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Securitization, Bank Regulation, and the Macroeconomy

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Abstract

We develop a general equilibrium framework in which a commercial banker, constrained by capital adequacy requirements, creates a special purpose vehicle (SPV) to hold securitized assets off its balance sheet. By operating the bank and SPV as separate entities, the banker circumvents regulation, creating a gap between *de jure* and *de facto* statutory capital ratios. We quantify this gap. Our model integrates loan-to-value ratio and collateral constraints, together with credit default risk, to examine the dynamic interactions between the real and financial sectors, both with and without securitization, over business cycle. We find that securitization is expansionary, promotes regulatory arbitrage, increases off-balance-sheet lending under tighter regimes, amplifies credit risk, and enhances welfare in the steady state. Securitization becomes a prominent tool in bypassing stricter regulations, such as high capital requirements or tight loan-to-value caps. Our results call for robust oversight of securitization to preserve the integrity of capital regulation.

Keywords: Financial crisis; securitization; special purpose vehicles; DSGE models; credit risk.
JEL numbers: E32, E44, G2.

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1. Introduction

Traditionally, Dynamic Stochastic General Equilibrium (DSGE) macroeconomic models incorporating the banking system have primarily concentrated on the retail banking sector, where banks collect deposits from households and extend loans to both firms and households. The main focus of the analysis was on the implications of credit constraints faced by nonfinancial borrowers, which constrained spending on durable goods for production. Notable models in this category include those by Bernanke and Gertler (1989); Bernanke et al. (1996, 1999); Kiyotaki and Moore (1997); Iacoviello (2005); and Monacelli (2009), among others. Bernanke and Gertler (1989) use an overlapping generations framework where the economy comprises households and entrepreneurs. Households allocate their resources between lending to entrepreneurs or saving, each offering a return. Financial frictions in their model generate fluctuations in output. In the "financial accelerator" model by Bernanke et al. (1996, 1999), credit market conditions amplify economic shocks. Kiyotaki and Moore (1997) explore the role of collateral in loan dynamics, whereas Iacoviello (2005) analyzes the impact of housing collateral on housing demand in response to house price shocks. Monacelli (2009) models the role of collateral constraints, where borrowing is constrained by asset values. These constraints act as a form of nominal rigidity, generating a financial accelerator effect: when asset prices fall, collateral values decline, credit tightens, investment decreases, and recessions are amplified.

However, the Global Financial Crisis (GFC) of 2007–2008 introduced significant new challenges. Financial institutions faced severe credit constraints, not only in retail markets but also in interbank and broader non-bank wholesale markets. This was particularly critical for the banking sector, which operates with high leverage and relies heavily on short-term debt that often mature within months, days, or even overnight.[1] When these obligations matured, many banks were unable to roll them over, triggering a liquidity crisis. This crisis was further exacerbated by the mass withdrawal of funding by lenders and the simultaneous collapse of the mortgage-backed securities market, which deepened the instability across financial institutions. The banking turmoil and tightening credit conditions led to the most prolonged and severe post-WWII recession across industrialized nations. Reinhart and Rogoff (2009) label the GFC as the 'Second Great Contraction', following the Great Depression of the 1930s.

In the aftermath of the GFC, DSGE models have gradually evolved to incorporate more nuanced representations of banking, including shadow banking systems, and to analyze the macroeconomic effects of credit market frictions, particularly in the context of the GFC and their implications for financial regulation and the design of macroprudential policies. Notable works in this field include Dib (2010); Gerali et al. (2010); Gertler and Kiyotaki (2010, 2011); Del Negro et al. (2013); Angellini et al. (2014); Meeks et al. (2017); and Feve et al. (2019), among others.

Dib (2010) models a two-tier banking system comprising saving banks—which collect deposits and lend to lending banks—and lending banks, which extend credit to entrepreneurs and in-

[1] Until the mid-19th century, banks typically held equity as high as 40–50% of their total assets, declining to around 25% by the early 20th century. By the early 1990s, equity levels had dropped further to 6–8%, and fell as low as 2–3% for major banks worldwide leading up to the GFC. This sharp decline in equity, combined with a heavy reliance on debt, meant that the sudden freeze in credit markets quickly pushed many banks into insolvency. Admati and Hellwig (2013) offer a rigorous analysis of these structural fragilities within the banking sector.

vest in government bonds. Lending banks are subject to an 8% Basel II capital requirement, which constrains credit supply. He shows that an active banking sector amplifies supply-side shocks (e.g., technology, investment efficiency) on output and capital, while dampening demand-side and financial shocks, particularly those related to risk. Gerali et al. (2010) examine an imperfectly competitive banking system where bank balance-sheet constraints are tied to the business cycle. They find that shocks to the banking sector contributed to the output decline in the euro area in 2008. Gertler and Kiyotaki (2010) model bank balance sheet constraints and their effects on credit supply, whereas in Gertler and Kiyotaki (2011) lending is constrained by collateral requirements. Angellini et al. (2014) examine the interaction between countercyclical capital requirements and monetary policy transmission. They find that countercyclical capital regulation effectively mitigates the impact of financial shocks, helping to smooth the business cycle. Meeks et al. (2017) examine the interaction between commercial and shadow banks in the ABS market during the GFC, assuming that ABS—standardized, tradable, and diversified—offer superior collateral to on-balance-sheet loans. On the macroprudential policy front, they find that government lending to shadow banks via ABS purchases is substantially less effective than direct asset purchases. Similarly, Feve et al. (2019) explore the macroeconomic effects of shadow banking, including its influence on macroprudential policy. They find that shadow banking amplifies most economic shocks, heightens overall volatility, and undermines the effectiveness of policies targeting only traditional banks.

Post-GFC developments in the DSGE framework have significantly advanced the integration of the financial sector. However, the role of securitization in circumventing statutory capital adequacy requirements, widely acknowledged as a key contributor to the crisis, remains largely unaddressed.[2] Securitization undermined the regulatory framework and exacerbated financial instability (Eggert, 2009; Coval et al., 2009; Acharya and Richardson, 2009; Acharya et al., 2013; Blinder, 2013; Admati and Hellwig, 2013), and has been dubbed the primary driver of the Global Financial Crisis (Financial Crisis Inquiry Commission, 2011).[3]

The investigation of this issue is particularly timely, given that the Basel III Endgame proposals—more than a decade in development in response to the shortcomings revealed by the GFC—recommend a statutory capital adequacy ratio of 10–15% of Risk-Weighted Assets (RWA) for banks, together with stricter regulatory oversight and enhanced capital requirements for securitization exposures. However, their implementation has been significantly delayed and remains incomplete, largely due to sustained lobbying by large banks and other vested interests.[4]

We seek to address this gap by examining the role of securitization in circumventing statu-

[2]While a sizable empirical literature has explored the effects of securitization on market liquidity, risk transfer, and capital access (Loutskina, 2011; Acharya et al., 2013; Chen and Lu, 2018, to name but a few), its analysis within a general equilibrium framework remains limited.

[3]The notoriety of securitization and special purpose vehicles (SPVs) vis-à-vis Enron's collapse is well-documented (Litan, 2002; Powers et al., 2002; Healy and Palepu, 2003, among others). In principle, securitization and SPVs are widely recognized as significant advancements in financial engineering. They are perceived as facilitating risk diversification, enhancing liquidity, and improving access to capital across various sectors, including housing, mortgages, and corporate financing. SPVs, in particular, enable the separation of risk and capital requirements, contributing to more efficient financial management (Mian and Sufi, 2009; Gorton and Metrick, 2012; Acharya et al., 2013). However, the misuse of SPVs (Admati and Hellwig, 2013) has led to their disrepute.

[4]Lobbying by global banks—including JPMorgan Chase, Citigroup, Bank of America, BNP Paribas, HSBC, and

tory capital adequacy requirements and undermining macroprudential policy, drawing inspiration from Gertler and Kiyotaki's (2010) seminal work on credit market frictions and macroeconomic dynamics during the GFC. We extend the analysis to a framework in which a commercial banker, subject to a statutory capital adequacy requirement, establishes a Special Purpose Vehicle (SPV). The banker manages the structure as a universal bank, with the commercial bank and SPV operating as distinct entities. Since the SPV holds securitized assets off the commercial bank's balance sheet, it functions as an investment bank, effectively allowing the commercial bank to circumvent capital adequacy regulations. This creates a divergence between the *de jure* and *de facto* capital adequacy ratios, thereby reducing the effective capital buffer below regulatory requirements. Since the originating bank earns a management fee in addition to the sale price of the originated securities, on-balance-sheet and off-balance-sheet loans are not perfect substitutes.

To provide a sense of the scale of securitization, the total outstanding credit in the United States— comprising of one-to-four-family and multifamily residential mortgages, commercial and farm mortgages, commercial and industrial (C&I) loans, and consumer credit—stood at $5.2 trillion in 1990Q4, of which $1.0 trillion (19.2%) was securitised. By 2007Q4, total credit had grown to $19.0 trillion, reflecting a compound annual growth rate (CAGR) of 7.6% over those 17.75 years. During the same period, securitized loan volume increased to $8.4 trillion (CAGR$\approx$12.7%), raising the securitization ratio to 44.2%.[5] This ratio remained elevated throughout the GFC, peaking at 45.5% in 2009Q4, before dropping sharply to 18.8% in 2010Q1. This pronounced drop resulted from the collapse of private securitization markets and the tightening of regulatory frameworks, notably the Dodd–Frank Act. As of 2024Q1, total outstanding credit reached $29.3 trillion, with $4.2 trillion (14.2%) securitized. We provide time-series plots of total outstanding lending, securitized volumes, securitization ratios, and the data sources in Appendix A.

While the proportion of securitized assets is notably lower than levels seen before and during the GFC, the absolute size of the U.S. securitization market—at $4.2 trillion—remains substantial. At this scale, securitization continues to pose material implications for financial stability and systemic risk. Its capacity to obscure latent credit risks, weaken market discipline, and undermine the credibility of capital adequacy frameworks—as became starkly evident during the GFC—renders it a subject necessitating rigorous analysis and sustained scrutiny, thereby underscoring the relevance of this study.

