks, directly or through pass-through securities
L_t	Total mortgage principal outstanding after settlement

Symbol	Meaning
θ_t	Fraction of mortgage principal retained by banks
P_t	Price of the consumption good
$i_t^B, i_t^D, i_t^S, i_t^M$	Net nominal returns on public claims, deposits, MBS, and mortgages, agreed at t

There are borrowers or homebuyers and savers or investors. The house seller may belong to the saver group. Keeping these roles distinct avoids making the mortgage merely a representative household's loan to itself. The household problem below describes savers; a complete borrower and housing block remains to be specified.

Savers have preferences

$$E_0 \sum_{t=0}^{\infty} \beta^t [C_t + V(q_t)], \qquad q_t = \frac{B_t + D_t}{P_t}, \qquad 0 < \beta < 1.$$

The liquidity function is concave and differentiable, with $V_q(q) > 0$ below a satiation level $\bar{q}$ and $V_q(q) = 0$ for $q \geq \bar{q}$. Consumption is linear in utility, as in Benigno's equation (4.1). Mortgage securities enter the budget but not V.

Write the saver budget as

$$\begin{aligned} P_t C_t + B_t + D_t + S_t = A_t &+ (1 + i_{t-1}^B) B_{t-1} \\ &+ (1 + i_{t-1}^D) D_{t-1} + (1 + i_{t-1}^S) S_{t-1}. \end{aligned}$$

Here A_t is net nominal nonfinancial receipts, including endowment income, net house-sale receipts, and transfers less taxes. It is a defined residual for those transactions, not an additional security or a source of newly created wealth. In the implementation comparison, these receipts and the associated real transactions remain the same. Holdings are nonnegative and the household faces the usual intertemporal feasibility and terminal conditions. Bank equity is zero in the baseline; its financing and dividends must enter this budget when equity is introduced.

For interior consumption, the multiplier on the nominal budget is $\lambda_t = 1/P_t$. Consequently, the nominal stochastic discount factor is

$$\tilde{R}_{t,t+1} = \beta \frac{P_t}{P_{t+1}}.$$

Define the marginal liquidity value

$$\varrho_t = V_q\left(\frac{B_t + D_t}{P_t}\right).$$

The nonnegative portfolio choices imply

$$\begin{aligned} 1 &\geq \varrho_t + E_t[\tilde{R}_{t,t+1}(1 + i_t^D)], \\ 1 &\geq E_t[\tilde{R}_{t,t+1}(1 + i_t^S)], \\ 1 &\geq \varrho_t + E_t[\tilde{R}_{t,t+1}(1 + i_t^B)]. \end{aligned}$$

Each inequality is an equality when the corresponding asset is held in a positive quantity. Equivalently, its slack multiplied by the asset holding is zero. This complementary-slackness formulation matters because the pure-retention economy has $S_t = 0$, while the pure-sale economy has $D_t = 0$. We should not assume positive holdings of both assets when describing either endpoint.

2.3 The liquidity premium and interest on deposits

When deposits and mortgage securities are both held, subtracting their first-order conditions gives

$$E_t[\tilde{R}_{t,t+1}(i_t^S - i_t^D)] = \varrho_t.$$

The promised nominal rates are known at t, so this can also be written

$$i_t^S - i_t^D = \frac{\varrho_t}{E_t \tilde{R}_{t,t+1}}.$$

Under a constant price level,

$$\beta(1 + i_t^S) = 1, \qquad \beta(1 + i_t^D) + \varrho_t = 1,$$

and therefore

$$i_t^S - i_t^D = \frac{\varrho_t}{\beta}.$$

Households can hold deposits paying less than MBS because deposits provide liquidity services. Zero-interest deposits are therefore compatible with positive-interest MBS when the liquidity premium compensates for the return difference. For example, with $i_t^D = 0$, the conditions require $\varrho_t = 1 - \beta$ and $i_t^S = \beta^{-1} - 1$.

