Gow and Kells

Research notes and work in progress

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Preface

This book brings together research notes and work in progress by Ian Gow and Stuart Kells. It provides a place to develop arguments, work through models and derivations, and connect empirical evidence to the questions being studied.

The title and chapter structure are provisional. Chapters will be added as the work develops.

1. Mortgage finance regimes and money

We are developing a comparison of otherwise-identical economies in which mortgages are either retained by banks or sold to non-bank investors. The initial objective is to establish precisely how the financing arrangement changes monetary claims, holding the mortgage transaction fixed. We will then introduce portfolio choice and market clearing to examine whether the arrangements imply different lending quantities, interest rates, house prices, or investment.

These notes carry forward the analysis of *Securitisation_destroys_money_draft_130926_revised_v3_sent to Ian_.docx*, dated 13 September 2026. They provide a starting point for rebuilding the paper, rather than a completed model or a set of established empirical results. The historical estimates discussed below are those reported in that manuscript; they have not been independently reproduced here.

1.1 Research question and contribution

The question is how the organization of mortgage finance affects the composition of financial claims and, under specified economic mechanisms, real allocations. Three objects must be kept separate: the monetary effect of a transaction, the distribution of outstanding mortgage claims across institutions, and the equilibrium consequences of changing the financing regime.

The familiar accounting result is conditional. A bank originates a mortgage by creating a deposit. If it subsequently sells that mortgage at par to a non-bank investor paying with an existing deposit, the sale offsets the deposit created at origination. Mortgage credit rises while aggregate deposits return to their initial level. This is an application of standard asset-sale accounting, not a new mechanism of money creation or destruction. The Bank of England's account of money creation provides a useful reference.

The original critique raised four concerns that motivate the reconstruction:

1. The abstract should state the conditional accounting result plainly and distinguish it from the proposed contribution.
2. The paper should identify what it measures. Mortgage holdings are not a direct measure of money destroyed or of the money stock in an alternative regime. US evidence can document a historical allocation, but does not by itself identify the effect of a regime change.
3. A complete model should include households choosing among deposits, mortgage securities, and bank equity, together with budget constraints and market clearing.
4. Claims about investment and house prices require additional economics. A clean comparison of otherwise-identical regimes should precede those claims.

A plausible descriptive contribution is to reconstruct the allocation of US mortgage claims between depositories, the Federal Reserve, and other investors. The theoretical contribution would explain when that allocation maps into different monetary aggregates and when a change in financing arrangements affects economic outcomes. Neither contribution should be presumed established at this stage.

1.2 A fixed-quantity accounting benchmark

Begin with borrowers, house sellers, savers, and banks. Hold initial portfolios, initial bank equity, the mortgage contract, the house transaction, and policy arrangements fixed. Savers may hold deposits, mortgage securities, and bank equity or bonds. The initial comparison holds bank equity and non-deposit bank debt unchanged and assumes sufficient capital for both arrangements.

Let the mortgage principal be L. Assume origination and sale at par, no defaults, no fees, no additional bank lending to the securities investor, and no offsetting repayment of other bank loans. The saver initially has at least

L in deposits. All deposits in this benchmark belong to the chosen money aggregate. Begin without central-bank mortgage purchases or changes in currency holdings.

1.2.1 Bank retention

The bank originates the mortgage and credits the borrower with a deposit of L. The borrower pays the house seller. Payment may redistribute reserves between banks, but does not change aggregate deposits. The banking system ends with an additional mortgage asset and an additional deposit liability of L.

1.2.2 Sale to a saver

Origination and payment to the seller proceed in the same way. The bank then sells the mortgage, or a pass-through claim on it, to the saver for L. The saver pays with an existing deposit. At the consolidated banking-system level, mortgage assets and deposit liabilities both fall by L relative to the position immediately before the sale.

The seller has received the same payment and the borrower has the same debt in both regimes. The difference is in the saver's portfolio and the banking system's balance sheet.

Object after the completed sequence	Bank retention	Sale to saver
Borrower's mortgage debt	Increases by L	Increases by L
Seller's deposit receipt	L	L
Saver's portfolio	Keeps deposit	Exchanges deposit for mortgage claim
Banking-system mortgage assets	Increase by L	No net change
Aggregate deposits	Increase by L	No net change

The accounting comparison establishes a difference in financial claims for the same specified transaction. It does not establish that households would willingly hold both resulting portfolios at the same prices, or that either allocation is an equilibrium. It also establishes no necessary difference in house prices, consumption, or investment.

We can call the second arrangement *money-neutral mortgage lending* within this benchmark. The term should not be used as an unconditional description of mortgages held by non-banks.