Our model captures seven economic agents: Workers, Entrepreneurs, Firms, Commercial Banks, SPVs, the Central Bank, and the Government. The model features two types of households—workers and entrepreneurs—who differ in their time preferences, with workers being more patient than entrepreneurs. Entrepreneurs finance the acquisition of new physical capital through a combination of their own resources and bank loans, but their ability to borrow is limited by col-

Deutsche Bank—as well as industry bodies such as the Institute of International Finance (IIF) and the Global Financial Markets Association (GFMA), to dilute the Basel III Endgame (also referred to as Basel IV) proposals is both widespread and well-documented in the financial press. Their central argument is that full implementation of these reforms would constrain banks' lending capacity, place them at a competitive disadvantage, and hinder economic growth.

[5] 2007Q4 refers to the period leading up to the GFC, which is officially dated from December 2007 to June 2009 in the United States. https://www.nber.org/news/business-cycle-dating-committee-announcement-september-20-2010? (accessed on 23/07/2025).

lateral requirements and the loan-to-value (LTV) ratio imposed by banks—both of which are key macroprudential policy tools. In our model, collateral constraints, credit default risk, and the LTV ratio jointly shape the dynamics of capital accumulation. Entrepreneurs own firms that produce final output using labor, physical capital, and a constant returns to scale technology.

Commercial banks intermediate: they collect deposits from workers, extend loans to entrepreneurs, and originate a portion of these loans to SPVs, thereby moving them off balance sheet through securitization. In doing so, banks face two key constraints: (i) the statutory capital adequacy requirements of 10% under Basel III, and (ii) the credit default risk. SPVs repackage loan portfolios acquired from commercial banks into tradable securities, thereby transforming illiquid assets into liquid funds by selling them to external investors. The proceeds from loan sales to SPVs enable commercial banks to extend additional lending beyond the limits imposed by capital adequacy requirements. Bank borrowing by the entrepreneur links the real sector and the financial sector in the model. The Central Bank seeks to minimize deviations of actual output from the target output by adjusting its policy rate. The role of the government is minimal: it collects taxes from various economic agents and distributes lump-sum transfers to households.

We calibrate the model using stylized parameters from the existing literature and conduct a series of policy simulations. Specifically, we examine: (i) the extent to which banks' securitization activities generated a divergence between *de jure* and *de facto* capital adequacy ratios leading up to the GFC, potentially undermining the effectiveness of macroprudential policy; and (ii) the extent to which Basel III regulatory provisions may be compromised in the presence of unregulated securitization—an issue that is particularly important vis-à-vis the current debate on the full implementation of the Basel III Endgame proposals. Further, we examine (iii) the interaction between the financial and real sectors over the business cycle through a total factor productivity (TFP) shock; (iv) the role of the LTV ratio as a macroprudential tool; (v) the implications of increased credit default risk for financial stability and real activity; and (vi) the welfare implications of securitization. All simulations are conducted under two distinct scenarios, with and without securitization, to isolate its effects.

A brief overview of our main findings is in order. Securitization enables banks to materially bypass capital adequacy requirements. Although the *de jure* capital ratio was 8% during the GFC, our counterfactual analysis that accounts for off-balance-sheet activities suggests a *de facto* ratio of approximately 4.2%—a notable shortfall. Thus, securitization can substantially undermine the effectiveness of macroprudential policy. As bank capital requirements are tightened, as currently proposed under Basel III, off-balance-sheet lending expands, eroding the *de facto* bank capital position. For example, increasing the *de jure* BIS ratio to 15%, as proposed in the Basel III Endgame, drives the securitization ratio up to 57.9% and lowers the *de facto* BIS ratio to 6.3%, unless securitizations are brought under the regulatory framework.

As expected, a positive productivity (TFP) shock raises output. However, securitization produces only marginally expansionary effects over the business cycle compared to the unsecuritized case. Relaxing the LTV ratio reduces off-balance-sheet lending and increases conventional on-balance-sheet credit, reflecting banks' reduced incentives to securitize under looser regulatory constraints. It stimulates bank lending and capital accumulation, boosts output, and reinforces expansions while mitigating the severity of downturns. Conversely, a rise in credit default risk negatively impacts both the real and financial sectors: output contracts, lending rate increases,

and loan and deposit volumes decline. Securitization amplifies these effects, potentially reflecting banks' efforts to restore capital buffers and limit exposure to non-performing assets. Finally, we find that securitization enhances household welfare.

The remainder of the paper is structured as follows: Section 2 outlines the theoretical framework; Section 3 describes the calibration of model parameters; Section 4 presents and discusses the simulation results; and Section 5 concludes.

2. The model

Our objective is to integrate securitization technology—an essential component of financial engineering and a key aspect of shadow banking—into a DSGE framework and examine its effect on the broader economy. To this end, we extend a standard neoclassical DSGE model by incorporating the balance sheets of commercial banks and SPVs. In the subsequent sections, we delineate the behavior of each of the seven economic agents.

2.1. Workers

We model two types of infinitely lived representative agents (households), each maximizing the expected value of lifetime utility. A proportion (μ) of the population is workers whose saving decisions create bank deposits. The remaining $(1-\mu)$ is the entrepreneurs who save, borrow, and invest in physical capital. Workers, denoted by the superscript (i), are assumed to be more patient than entrepreneurs, hence have a higher discount factor. Workers make decisions concerning labor supply, consumption, and savings, with the latter held in the form of bank deposits. They do not borrow or own physical capital. The workers' preferences are represented by the following instantaneous utility function:

$$U(C_t^i, D_t^i, L_t^i) = \Theta_t^{c,i}\gamma_1 \log C_t^i + \Theta_t^{d,i}\gamma_2 \log D_t^i + (1-\gamma_1-\gamma_2)\log(1-L_t^i) \tag{1}$$

where C_t^i is consumption, D_t^i denotes the flow of services derived from holdings of cash balances, which are assumed to be equal to bank deposits, $1-L_t^i$ is leisure, where L_t^i denotes hours worked and $\gamma_1, \gamma_2 \in (0,1)$ are parameters which denote the weights of consumption and bank deposits to total utility, respectively. In line with Sidrauski (1967), bank deposits enter the utility function, reflecting precautionary saving that positively impacts the overall utility level (Kollmann et al., 2011). The inclusion of deposits in the utility function could also be substantiated in terms of a cash-in-advance restriction, where cash balance is required to finance consumption. $\Theta_t^{c,i}$ and $\Theta_t^{d,i}$ are shocks to consumption and bank deposit demand, respectively.[6]

[6]We specify both of these shocks as stochastic AR(1) processes:

$$\begin{aligned}
\ln \Theta_t^{c,i} &= (1-\rho_{c,i})\ln \overline{\Theta}^{c,i} + \rho_{c,i}\ln \Theta_{t-1}^{c,i} + \varepsilon_t^{c,i} \\
\ln \Theta_t^{d,i} &= (1-\rho_{d,i})\ln \overline{\Theta}^{d,i} + \rho_{d,i}\ln \Theta_{t-1}^{d,i} + \varepsilon_t^{d,i}
\end{aligned}$$

where $\overline{\Theta}^{z,i} = 1$, $\rho_{z,i} < 1$, and $\varepsilon_t^{z,i} \sim N(0, \sigma^2_{\Theta^{z,i}})$, for $z = c, d$. All shocks in our model, discussed below, follow the same AR(1) structure except for the 'probability of loan repayment' and 'monetary policy' which are i.i.d. shocks.

The workers' budget constraint is given by,

$$(1+\tau_t^c)C_t^i + D_t^i = (1-\tau_t^l)W_t^i L_t^i + D_{t-1}^i + (1-\tau_t^d)R_{t-1}^D D_{t-1}^i + T_t^i \tag{2}$$

where savings, in the form of consumption goods, are held as bank deposits, D_t^i. W_t^i is the wage rate, and R_t^D is the bank deposit rate. Workers' budget constraint includes three taxes: τ_t^c, tax rate on consumption; τ_t^l, tax rate on labor income; and τ_t^d, tax rate on deposit interest. T_t^i denotes the lump-sum transfers from the government. The representative worker maximizes the discounted expected lifetime utility, subject to the budget constraint (2). The solution to the worker's maximization problem yields the equilibrium condition for labor supply:

$$(1-\gamma_1-\gamma_2)(1+\tau_t^c)C_t^i = \Theta_t^{c,i}\gamma_1(1-\tau_t^l)W_t^i(1-L_t^i) \tag{3}$$

and the optimal consumption-saving path or bank deposit demand is:

$$\frac{\Theta_t^{c,i}\gamma_1}{(1+\tau_t^c)C_t^i} - \frac{\Theta_t^d\gamma_2}{D_t} = \beta_i \mathbb{E}_t\left[\frac{\Theta_{t+1}^{c,i}\gamma_1}{(1+\tau_{t+1}^c)C_{t+1}^i}\left(1+(1-\tau_{t+1}^d)R_t^D\right)\right] \tag{4}$$

where β_i is the workers' discount rate and $\mathbb{E}_t$ is the expectations operator.

2.2. Entrepreneurs

Entrepreneurs, denoted by the superscript j, are assumed to be impatient agents, characterised by a lower discount factor relative to the workers.[7] They own both physical capital and firms. Each period, the entrepreneur purchases new units of capital, I_t^j, to use in the next period's production. The entrepreneur has two sources of finance: own resources and bank borrowing. The following instantaneous utility function represents the preferences of entrepreneurs:

$$U(C_t^j, L_t^j) = \Theta_t^{c,j}\gamma_3 \log C_t^j + (1-\gamma_3)\log(1-L_t^j) \tag{5}$$

where $\Theta_t^{c,j}$ is consumption shock which follows stochastic AR(1) processes, C_t^j is the level of consumption, and L_t^j is the labor.