This answers the original question about interest-bearing deposits more precisely. Interest on deposits is not sufficient to make the two assets equivalent, and zero interest is not fatal to their coexistence. For the equal-return, constant-price satiation benchmark below, however, $\beta < 1$ implies that deposits must pay the positive return $\beta^{-1} - 1$ if they are held. Zero-interest deposits belong to a different parameterization or liquidity-premium configuration.

2.4 Liquidity satiation across both regimes

A particularly transparent sufficient condition is that savers' public claims alone provide satiation:

$$\frac{B_t}{P_t} \geq \bar{q}$$

at every date and relevant state. With heterogeneous savers, the condition must hold for each household whose deposits are replaced, not merely for an aggregate average. Then reducing deposits to zero still leaves $V_q(q_t) = 0$. The utility contribution $V(q_t)$ remains constant throughout the portfolio substitution.

Equal-payoff deposits and MBS can consequently have equal returns, with savers indifferent at the margin. At the endpoint with a zero holding of one asset, an equality in its optimality condition is permissible: the household is indifferent about acquiring that asset.

This public-liquidity assumption must be supported by a feasible common government policy. For the consolidated public sector, the analogue of Benigno's equation (4.7) is

$$B_t = (1 + i_{t-1}^B)B_{t-1} - T_t,$$

where T_t is net nominal tax revenue. The benchmark takes the same feasible public-liability, tax, and price-level paths in both regimes, including the valuation and terminal conditions that support them. It does not assert that an arbitrary supply of public liabilities fixes an arbitrary price level.

Here B_t represents public claims accessible to savers, such as short-term public debt in the model. It should not be read as an assertion that ordinary households can hold commercial banks' reserve accounts. Nor does inclusion in B_t automatically mean inclusion in an empirical money aggregate such as M2.

Benigno's Section 4.3 provides another route to satiation through competitive private issuance when backing and equity financing are feasible. We do not rely on that route here because removing private deposits in the sale regime

could otherwise remove the very supply that sustains satiation. Section 4.5, which restricts equity issuance, also shows why free entry alone should not be treated as a universal guarantee of zero liquidity premia.

2.5 Mortgage intermediation and the bank balance sheet

Assume mortgages are nominally risk-free and all intermediaries are competitive and costless. There are no capital requirements, operating costs, taxes on intermediation, origination fees, or other regulatory wedges. There is no maturity mismatch, and banks have neither equity nor other assets and liabilities in this mortgage-financing block. Savers do not borrow from banks to acquire the MBS.

After settlement,

$$L_t^B = \theta_t L_t, \qquad S_t = (1-\theta_t)L_t, \qquad D_t = \theta_t L_t.$$

The final equality follows from the restricted bank balance sheet, not from the holder's identity alone. In particular,

$$D_t + S_t = L_t.$$

For a positive retained position, zero profits require

$$(1+i_t^M)\theta_t L_t = (1+i_t^D)D_t,$$

so $i_t^M = i_t^D$. A costless pass-through security pays $i_t^S = i_t^M$. Thus the same mortgage contract can support both arrangements at

$$i_t^D = i_t^S = i_t^M.$$

If both deposits and MBS are held and freely substitutable at these returns, household optimality requires $\varrho_t = 0$. Otherwise an equal-return deposit delivers a strictly greater marginal benefit. This necessity statement concerns the equal-return interior comparison; quantity restrictions or the absence of an instrument can sustain corners outside that comparison.

The transaction sequence gives the same balance sheet. Origination creates a mortgage and deposits of L_t. The borrower pays the house seller, who can be the saver in this example. The bank sells $(1-\theta_t)L_t$ of mortgage claims to the saver in exchange for deposits of that amount. The bank extinguishes those deposits and removes the corresponding mortgage assets, leaving

$$D_t = L_t - (1-\theta_t)L_t = \theta_t L_t.$$

This is the accounting for a settled mortgage position or a new cohort from a zero initial position. In a dynamic economy with inherited loans, repayments, and new originations, the flow accounting must include all those transactions. We should not equate gross origination with a change in the outstanding mortgage stock.