1.3 Why the holder alone is insufficient

Let D^B and D^C denote mortgage claims held by banks and the central bank. Let M denote the monetary liabilities included in the model, K the consolidated monetary sector's equity and specified non-monetary liabilities, and X its remaining net assets, excluding items already assigned to K. Consolidation eliminates reserves and central-bank lending to banks. With consistent definitions and valuations,

$$M + K = D^B + D^C + X,$$

and therefore

$$\Delta M = \Delta D^B + \Delta D^C + \Delta X - \Delta K.$$

This identity is useful, but holding X and K fixed is a substantive restriction. The following examples illustrate its importance. Each begins with a new $100 mortgage, assumes transactions at par, and abstracts from other changes.

Completed sequence	Final mortgage holder	Net deposit creation
Bank originates and retains mortgage	Bank	$100
Bank originates and sells to an investor using existing deposits	Non-bank	$0
Bank retains mortgage and issues $100 of bank bonds purchased with deposits	Bank	$0
Bank sells mortgage to a non-bank financed by a new $100 bank loan	Non-bank	$100

The third case operates through K and the fourth through X. Both are consistent with the identity. Neither is consistent with an unconditional claim that the mortgage holder determines how much money survives. A house seller's repayment of another bank loan provides another possible offset to deposit creation.

Deposits are fungible. An outstanding mortgage does not identify an outstanding deposit descended from its origination. Mortgage ownership must be considered alongside the financing chain and other balance-sheet adjustments.

A further distinction concerns transactions and changes in stocks. Write-offs, valuation changes, and reclassifications can change recorded mortgage holdings without creating or destroying deposits. For example, a write-off can reduce mortgage assets and equity together. The Financial Accounts series documentation explicitly distinguishes transactions, revaluations, and other changes in volume.

1.4 From accounting to equilibrium

The next stage should retain the same preferences, endowments, technology, borrower risk, mortgage cash flows, and policy rule across economies, while changing the permitted arrangement for holding mortgages. Equilibrium portfolios, rates, and quantities should then be allowed to adjust. Holding these endogenous outcomes fixed would return us to the accounting exercise.

The framework should include the following elements:

- **Households and portfolios.** Distinguish borrowers, sellers, and savers. Give each a budget constraint. Savers choose deposits, mortgage securities, and bank equity or bonds. Specify the liquidity services provided by deposits and the risk and return of alternative claims.
- **Mortgage demand.** Specify how borrowing depends on rates, income, collateral, and any borrowing constraints. Avoid assuming the same mortgage quantity once the model is used to evaluate equilibrium effects.
- **Banks.** Specify profits, liability costs, capital requirements, and the choice of origination and retention. Household purchases of bank equity must be part of the accounting if equity is endogenous.
- **Securities investors.** Determine demand for mortgage claims and the price at which originators can sell them. A take-out market cannot be treated as having unlimited capacity at an exogenous price without stating that assumption.
- **Timing.** Include a positive interval between origination and sale when studying origination capacity or stress. A bank that ultimately sells every mortgage still carries a pipeline.
- **Policy and market clearing.** Use a common monetary-policy rule and explicit clearing conditions for deposits, securities, bank equity, and mortgage credit.

The earlier analysis using Benigno (2025), Chapter 4, is reproduced in Mortgage finance and money in a Benigno framework. That chapter derives the liquidity premium and the conditional equivalence of mortgage-finance regimes under liquidity satiation. The remaining task is to complete the borrower, housing, and policy blocks and examine departures from that benchmark.

Initially, keep guarantees and the distribution of mortgage payoffs identical across arrangements. Comparing an unguaranteed whole loan with a government-guaranteed agency security changes risk and public support alongside the financing regime. Such differences can be introduced later as separate mechanisms.

The first equilibrium question is whether the change in financing arrangements can be absorbed by portfolio and price adjustments with the same real allocation. If not, the model should identify the friction responsible. Candidate mechanisms include liquidity services, capital constraints, risk-bearing capacity, and origination costs. The signs of effects on lending and housing should follow from these mechanisms rather than from the deposit entries alone.

1.5 Capital capacity and lender risk

The draft's capital constraint provides a useful starting point, but a relaxation of a constraint does not itself prove that lending increases. That requires borrower demand, investor demand, profitable lending opportunities, and a constraint that actually binds.

Selling a mortgage can release regulatory capital capacity without creating equity. The result that origination capacity becomes unbounded as retention approaches zero reflects omitted constraints, including the cost and capital required to carry loans before sale. A model with a positive holding interval should account for that inventory explicitly.

Banks create deposits at origination, but still face the cost and availability of maintaining a viable liability structure after payments leave the bank. Aggregate accommodation of reserve demand is not an unconditional guarantee of liquidity to each bank. Federal Reserve lending depends on eligibility and collateral; see lending to depository institutions.

The useful distinction between banks and non-bank originators concerns access to deposit funding, public liquidity support, and the structure of liabilities. It does not divide lenders into banks bearing only credit risk and non-banks bearing only liquidity risk. Banks may be unable to retain an unexpectedly large unsold pipeline; non-banks also bear credit, valuation, and operational risks.