Entrepreneurs finance their consumption, capital investment, and loan repayments—both interest and principal—through income from labor, returns from capital, newly acquired loans, government transfers, and profit distributions from banks. Therefore, the budget constraint of entrepreneurs is:

$$\begin{aligned} & (1+\tau_t^c)C_t^j + I_t^j + \phi_t(1+R_t^H)H_{t-1}^j \\ = \;& (1-\tau_t^l)W_t^j L_t^j + (1-\tau_t^k)R_t^K K_t^j + H_t^j + T_t^j + (1-\varphi)\pi_t^{b,net} \end{aligned} \tag{6}$$

[7] Guerrieri and Iacoviello (2017) allow bank credit in DSGE framework where impatient households borrow from banks to finance house purchases. However, in Gerali et al. (2010) patient households save and create bank deposits, whereas impatient households and entrepreneurs borrow from banks. Our approach is similar to that of Gerali et al. (2010): workers are patient - they save and deposit, while entrepreneurs are impatient- they borrow and invest in physical capital.

where H_t^j denotes bank loans, R_t^H is the interest rate on bank loans, W_t^j is the wage rate, R_t^K is the rental rate of physical capital, and K_t^j is the physical capital stock. Entrepreneurs are also shareholders of the banks and hence receive a fraction $(1-\varphi)$ of bank net profit ($\pi_t^{b,net}$).

We specify the probability of loan repayment by entrepreneurs as $0 \leq \phi_t \leq 1$, and explicitly model that loan default adversely affects the bank's balance sheet and its ability to issue new credit. It is specified as a function of the business cycle, represented by total factor productivity (TFP), and the overall level of bank lending. Specifically, we adopt the following functional form:

$$\phi_t = \phi_0 + \phi_1(A_t - \overline{A}) - \phi_2(H_t - \overline{H}) + \varepsilon_t^{\phi} \tag{7}$$

where, $\overline{A}$ is the steady state level of TFP, $\overline{H}$ is the steady state level of loands, $\phi_0 \leq 1$ is the steady state probability of repayment, $\phi_1, \phi_2 > 0$, and ε_t^{ϕ} represents an i.i.d. credit risk shock. The probability of credit default is $(1-\phi_t)$. We incorporate two opposing forces that affect the probability of default: favorable economic conditions improve firm health and reduce default risk, whereas the expansion of new credit raises the likelihood of default. On balance, we assume that the probability of loan default is countercyclical; however, loan quality may decline when the volume of lending exceeds its steady-state level.

The existence of credit risk requires provisions of collateral, X_t^j, to secure the loan. We specify the collateral requirement such that it exceeds the value of the loan:

$$X_t^j = \Theta_t^{x,j}(1+\eta)H_t^j \tag{8}$$

where $\eta \geq 0$ and $\Theta_t^{x,j}$ is a random collateral shock. In a tight credit environment, banks may demand higher levels of collateral hence the shock. Collateral is assumed to consist of physical capital, the value of which is entirely forfeited in the event of credit default. This is a reasonable assumption, as firms typically pledge their existing capital stock as collateral for new loans. Put differently, in the event of default, banks seize the collateral, leading to a one-to-one reduction in the entrepreneurs' physical capital by the amount $(1-\phi_t)X_t^j$.

Given our specification of collateral, the capital accumulation process in our model is given by:

$$K_{t+1}^j = (1-\delta_k)K_t^j + I_t^j - (1-\phi_t)X_t \tag{9}$$

where δ_k is the capital depreciation rate. Loans to entrepreneurs are constrained by the value of collateral subject to a target loan-to-value (LTV) ratio. The entrepreneurs' borrowing constraint is defined as:

$$(1+R_t^H)H_t^j \leq \Theta_t^{LTV}K_{t+1}^j \tag{10}$$

where Θ_t^{LTV} is the stochastic loan-to-value ratio. This borrowing constraint limits loans to the present discounted value of entrepreneur's physical capital holdings.

The representative entrepreneur maximizes the lifetime utility, subject to the budget constraint, the state equation for K_t^j, the state equation for H_t^j, and the borrowing constraint. Formally, the maximization problem is:

$$\max_{(C^j,K^j,L^j,H^j)} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta_j^t \left(\Theta_t^{c,j}\gamma_3 \log C_t^j + (1-\gamma)\log(1-L_t^j)\right), \tag{11}$$

with respect to $\left(C_t^j, K_{t+1}^j, L_t^j, H_t^j\right)$, where β_j is the entrepreneur's discount factor.

From the first-order conditions, we obtain an equilibrium labor supply and the combined equilibrium condition for both investment and borrowing constraint as:

$$\frac{(1-\gamma_3)}{(1-L_t^j)} = \frac{\Theta_t^{c,j}\gamma_3}{(1+\tau_t^c)C_t^j}(1-\tau_t^l)W_t^j \tag{12}$$

$$\begin{aligned}
&\frac{\Theta_{t+1}^{c,j}\gamma_3}{(1+\tau_t^c)C_t^j}\left[(1-\phi_t)\Theta_t^{x,j}(1+\eta)-1\right] + \frac{(1+R_t^H)\Theta_t^{c,i}\gamma_3}{\Theta_t^{LTV}(1+\tau_t^c)C_t^j} = \\
&\beta_j\mathbb{E}_t\frac{\Theta_t^{c,j}\gamma_3}{(1+\tau_{t+1}^c)C_{t+1}^j}(\phi_t(1+R_t^H)) + \\
&(1+R_t^H)\beta_j\mathbb{E}_t\left[\frac{\Theta_t^{c,j}\gamma_3}{\Theta_t^{LTV}(1+\tau_{t+1}^c)C_{t+1}^j}((1-\tau_t^k)R_{t+1}^K+1-\delta_k)\right]
\end{aligned} \tag{13}$$

2.3. Firms

To keep the analysis simple, we assume a competitive environment in which the firm determines the optimal levels of labor, L_t, and capital, K_t, to produce final output, Y_t. The firm rents capital from the entrepreneurs and hires labor from households and maximizes period-by-period profits, taking factor prices as given. The technology exhibits constant returns to scale hence the profits are zero in equilibrium. The firm uses the standard Cobb-Douglas technology:

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} \tag{14}$$

where A_t is a measure of total factor productivity (Hicks neutral technological shock), and α is the capital share of output.

The solution to the profit maximization problem yields the two standard first-order conditions, in which factor prices are equal to their marginal productivities:

$$W_t = A_t(1-\alpha)K_t^{\alpha}L_t^{-\alpha}, \tag{15}$$

$$R_t^K = A_t\alpha K_t^{\alpha-1}L_t^{1-\alpha} \tag{16}$$

2.4. Financial Sector

We consider commercial banks and SPVs. Commercial banks operate in the loan and deposit markets, whereas SPVs—entities for securitization—operate in the markets for mortgage-backed securities (MBS) and asset-backed securities (ABS). The financial sector's aggregate balance sheet consolidates the balance sheets of both commercial banks and SPVs.

2.4.1. Commercial Banks

Commercial banks intermediate by collecting deposits from workers and lending to entrepreneurs. Gerali et al. (2010) assume deposit and loan rates are linked to the policy rate via markups and optimize with respect to the policy rate. We optimize bank's profit with respect to both interest

rates, R_t^H and R_t^D. In our framework, commercial banks securitize by selling a fraction of loans to SPVs, making them off-balance-sheet and thereby boosting lending capacity. Commercial bank's balance sheet is shown in Table 1, where B denotes the bank capital, and H^b is the stock of loans on the balance sheet.

Table 1: Balance Sheet of the Commercial Bank

Assets	Liabilities
Loans to entrepreneurs H^b	Deposits D
	Equity (Bank capital) B

With securitization, the total stock of loans in the economy, H, is given by $H = H^b + H^s$, where H^s denotes the amount of securitized (off-balance-sheet) loans. Total bank lending thus exceeds the conventional liability (D+B) to the extent that H is financed through securitization. We depict this by the fraction, $0 \leq s_t < 1$, which captures the ratio of loans financed through SPVs relative to the loans held on the balance sheet,

$$s_t = \frac{H_t^s}{H_t^b} \tag{17}$$

The loan amount H_t^s is removed from the commercial bank's balance sheet but appears on the balance sheet of SPVs. Accounting for securitization yields the following constraint in the bank's profit maximization problem:

$$H_t^b = D_t + B_t \tag{18}$$

The capital adequacy requirement, based on the progressively tightened Basel Accords, ties banks' on-balance-sheet loans to their capital. While intended to enhance financial stability, it imposes costs on banks and constrains credit supply. The capital adequacy ratio, BIS_t, imposes the following continuous-time credit constraint on commercial banks:

$$\frac{B_t}{H_t^b} \geq BIS_t \tag{19}$$

We assume the above constraint is always binding. Securitization allows commercial banks to circumvent capital adequacy requirements, since BIS_t applies only to on-balance-sheet loans, net of securitization. This creates a wedge between the *de jure* and *de facto* BIS_t ratios, causing the effective BIS_t to fall below the statutory benchmark. The commercial banks' period-by-period gross profit function, accounting for securitization and loan default probability, is:[8]

$$\begin{aligned} \max \pi_t^B \quad = \quad & \phi_t(1 + R_t^H)H_t - \phi_t(1 + R_t^H)H_t^s + (1 + \varsigma)H_t^s - H_{t+1} \\ & + D_{t+1} - (1 + R_t^D)D_t + B_{t+1} - (1 + R_t^B)B_t \end{aligned} \tag{20}$$

[8]Notice that without securitization ($s_t = 0$), and in the absence of risk ($\phi_t = 1$) the above expression reduces to the standard definition of bank profits:

$$\pi_t^B = (1 + R_t^H)H_t - H_{t+1} + D_{t+1} - (1 + R_t^D)D_t + B_{t+1} - (1 + R_t^B)B_t.$$

The cost of bank capital, R_t^B, is included in the definition of bank profits, so gross profits are zero but net profits are positive and equal to $\pi_t^{B,net} = R_t^B B_t$. Income from loan securitization is $(1+\varsigma)H_t^s$, where ς is a management cost paid by the SPV to the bank. Given that this managing cost is different from zero both on-balance and off-balance loans are not perfect substitutes. Bank profits may be distributed to shareholders or retained as equity. We assume that a fraction of these profits contributes to bank capital accumulation, as follows:

$$B_{t+1} = (1-\delta_B)B_t + \varphi\pi_t^{B,net} = (1+\varphi R_t^B - \delta_B)B_t \tag{21}$$

where, $0 < \varphi < 1$, represents the proportion of bank profits converted into bank capital, and $\delta_B > 0$ denotes the management cost associated with bank capital. In the steady state, the return on bank capital equals the management cost. Loan defaults result in losses for both firms and banks: firms lose physical capital, while banks suffer profit losses. The bank's objective is to maximize profits, subject to the constraints (18) and (19). Substituting both expressions in periods t and $t+1$ in the bank profits function, we get:

$$\begin{aligned} \max_{H^b} \pi_t^B \quad = \quad & \phi_t(1+R_t^H)H_t^b + (1+\varsigma)H_t^s \\ & -(1+R_t^D)(1-BIS_t)H_t^b - (1+R_t^B)BIS_t H_t^b \end{aligned} \tag{22}$$

From the first first-order condition, we obtain the following expressions for the lending interest rate:

$$R_t^H = \frac{(1-BIS_t)(1+R_t^D) + BIS_t(1+R_t^B)}{\phi_t} - 1 \tag{23}$$

Equation (23) shows that the lending rate of commercial banks is determined by a range of factors, including the capital adequacy ratio, the deposit rate, and credit risk. For simplicity, we assume that deposit rate is equal to the policy rate.