2.6 Which measure of money changes

The original discussion wrote $M_t = D_t = \theta_t L_t$. To avoid treating that as a statement about every monetary aggregate, define bank deposit money explicitly:

$$M_t^{\text{bank}} \equiv D_t = \theta_t L_t.$$

If a broader statistical aggregate includes a common background component M_t^0, includes these deposits, and excludes these MBS, then

$$M_t^{\text{stat}} = M_t^0 + D_t = M_t^0 + \theta_t L_t.$$

The common component must exclude the deposits already counted in D_t. It can include any public monetary claims or other fixed components appropriate to that aggregate. This definition is illustrative, not an exact model of US M2 or an assumption that all public debt belongs in M2.

Liquidity-providing claims and total financial claims are different objects:

$$Q_t^{\text{liq}} = B_t + D_t, \qquad F_t = B_t + D_t + S_t = B_t + L_t.$$

Quantity	Full retention, $\theta_t = 1$	Full sale, $\theta_t = 0$
Mortgage credit	L_t	L_t
Deposits	L_t	0
MBS held outside banks	0	L_t
Bank deposit money	L_t	0
Illustrative statistical money	$M_t^0 + L_t$	M_t^0
Liquidity-providing claims	$B_t + L_t$	B_t
Public claims plus mortgage-related financial claims	$B_t + L_t$	$B_t + L_t$

The last row measures savers' gross claims, not aggregate net financial wealth. The private mortgage claim is matched by the borrower's liability in either regime. The quantity of liquidity-providing assets is lower under full sale, but liquidity utility is unchanged when both quantities lie above satiation.

For a partial-retention comparison with the same L_t,

$$M_t^{\text{bank}}(\theta_a) - M_t^{\text{bank}}(\theta_b) = (\theta_a - \theta_b)L_t.$$

The same difference holds for M_t^{stat} if its background component is common. A broader measure counting MBS at full face value alongside public claims and deposits would instead equal $B_t + L_t$ and would not change in this benchmark. Whether such an aggregate is economically useful is a separate measurement question.

2.7 A conditional equivalence result

Proposition. Suppose a feasible equilibrium exists with risk-free mortgages, costless competitive intermediation, the restricted balance sheets above, and public claims sufficient to satiate the affected savers in every relevant date and state. Suppose also that borrower constraints and housing-market conditions depend on mortgage contracts and real allocations, not on the identity of the mortgage holder. Public policy, initial payoff entitlements, and terminal conditions are common across the comparison. Then replacing a portion of deposit-financed bank-held mortgages with equal-payoff pass-through claims held by the same savers preserves that equilibrium's consumption, housing allocation, mortgage quantity, price paths, and returns. The replacement changes bank deposit money according to $D_t = \theta_t L_t$.

To see this, start from one such equilibrium and replace deposits of an amount δ_t with MBS of the same purchase value and state-by-state payoff. Reduce the bank's mortgage assets and deposit liabilities by the same amount. The bank remains balanced and earns zero profits. The saver's acquisition expenditure and subsequent financial receipts are unchanged because $D_t + S_t = L_t$ and the returns coincide. The saver loses no liquidity utility because public claims alone already deliver satiation. The portfolio optimality conditions therefore remain satisfied, including at zero holdings. The borrower faces the same repayment contract, and no additional intermediation resources are consumed. Public budgets, aggregate resources, and the unchanged borrower and housing conditions continue to hold.

For a dynamic implementation, inherited deposits must be replaced by claims with the same inherited payoff entitlements, so that the comparison does not introduce a wealth transfer. Changes in θ_t must be settled at the specified prices and respect nonnegative holdings. These requirements distinguish the implementation argument from merely setting two unrelated initial balance sheets side by side.