Stress analysis must trace both sides of balance sheets. A warehouse draw can create a bank claim on an originator in X without raising measured mortgage holdings in D^B. A bank's absorption of assets together with their existing liabilities need not create deposits. A securities seller may use purchase proceeds to repay bank borrowing. These cases qualify any interpretation of asset migration as automatic re-monetisation.

1.6 Empirical measurement

The draft's monetary retention series should initially be treated as a mortgage-holdings measure. Its interpretation as a monetary measure requires a separate reconciliation.

The estimated monetary-sector mortgage holdings are

$$\hat{D}^m = W + (Z^B + Z^C)\frac{P}{Z},$$

where W is whole mortgages held by depositories, P is home mortgage credit in agency pools and on GSE balance sheets, Z is total agency and GSE-backed securities, and Z^B and Z^C are holdings of those securities by depositories and the Federal Reserve. The allocation applies the same mortgage proportion to each holder's agency securities.

The principal measurement issues are:

1. **The monetary boundary.** Currency and deposits held by the model's non-bank sector do not coincide automatically with US M2. M2 includes retail money-market-fund shares and excludes some bank liabilities and holders' balances. A purchase through a retail money fund requires tracing fund shares as well as deposits. Use the H.6 definitions appropriate to the chosen data vintage.
2. **Instrument composition.** Agency debt is not the same as a pass-through mortgage claim. Holder portfolios may differ substantially. Use direct MBS holdings where available and distinguish them from general agency debt.
3. **Stock and transaction reconciliation.** Separate transactions from write-offs, valuation changes, and reclassifications, especially around crises and accounting changes.

4. **Missing holdings and claimed bounds.** Omitting private-label securities held by banks understates the measured holdings level, but does not necessarily understate its change. An error at both endpoints has no predetermined effect on the difference. Multiple errors with opposite signs do not establish a general upper or lower bound.
5. **Counterparties and financing.** Foreign-official balances, bank-financed securities purchases, and liability adjustments affect the monetary interpretation. Holdings alone cannot establish the transaction path.
6. **Incremental ratios.** A ratio above 100 percent can reflect purchases of existing claims relative to a small net increase in total mortgage debt. It is not a share of newly originated mortgages retained. Show dollar changes alongside ratios.

The reported $1.87 trillion and $5.93 trillion additions to 2007 M2 are accounting sensitivity calculations, not alternative histories. They change assumed retention while holding mortgage quantity and other counterparts fixed. For retention regime R and sale regime S, the general comparison is

$$M_R - M_S = (D_R^m - D_S^m) + (X_R - X_S) - (K_R - K_S).$$

The draft suppresses the last two differences in its counterfactual. An equilibrium comparison must determine them along with mortgage quantity and prices.

US data can support a descriptive account of changes in mortgage ownership. Comparing long windows of mortgage growth and M2 relative to GDP does not identify the causal effect of securitisation. Cross-country evidence could provide additional variation, but would require addressing differences in regulation, guarantees, monetary policy, and housing supply.

1.7 Housing prices and investment

A zero net change in deposits does not imply that no house purchase occurred. It also does not imply a particular effect on house prices. The same house purchase could be financed by a retained bank mortgage, a mortgage sold to a saver, or direct lending from an investor's existing deposits.

The relevant question is whether the regime changes borrowing costs, access to credit, leverage, risk allocation, or desired portfolios. Gross mortgage originations are not themselves a measure of bids for existing houses: they include refinancing and other uses, while house purchases also involve down payments and cash buyers.

Purchases of existing houses transfer assets; they do not themselves constitute new residential investment. To study investment, add a construction sector or another explicit investment margin. To study house prices with a fixed housing stock, specify household housing demand and market clearing.

CPI excludes the purchase of the housing asset but measures housing services through rents and owners' equivalent rent. Mortgage-market developments can affect those services and other consumption prices indirectly. See the BLS explanation of rent and rental equivalence.

The analogy between mortgage securities and government bonds should remain a possible extension. Their substitutability depends on risk, liquidity, guarantees, and investor preferences; it does not follow from similar deposit entries. Likewise, the creation of dollar deposits does not negate foreign saving or international capital flows, which describe a different aspect of the transactions.

1.8 Next steps

1. Write complete sectoral balance sheets and transaction accounts for the fixed-quantity benchmark, including households' holdings of bank equity.
2. Choose a minimal monetary and portfolio model and define both regime equilibria with the same fundamentals and policy rule.
3. Derive the conditions for identical real allocations and identify the friction needed for any departure from that benchmark.
4. Add capital constraints and origination-to-sale timing; introduce housing supply only when turning to investment.
5. Reconstruct the mortgage-holdings series with documented instruments, sectors, units, and data vintages. Reconcile stock changes with transactions before interpreting monetary effects.

6. Rewrite the abstract and empirical claims around the results actually established. Keep accounting identities, descriptive measures, causal evidence, and equilibrium predictions distinct.

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.

3. Research notes

This chapter is a placeholder for research questions, draft arguments, derivations, and empirical analysis.