2.4.2. Special Purpose Vehicles (SPVs)

SPVs neither collect deposits nor issue loans directly. They issue various tranches of MBS and ABS, which are bundles of loans originated by commercial banks. Commercial banks channel a fraction, $0 \leq s_t \leq 1$, of their total loans to SPVs. Formally,

$$H_t^s = V_t \tag{24}$$

where V_t denotes SPV securities, MBS and ABS. Table 2 presents the SPV's balance sheet: the asset side displays the value of loans acquired from commercial banks, while the liabilities side shows the securites issues by the SPV.

Table 2: Balance Sheet of the Special Purpose Vehicle

Assets	Liabilities
Loans H^s	Securities V

The SPV's profit-maximization objective function is:

$$\max_{H_t^s} \pi_t^{SPV} = \phi_t(1+R_t^H)H_t^s - (1+\varsigma)H_t^s - R_t^V V_t \tag{25}$$

where R_t^V denotes the cost of SPV securities. The SPV maximizes profits subject to the restriction (24). The first order condition for this profit maximization yields the cost of SPV securities:

$$R_t^V = \phi_t(1 + R_t^H) - (1 + \varsigma) \tag{26}$$

Net profit for SPV is $R_t^V V_t$. The SPV's security accumulation process is given by:

$$V_{t+1} = (1 + R_t^V - \delta_V)V_t \tag{27}$$

where δ_V is a management cost associated to the SPV securities. In this setup, no credit risk is transferred from originating banks to SPVs. This aligns with Acharya et al. (2013), who conclude that the reduction in regulatory capital requirements was the primary driver of securitization, with little or no actual risk transfer.

2.5. The Central Bank

Our model is specified in real terms; therefore, it abstracts from inflation. The central bank is assumed to set the policy rate, R_t, as follows:

$$R_t = \overline{R}^{(1-\phi)} R_{t-1}^{\phi} \left[\frac{Y_t}{Y_{t-1}} \right]^{\psi(1-\phi)} + \varepsilon_t^{CB} \tag{28}$$

where $\overline{R}$ is the policy rate in steady state, and ε_t^{CB} is a monetary policy shock.

2.6. The Government

We assume that the government runs a balanced budget each period, raising revenues through distortionary taxes and fully expending it as lump-sum transfers, T_t. Specifically, the effective average tax rates are: τ_t^c, τ_t^l, τ_t^k, τ_t^d, and τ_t^{π}, as defined above. The government's budget constraint in each period is given by,

$$\tau_t^c C_t + \tau_t^l W_t L_t + \tau_t^k \left[(R_t^k - \delta) K_{t-1} \right] + \tau_t^k R_t^d D_t = T_t^i + T_t^j \tag{29}$$

Transfers to households are the counterpart of fiscal revenues.

2.7. Aggregation of Workers and Entrepreneurs

Since the model includes two distinct household types—workers and entrepreneurs—we compute the aggregate values of all real-sector variables by appropriately weighting and combining data from both groups. The aggregation procedure, together with the economy-wide feasibility conditions, is detailed in Appendix B.

2.8. Aggregate Balance Sheet of the Financial Sector

The aggregation of the financial sector encompasses the balance sheets of both commercial banks and SPVs. The sources and uses of funds for commercial banks and SPVs are given by:

$$H_t^b + H_t^s = D_t + B_t + V_t \tag{30}$$

Table 3 shows the financial sector's aggregate balance sheet.

Table 3: Aggregate balance sheet of the financial sector

Assets	Liabilities
Loans to entrepreneurs H^b	Deposits D
Securitized loans H^s	Securities V
	Equity (Bank capital) B

3. Calibration of Model Parameters

The model is calibrated using stylized parameter values from the literature. Workers' discount factor is set to 0.9943 (Gerali et al., 2010) and entrepreneurs' to 0.975 (Iacoviello, 2005; Gerali et al., 2010). The weight of consumption in workers' utility is 0.35, and bank deposits' weight is 0.005. For entrepreneurs, consumption weight is 0.45. Based on U.S. Census data, the proportion of workers in the population is 0.8258, with an entrepreneur-to-employment ratio of 0.1742. The output elasticity with respect to capital is set at 0.35, implying a labor share of 0.65. The quarterly depreciation rate of physical capital is assumed to be 0.025. The LTV ratio is set at 0.35 (Gerali et al., 2010), while the capital management cost is calibrated to an annualized rate of 3%. The steady-state loan repayment probability is 0.95, with the elasticities of repayment probability to TFP and loan volume set at 0.8 and 0.2, respectively. Table 4 presents the calibrated parameters and their corresponding values.

Table 4: Model Calibration Parameters

Category	Notation	Parameter definition	Value
Preferences	β_i	Discount factor, patient agent (worker)	0.9943
	β_j	Discount factor, impatient agent (entrepreneur)	0.9750
	γ_1	Weight of consumption in utility, agent	0.350
	γ_2	Weight of bank deposits in utility, patient agent	0.005
	γ_3	Weight of consumption in utility, impatient agent	0.450
	μ	Proportion of workers over total population	0.8258
Technology	α	Physical capital share	0.35
	δ_k	Physical capital depreciation rate	0.025
Central Bank	$\overline{R}_{CB}$	Steady state central bank interest rate	0.005
Financial Sector	δ_b	Bank capital management cost	0.03
	δ_v	SPVs capital management cost	0.03
	ς	Managing cost securitized loans	0.001
	ϕ_0	Steady state probability of loan repayment	0.95
	ϕ_1	Sensitivity of Repayment Probability to TFP	0.80
	ϕ_2	Sensitivity of Repayment Probability to loans	0.20
	η	Overcollateralization (Haircut) parameter	1.00
	θ	Loan-to-value ratio	0.35
	BIS	BIS rate	0.10
Government	τ^c	Consumption tax rate	0.10
	τ^k	Capital income tax rate	0.25
	τ^l	Labor income tax rate	0.15
	τ^d	Deposit yield tax rate	0.25

4. Simulations

4.1. Securitization, Bank Capital, and the Macroeconomy: Steady-State Simulations

In our theoretical framework, commercial banks utilize securitization as a means of regulatory arbitrage. From the constraints given in equations (17) and (18), it follows that, an increase in the securitization proportion, s_t, reduces the effective capital adequacy ratio, B_t/H_t, *ceteris paribus*. This creates a wedge between the statutory (*de jure*) capital adequacy ratio —defined in our case by BIS regulation— and the effective (*de facto*) capital ratio. The magnitude of this wedge depends on the extent of securitization, which in turn is influenced by the stringency of statutory capital requirements. The wider this wedge grows, the less effective macroprudential policies are, and the greater the systemic risk.

In this subsection, we conduct two steady-state simulations. First, we examine the impact of securitization on the capital adequacy ratio by progressively increasing the share of off-balance-sheet (securitized) loans relative to on-balance-sheet (unsecuritized) loans, *ceteris paribus*. Second, in light of the Basel III Endgame proposal to raise bank capital requirements to 10–15% of RWAs, we examine the macroeconomic effects of policy-driven changes in the regulatory BIS ratio. We

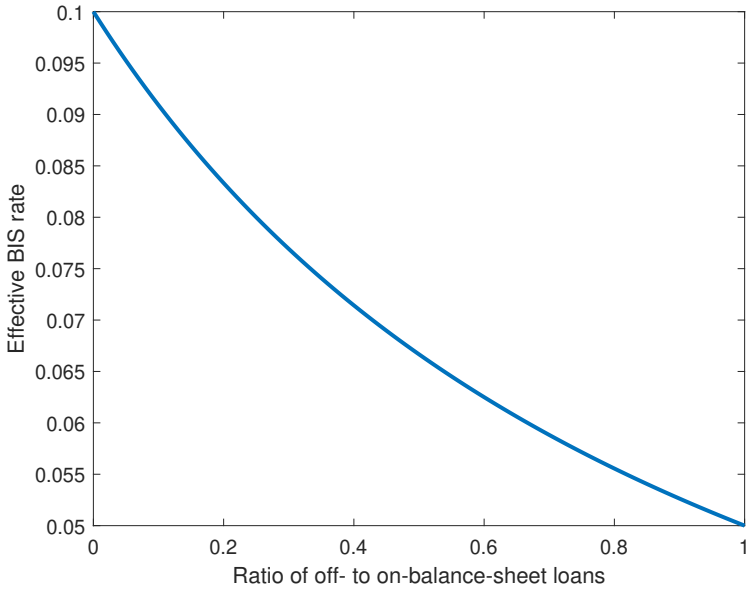


Figure 1: The effective BIS rate as a function of securitization (for a 10% *de jure* statutory BIS rate)

also assess the extent to which securitization may weaken the regulatory capital adequacy ratio, particularly if securitized assets remain excluded from capital adequacy requirements.

Figure 1 plots the results of first simulation: the effect of increasing securitization on the effective BIS ratio. The horizontal axis represents the proportion of off-balance-sheet loans relative to on-balance-sheet loans held by banks. The ratio gradually increases from zero (no securitization) to 1 (an equal split of 50% securitized and 50% non-securitized loans), with 0.2 indicating 16.7% securitized and 83.3% on-balance-sheet loans, and 0.8 indicating 44.4% securitized and 55.6% unsecuritized.