The proposition is deliberately conditional on an equilibrium of the common borrower, housing, and public-policy blocks. We have not yet specified those blocks sufficiently to calculate a house price or mortgage quantity, prove existence, or claim that every equilibrium is equivalent. The result shows that different measured deposit stocks need not require different real allocations.

2.8 A numerical accounting illustration

Take $\beta = 0.96$, a constant price level $P = 1$, public claims $B = 100$, satiation at $\bar{q} = 80$, and mortgage principal $L = 100$. The common net return consistent with satiation is

$$i = \beta^{-1} - 1 \approx 0.041667.$$

Both the full-retention and full-sale portfolios are above satiation. At retention rates 1, 0.5, and 0, deposit money is respectively 100, 50, and 0, while MBS holdings are 0, 50, and 100. The combined mortgage-related claim remains 100 and its promised next-period payoff remains approximately 104.167. Public claims plus deposits range from 200 to 100, without moving below the satiation level.

This is an illustration of the portfolio and balance-sheet equalities, not a calibration or a solved housing economy. It does not supply borrower income or tax paths that would independently demonstrate the feasibility of every chosen quantity.

2.9 Risk, equity, and departures from equivalence

No regulatory capital requirement is not the same assumption as no need for loss-absorbing capital. If mortgages are risky while deposits promise a safe nominal payoff, zero equity requires some other source of backing or a restriction on promises. The baseline avoids that issue by making mortgage payoffs risk-free. A government guarantee would require its own fiscal accounting and would have to apply consistently across the two regimes.

Benigno's equations (4.8)–(4.10) make the distinction precise. If assets worth $D_t + N_t$ have worst gross nominal return $g_t > 0$, safe deposits require

$$g_t(D_t + N_t) \geq (1 + i_t^D)D_t,$$

and hence

$$N_t \geq \max\left\{\frac{1 + i_t^D}{g_t} - 1, 0\right\} D_t.$$

Here N_t is equity financing and is distinct from a regulatory capital requirement. This is a backing condition for the specified asset portfolio, not a claim that all risky mortgages can be made safe with arbitrary leverage.

With mortgage assets alone and equity N_t, the balance sheet becomes

$$D_t + N_t = \theta_t L_t.$$

Consequently, $D_t = \theta_t L_t - N_t$ rather than $\theta_t L_t$. The household budget must include equity purchases and dividends, and both the valuation and supply of equity must be determined. Bank loans financing non-bank MBS holders would similarly add an asset category omitted from the baseline and could sustain deposits even with no mortgages retained directly.

Other extensions include scarce liquidity, partially liquid MBS, market power, origination and securitisation costs, capital regulation, pipeline funding, and borrower collateral constraints. For example, replacing q_t by $(B_t + D_t + \eta S_t)/P_t$ with $0 \leq \eta \leq 1$ makes the interior return spread proportional to $(1 - \eta)\varrho_t$. At $\eta = 1$, equally safe claims provide the same liquidity services, so their equal returns need not require satiation. These alternatives should be derived separately rather than attributed to the baseline.

An effect on house prices requires a mechanism through borrowing costs, credit constraints, risk allocation, or housing demand. An effect on residential investment additionally requires a construction or other investment margin.

The earlier result supplies the benchmark against which those mechanisms can be evaluated: the same mortgage credit and real allocation can coexist with different measured bank money.

2.10 Work remaining

The immediate task is to specify the common borrower and housing block and a supporting fiscal and monetary policy, rather than to rederive the deposit identity. We should then verify which parts of the implementation argument survive with realistic mortgage risk and bank equity. The empirical mapping should follow only after deciding which model liabilities correspond to the monetary aggregate being measured.

This chapter reproduces the earlier argument with explicit notation, boundary conditions, and qualifications. The distinctions between bank money and other liquid claims, the endpoint portfolio inequalities, and the conditional nature of the equilibrium claim are clarifications added during reconstruction.