In the absence of securitization, the effective BIS rate for banks equals the statutory rate, set at a baseline of 10%. However, as securitization increases, the effective BIS ratio declines due to a growing volume of bank loans being transferred off-balance-sheet through SPVs, driven by regulatory arbitrage by banks. As shown in Appendix A and discussed in Section 1, securitization in the U.S. reached as high as 44% prior to the GFC. At a 44% securitization level, our simulation results suggest an effective BIS capital adequacy ratio of 5.3% compared to the baseline 10%. Assuming the same gap and applying it to the 8% pre-GFC requirement implies a *de facto* bank capital ratio of 4.2%—a 3.8 percentage point shortfall that severely weakens macroprudential policy. This result aligns with the equity positions of banks and financial institutions in the lead-up to the GFC, when many operated with less than 5% equity, and some major institutions held as little as 2–3% of their assets in equity (Admati and Hellwig, 2013, pp. 30, 60).

Table 5: Steady-State Values and the BIS Rate

	Securitization		No-securitization	
BIS rate	**0.10**	**0.15**	**0.10**	**0.15**
Output	0.7882	0.7843	0.7582	0.7572
Capital stock	3.1507	3.1056	2.9255	2.9120
Loans	1.0050	0.9879	0.9241	0.9190
On-balance loans	0.7453	0.4160	0.9241	0.9190
Off-balance loans	0.2596	0.5719	0.0000	0.0000
Deposits	0.9303	0.9255	0.8317	0.7811
Bank capital	0.0745	0.0624	0.0924	0.1378
Loans interest rate	0.0316	0.0342	0.0415	0.0425
Securitization ratio	0.2583	0.5789	0.0000	0.0000
Effective BIS rate	0.0741	0.0632	0.1000	0.1500

Table 5 presents the results of the second simulation, showing the steady-state values of key variables when the benchmark capital adequacy ratio is raised from 10% to 15%. The results are intuitive. As statutory capital requirements rise, banks face a trade-off: either raise costly new capital or alleviate regulatory pressure by moving loans off their balance sheets via SPVs. Our results indicate a clear preference for the latter strategy, as an increase in the statutory BIS ratio leads to greater off-balance-sheet lending and a reduction in the effective BIS ratio. The ratio of securitized to total bank loans increases from 25.8% to 57.9% as the BIS capital adequacy ratio rises from 10% to 15%.[9] Concurrently, the effective BIS ratio declines from 7.4% to 6.3%. These shifts reflect a sharp rise in banks' off-balance-sheet activities and a concomitant decline in the effective statutory capital adequacy ratio. Steady-state output declines slightly, as reduced bank credit lowers investment and capital accumulation. Despite increased off-balance-sheet lending and a lower *de facto* capital adequacy ratio, the bank lending rate increases. Notably, a higher BIS ratio is associated with lower bank capital levels—an outcome driven solely by unregulated securitization, which runs counter to conventional macroprudential expectations.

Overall, in the steady state, an increase in the BIS ratio moves the economy to a new equilibrium with lower levels of bank lending, investment, and output, even when securitization is exempt from capital adequacy requirements. The declines in output and bank loans are modest. Off-balance-sheet loans rise sharply, loan interest rates increase moderately, and bank capital declines. Without securitization, as expected, bank capital improves following the rise in the BIS ratio, and the *de jure* and *de facto* BIS ratios coincide. Securitization appears more expansionary than when it is absent. In the absence of securitization, higher bank capital requirements produce stronger contractionary effects.

[9]Our simulated securitization ratio of 25.8% notably exceeds the actual figure of 14.2% recorded in 2024Q4. This divergence arises from our modeling assumption that securitization activities are exempt from capital adequacy requirements—regulations that are currently in force, though less stringent than those proposed under the Basel III Endgame framework. The objective is to illustrate the potential scale of off-balance-sheet activity that banks could undertake if securitization were not subject to a robust regulatory regime.

4.1.1. Welfare Implications

We measure the welfare impact of securitization by computing the consumption equivalent variation (CEV). As shown above, securitization alters the economy's steady state, producing a more expansionary outcome than in its absence; consequently, we expect welfare effects. We quantify these effects by comparing steady-state household utility with and without securitization. Steady-state utility with securitization is defined as follows:

$$\sum_{t=0}^{\infty} \beta^t W^S(C^S, L^S) = \frac{1}{1-\beta} W^S(C^S, L^S) \tag{31}$$

where C^S and L^S represents steady-state values for consumption and labor with securitization (denoted by the superscript s), respectively, and $W^S(C^S, L^S)$ denotes social welfare, defined as:

$$W^S(C^S, L^S) = \mu U^{i,S}(C_t^{i,S}, L_t^{i,S}) + (1-\mu) U^{j,S}(C_t^{j,S}, L_t^{j,S}) \tag{32}$$

We compute the change in steady-state consumption needed for a household without securitization to achieve the same welfare as under securitization by solving the following equation for each household type:

$$\frac{1}{1-\beta} W((1+\Delta^S)(C, L) = \frac{1}{1-\beta} W^S(C^S, L^S) \tag{33}$$

where $\Delta^S \lessgtr 0$, denotes the positive or negative consumption adjustment needed in the absence of securitization to achieve the same welfare as under securitization. Applying a first-order Taylor expansion of utility around the new steady state, the above equations can be rewritten to reflect the consumption adjustment as:

$$W(C, L) + W_C(C, L) C \Delta^S = W^S(C^S, L^S) \tag{34}$$

where $W_C(\cdot)$ represents the marginal utility of consumption in the steady-state. From the above expressions, the CEV is:

$$\Delta^S \approx \frac{U^S(C^S, L^S) - U(C, L)}{U_C(C, L) C} \tag{35}$$

We compute Δ^S for each household type and the entire economy. Results, reported in Table 6, show the percentage change in consumption, representing the welfare gain (positive) or loss (negative) from securitization. Welfare gains from securitization are positive. Specifically, the findings indicate that: (i) securitization has a positive impact on welfare for both workers and entrepreneurs; (ii) the welfare gains for entrepreneurs are considerably larger than those for workers; and (iii) as the BIS rate increases, welfare gains decline, suggesting that securitization can offset the negative welfare effects of a stringent capital adequacy regime. Van den Heuvel (2008) finds that the welfare cost of bank capital requirements can be large for the U.S. economy, amounting to a permanent consumption loss of up to 1%. Our findings corroborate this result by demonstrating that securitization enables banks to circumvent statutory capital adequacy requirements, thereby mitigating output reductions and preserving household welfare.

Table 6: Welfare Implications of Securitization

BIS rate	Total	Workers	Entrepreneurs
10%	1.66	1.28	3.44
15%	1.54	1.24	2.95

4.2. Securitization and the Business Cycle

We examine how securitization influences the interaction between the financial and real sectors over the business cycle by simulating a one-standard-deviation positive TFP shock. This shock plays two roles in the model: it directly boosts output as a neutral technology shock and reduces loan default risk by lowering the probability of default. Returns on investment increase, leading to higher demand for bank loans from entrepreneurs; however, binding bank capital requirements constrain the ability of banks to expand lending. Conceptually, banks may respond by raising new capital, shifting loans off their balance sheets, or both. Given the ease and cost-effectiveness, banks primarily shift loans off-balance-sheet, leading to a decline in on-balance-sheet loans and an increase in off-balance-sheet loans. Figures 2 and 3 display the impulse response functions of key model variables.

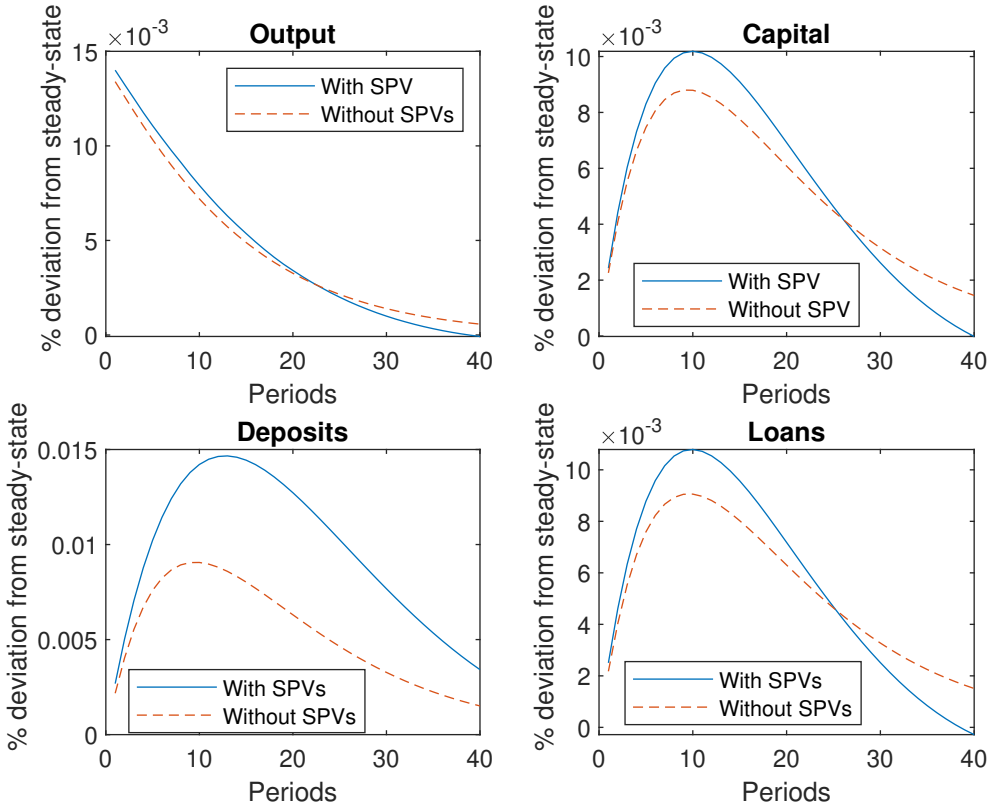


Figure 2: Positive aggregate productivity shock (I)

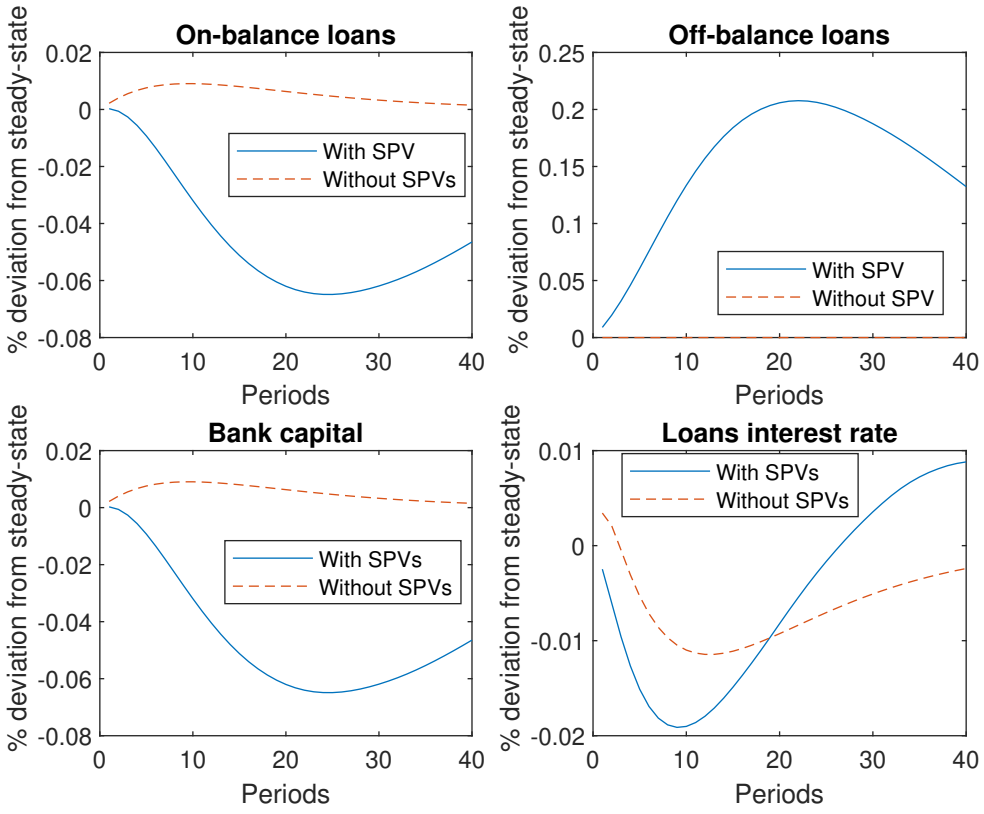


Figure 3: Positive aggregate productivity shock (II)

Consistent with the literature, a positive productivity shock raises output; however, securitization exerts only marginally greater effects than the non-securitized case in the initial period. The productivity shock leads to a capital accumulation process, which is supported by a rise in bank lending. The increase in deposits is due to higher household (worker) income. The business cycle dynamics show a stronger expansion of physical capital, loans, and deposits in the presence of securitization. However, bank capital declines and remains below its steady-state level, whereas the bank loan rate initially falls but eventually stabilizes above its steady-state value. Without securitization, a positive TFP shock produces the standard outcome: stricter capital adequacy requirements lead to higher bank capital, which in turn supports an expansion in lending. Securitization allows banks to partially circumvent capital requirements, enabling credit expansion despite a decline in bank capital. Both off-balance-sheet and total bank lending exhibit hump-shaped dynamics.

To recap, following a positive productivity shock, increases in off-balance-sheet loans, along with declines in the effective BIS ratio and lending rate, jointly contribute to the expansion of bank lending, which in turn stimulates investment, capital stock, output, and bank deposits. Securitization is expansionary and lowers the probability of loan defaults during economic upturns, but it amplifies downturns and raises the likelihood of defaults. This latter result is consistent with the well-established view of securitization's role in the GFC.

4.3. Shock to the Statutory Capital Adequacy Ratio

We investigate the effects of a one-percentage-point increase in the statutory capital adequacy (BIS) ratio. This shock raises the cost of bank capital. Figures 4 and 5 present the impulse response functions.

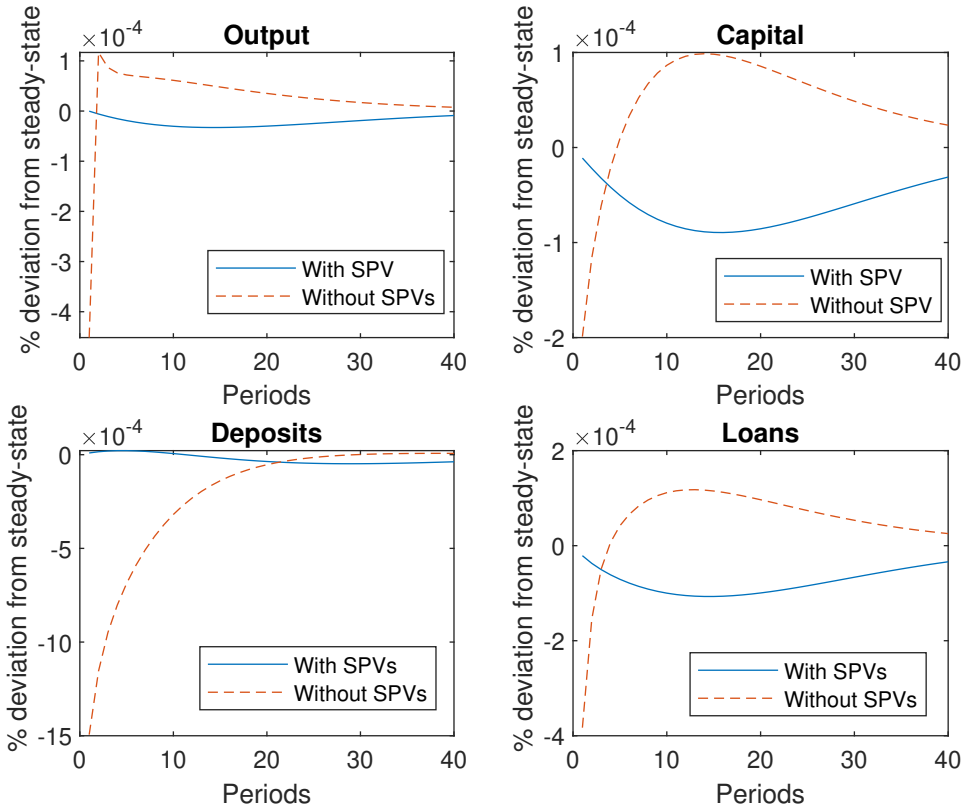


Figure 4: BIS rate shock (I)

As anticipated, in the absence of securitization, bank capital instantly rises by the magnitude of the shock. However, in the presence of securitization, bank capital declines initially despite the increase in the BIS ratio, as banks engage in regulatory arbitrage by shifting loans off their balance sheets and increasing their off-balance sheet exposures. The lending rate rises and bank lending declines; however, securitization mitigates the overshooting in lending rate, bank credit, and physical capital observed in its absence. The decline in bank loans reduces credit risk. Consistent with expectations, higher bank capital requirements reduce output and physical capital, but off-balance sheet activities help to partially offset these contractionary effects.

Overall, tighter bank capital requirements reduce on-balance sheet loans, total lending, physical capital, output, and deposits, while raising lending rate and increasing off-balance sheet loans. Although securitization significantly mitigates the effects of a higher BIS ratio, it does not fully offset them; nonetheless, it undermines the BIS rate's effectiveness as a macroprudential tool for stabilizing business cycle fluctuations.

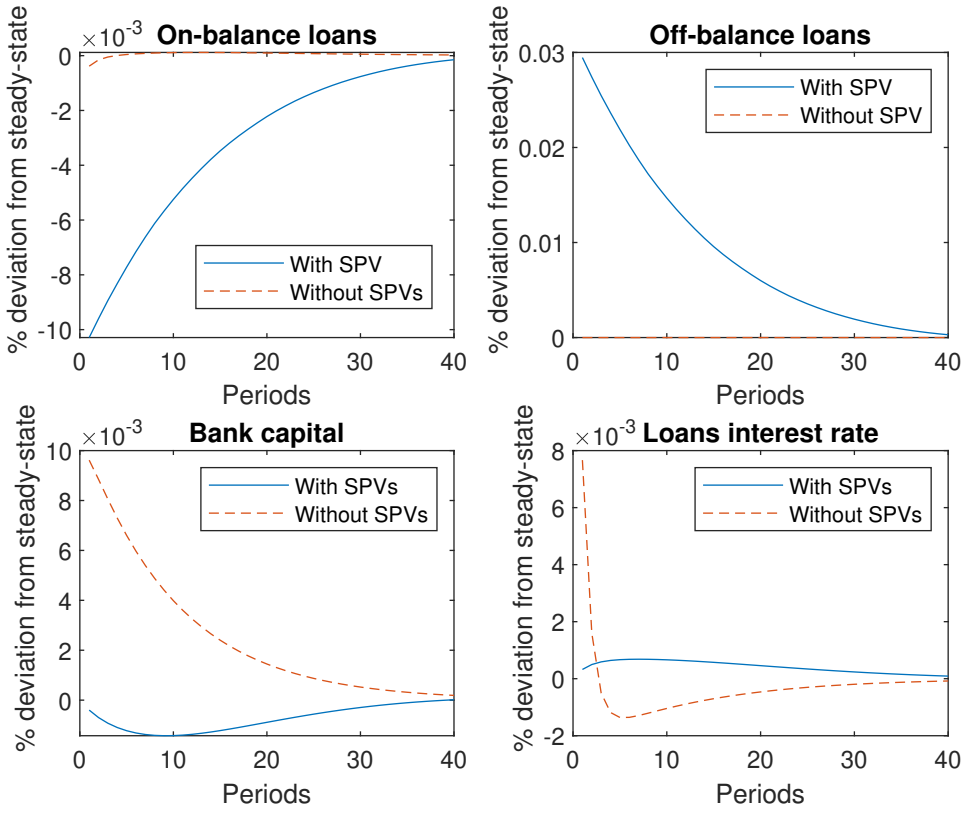


Figure 5: Bis rate shock (II)

4.4. Shock to the Loan-to-Value Ratio

The LTV ratio is another macroprudential policy that has garnered significant attention in the literature (Jiménez et al., 2017; Gatt, 2024). We examine the effects of a one-percentage-point positive shock in LTV. Impulse response functions are displayed in Figures 6 and 7.

An increase in the LTV ratio eases collateral constraints faced by entrepreneurs and raises the credit extension capacity of banks, thereby stimulating activity in both the financial and real sectors. Output increases as increased bank lending stimulates investment and builds up the physical capital stock. Although entrepreneurs' savings decline due to the relaxation of borrowing constraints, this is more than offset by increased bank lending, hence the rise in investment and physical capital. A higher LTV ratio also increases entrepreneurial leverage and credit default risk but does not attenuate its overall expansionary effect. However, the dynamics of physical capital accumulation differ markedly between the securitized and non-securitized case, largely due to differences in entrepreneurs' saving behavior. Under securitization, entrepreneurs tend to consume more and save less, while relying more heavily on bank borrowing than in the non-securitized case. Relaxation of the LTV ratio reduces securitization, indicating diminished incentives to securitize when regulatory constraints are looser. Thus, securitization appears more prominent when regulatory constraints are tighter, such as high BIS capital requirements or stringent LTV caps. Higher bank profitability, in turn, strengthens capital buffers and supports lending. The bank lending rate

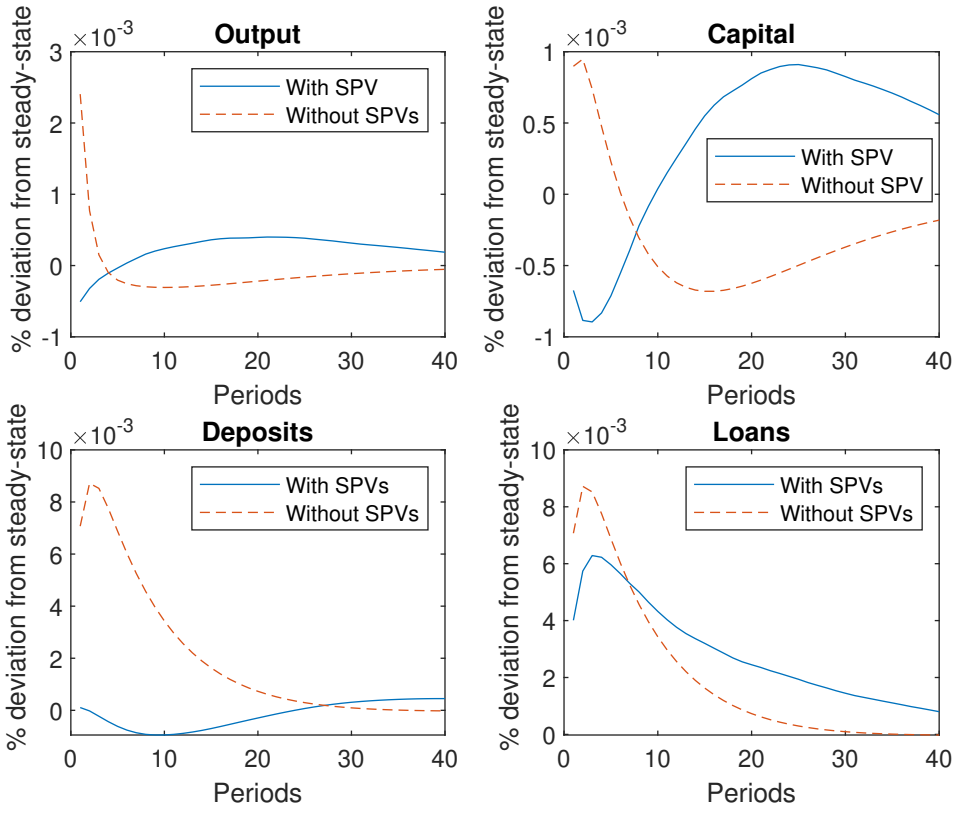


Figure 6: Loan-to-value ratio shock (I)

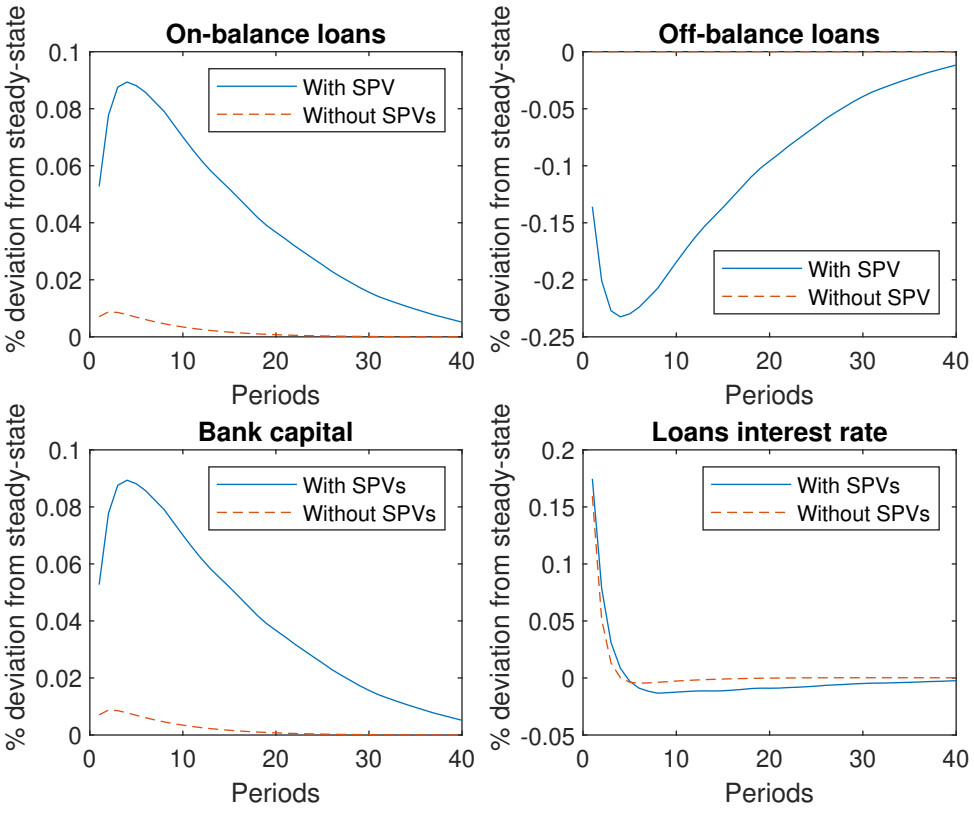


Figure 7: Loan-to-value ratio shock (II)

rises initially in response to elevated credit risk but declines as loan market dynamics stabilize.

Overall, a positive LTV shock has an expansionary effect on bank lending, investment, capital accumulation, and output. As collateral constraints ease, banks shift away from securitization in favor of on-balance-sheet lending. A positive LTV shock tends to amplify economic expansions while cushioning the impact of downturns.

4.5. Shock to Credit Risk

Finally, we examine the model's response to a rise in credit default risk by simulating one standard deviation increase in credit risk. The corresponding impulse response functions are presented in Figures 8 and 9.

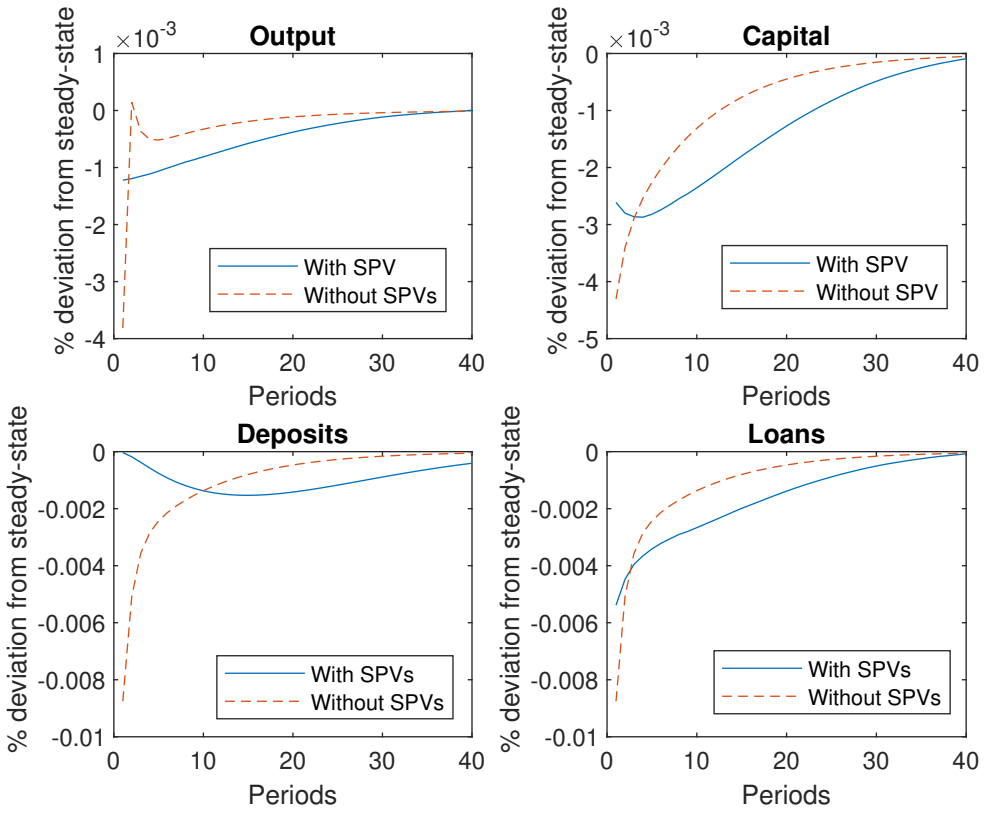


Figure 8: Credit risk shock (I)

An increase in credit default risk has widespread adverse effects, negatively impacting both the real and financial sectors. Output declines due to the erosion of firms' collateralized capital, compounded by a contraction in bank lending and capital formation. Lending rates rise as banks seek to offset expected losses, while both loan and deposit volumes fall, the latter driven by reduced output. Declining profitability erodes bank capital, further constraining lending capacity. In response, banks turn to securitization to alleviate capital pressures. Consequently, off-balance-sheet lending rises while on-balance-sheet lending contracts; however, total credit provision remains subdued. Overall, heightened credit risk undermines economic activity, with securitization amplifying most

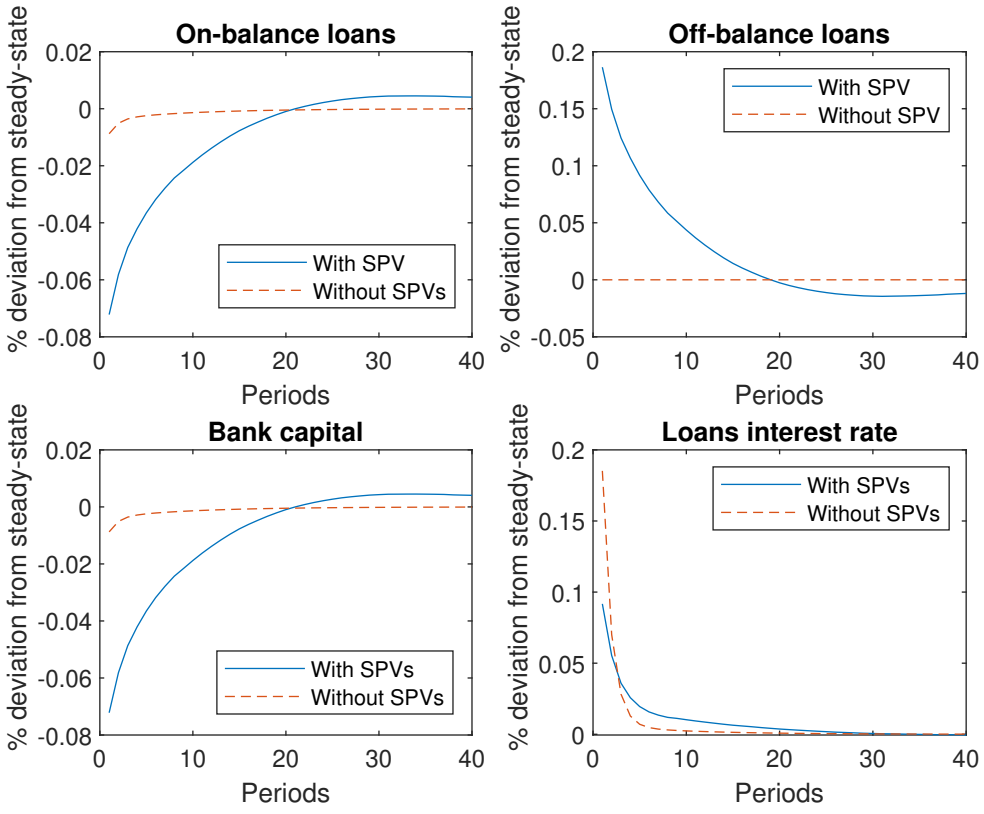


Figure 9: Credit risk shock (II)

adverse effects, potentially reflecting banks' efforts to build capital buffers and deleverage to reduce exposure to non-performing assets.

5. Conclusions

We incorporate commercial banks and their shadow banking activities—specifically securitization through SPVs—into a DSGE framework to examine the interaction between the financial and real sectors. A commercial banker, constrained by capital adequacy requirements, sets up an SPV to shift securitized assets off the bank's balance sheet, effectively circumventing regulation. The banker operates the bank and the SPV as distinct entities, with the SPV (i.e., the securitization) exempt from capital adequacy requirements—a practice that prevailed in the years leading up to the GFC.

We analyze business cycle dynamics and assess the effects of various macroprudential policies (with and without securitization), focusing particularly on the extent to which securitization allowed banks to circumvent statutory capital requirements in the lead-up to the GFC. We also examine the extent to which, in the absence of adequate regulatory oversight, securitization may undermine the effectiveness of the Basel III Endgame proposals, which set a statutory capital adequacy ratio of 10–15% of risk-weighted assets for banks.

Our counterfactual simulations reveal that securitization enabled banks to lower their *de facto* capital adequacy ratio from the required 8% to 4.2% in the run-up to the GFC—a substantial shortfall that undermined macroprudential policy and supports the view that securitization facilitated regulatory arbitrage and eroded bank capital buffers, thereby contributing to the GFC. In the Basel III scenario, where the capital adequacy ratio is raised to the proposed maximum of 15%, we find that, without robust prudential oversight of securitization practices, banks are likely to expand off-balance-sheet activities. This could create a substantial gap between the *de jure* and *de facto* capital ratios, potentially lowering the latter to as low as 6.3% and thereby significantly undermining the effectiveness of Basel III capital adequacy rules.

A standard positive TFP shock, as expected, raises output; however, the expansionary effects of securitization over the business cycle appear marginal at best. In the steady state, securitization raises output and welfare but does so at the cost of increased off-balance-sheet lending and weakened regulatory capital buffers, thereby elevating systemic risk. A higher LTV ratio (relaxed lending constraint) reduces off-balance-sheet lending and strengthens bank capital by lowering banks' incentives to securitise. It amplifies expansions and cushions downturns, whereas securitization appears to dampen these effects. In contrast, an increase in credit default risk raises lending rates, reduces bank loans, and contracts both output and deposits. Securitization amplifies these effects as banks seek to rebuild capital and shed non-performing assets.

To conclude, securitization without adequate regulatory oversight can substantially undermine capital adequacy requirements. To our knowledge, this is the first study to quantify these effects. Proponents claim securitization lowers the cost of bank credit; however, our findings reveal significant downsides. Acknowledging this trade-off is crucial for sound policy design. Our results highlight the necessity of robust regulatory oversight of securitization to preserve the integrity of capital regulation.

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Appendix A: Figures

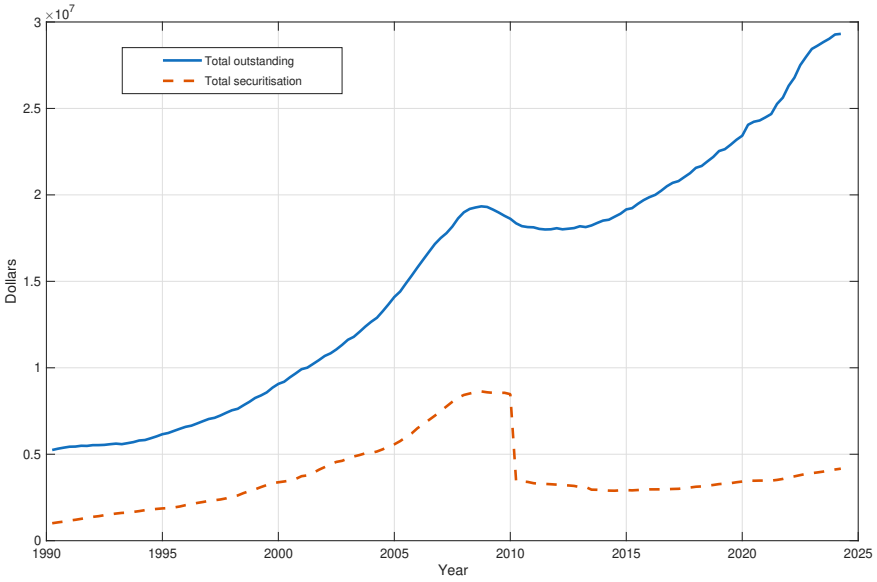


Figure A.1: Total outstanding and securitized loans (in trillions of dollars) include one-to-four-family, multifamily, commercial and farm mortgages, as well as C&I loans and consumer credit. Data cover both mortgage-backed (MBS) and asset-backed securities (ABS), sourced from the Board of Governors of the Federal Reserve System's Financial Accounts of the United States (Z.1), Tables L.126 and L.127: https://www.federalreserve.gov/apps/fof/FOFTables.aspx. We follow Loutskina's (2011) methodology, using data formerly known as the Flow of Funds Accounts before its 2013 renaming.

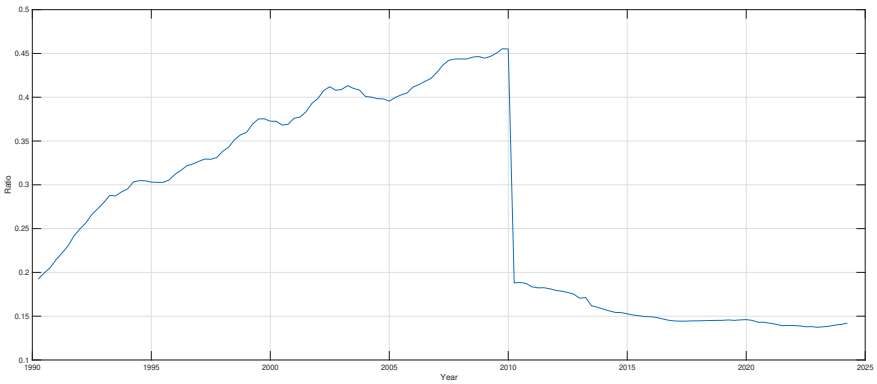


Figure A.2: The ratio of securitised to total outstanding loans reported in Figure 1 above.

Appendix B: Aggregation and Feasibility Conditions

Total consumption is defined as,

$$C_t = \mu C_t^i + (1-\mu)C_t^j \tag{36}$$

Similarly, by aggregating we obtain total labour as:

$$L_t = \mu L_t^i + (1-\mu)L_t^j \tag{37}$$

Only entrepreneur owns the capital stock, hence the total capital stock in the economy is:

$$K_t = (1-\mu)K_t^j \tag{38}$$

In similar vein, total investment, deposits, loans, collateral and savings in the economy are given by:

$$I_t = I_t^i + H_t - H_{t-1} \tag{39}$$

$$D_t = \mu D_t^i \tag{40}$$

$$H_t = (1-\mu)H_t^j \tag{41}$$

$$X_t = (1-\mu)X_t^j \tag{42}$$

$$S_t = \mu S_t^i + (1-\mu)S_t^j \tag{43}$$

It is now straight forward to arrive at the feasibility condition for the whole economy as:

$$Y_t = C_t + S_t = \mu C_t^i + (1-\mu)C_t^j + \mu S_t^i + (1-\mu)S_t^j \tag{44}$$