Managing Off-Balance Sheet Risks

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Learning Outcome

- Descript Off-balance sheet activities.
- Understand the risks associated with off-balance-sheet activities.
- Descript the process of loan sale and its risks.
- Understand the securitisation process and the risks associated with it.

Off-Balance Sheets

An Off-Balance Sheet (OBS) usually means an asset or debt or financing activity that is not reflecting on a bank's balance sheet.

Example:

1. Operating lease
2. Liabilities of unconsolidated Subsidiaries
3. Sales of receivables under certain conditions
4. Guarantee for a letter of credit

Off-Balance Sheets (Cont.)

An item should appear on the company's balance sheet if it is an asset or liability formally owned by the company or if the company is legally response for it.

Uncertain assets or liabilities must also meet tests of being probable, measurable and meaningful.

Incentives to Increase OBS Activities

Losses on LDC loans and reduced interest margins produced profit incentive

- Increases in fee income

Isolate losses and smooth profit.

Avoidance of regulatory costs or taxes

- Not levied on OBS activities:
  - Reserve requirements
  - Deposit insurance premiums
  - Capital adequacy requirement

Incentives to Increase OBS Activities (Cont.)

Example:

Company A has a subsidiary company B and it offloads all its risky investments in it.

Now, any potential losses of the subsidiary company do not reflect on the books of records of the parent company.

This helps A to appear financially more stable in the eyes of the public.

Incentives to Increase OBS Activities (Cont.)

Example:

- Bank balance sheet before securitisation

Assets		Liabilities	
Reserve	8	Deposits	100
Loan	100	Capital	8

- Bank balance sheet after securitisation*

Assets		Liabilities	
Reserve	8	Deposits	100
Securities	100	Capital	8

Off-Balance Sheets (Cont.)

In theory, the originator makes a profit because it gets more for selling the rights than it lent out in first place.

Securitisation enables banks to lend in high volume far beyond their own reserves / deposits.

Assets		Liabilities	
Reserve	8	Deposits	100
Loan	100	Extra Borrows	50
Extra Loan	50	Capital	8

Securitisation is an off-balance- sheet activity, will not show on bank's real balance sheet

Off-Balance-Sheet Risks

Contingent assets

Contingent liabilities

Derivative securities held off the balance sheet:

- Forward contract
- Futures contract
- Option
- Swap

Off-Balance-Sheet Risks (Cont.)

True picture of Equity

- Should include market value of on- and off-balance-sheet activities

$$\mathbf{E = (A - L) + (CA - CL)}$$

Equity = (Assets – Liabilities) + (Contingent Assets – Contingent Liabilities)

- Exposure to OBS risk just as important as other risk exposures

Off-Balance-Sheet Risks (Cont.)

Valuation of OBS items:

- Delta of an option
- Notional value of an OBS item
- Delta equivalent or contingent asset value
  - = delta × face value of option

$$\delta = \frac{\Delta option\ Premium}{\Delta underlying\ asset\ price}$$

Use Black-Scholes formula

$$\delta_{call} = e^{-qt} \times N(d_1)$$

$$\delta_{put} == e^{-qt} \times [(N(d_1) - 1)] \quad \text{where: } d_1 = \frac{\ln\left(\frac{S_0}{X}\right) + t(r - q + {}^{\sigma^2}/_{2})}{\sigma\sqrt{t}}$$

Example:

A bank has purchased options on bonds with a notional value of $500 million and has sold options on bonds with a notional value of $400 million. The purchased options have a delta of 0.25 and the sold options have a delta of 0.30. What is

(a) the contingent asset value of this position?

(b) the contingent liability value of this position?

(c) the contingent market value of net worth?

(a) The contingent asset value is $500 million x 0.25 = $125 million.

(b) The contingent liability value is $400 million x 0.30 = $120 million.

(c) The contingent market value of net worth is $125 million - $120 million = $5 million.

Derivative Contracts Held by Commercial Banks (Billions)

	1992	2015 (first quarter)
Futures & forwards	$4,780	$44,537
Swaps	2,417	117,711
Options	1,568	31,855
Credit derivatives	—	9,017
Total	8,765	203,120

Schedule Loan Activities

Banks must report to Federal Reserve as part of quarterly Call Reports

- Loan commitment
- Letters of credit
  - Letters of credit and standby letters of credit
- Derivative contract
- When-issued trading
- Loans sold
  - OBS only if sold without recourse

Loan Commitments

Interest rate risk

- If fixed-rate or variable-rate commitment, the bank is exposed to *interest rate* risk
- If floating rate commitment, there is still exposure to *basis risk*

Takedown risk

- Uncertainty of timing of takedown on loan commitment
- Back-end fees are intended to reduce this risk

Calculating Return on a Loan commitment

Return on a Loan

$$1 + k = 1 + \frac{of + (BR + \emptyset)}{1 - [b(1 - RR)]}$$

Return on a Loan commitment

$$1 + k = 1 + \frac{f_1 + f_2(1 - td) + (BR + \emptyset)td}{td - [b(td)(1 - RR)]}$$

Where:

BR = FI's base interest rate on the loans

Φ = Risk premium on loan commitment

f_1 = Up-front fee on the whole commitment

f_2 = Back-end fee on the average unused portion of the commitment

b = Compensating balance on loans

RR = Reserve requirements

td = Expected (average) takedown rate on the loan commitment

Loan Commitments (Cont.)

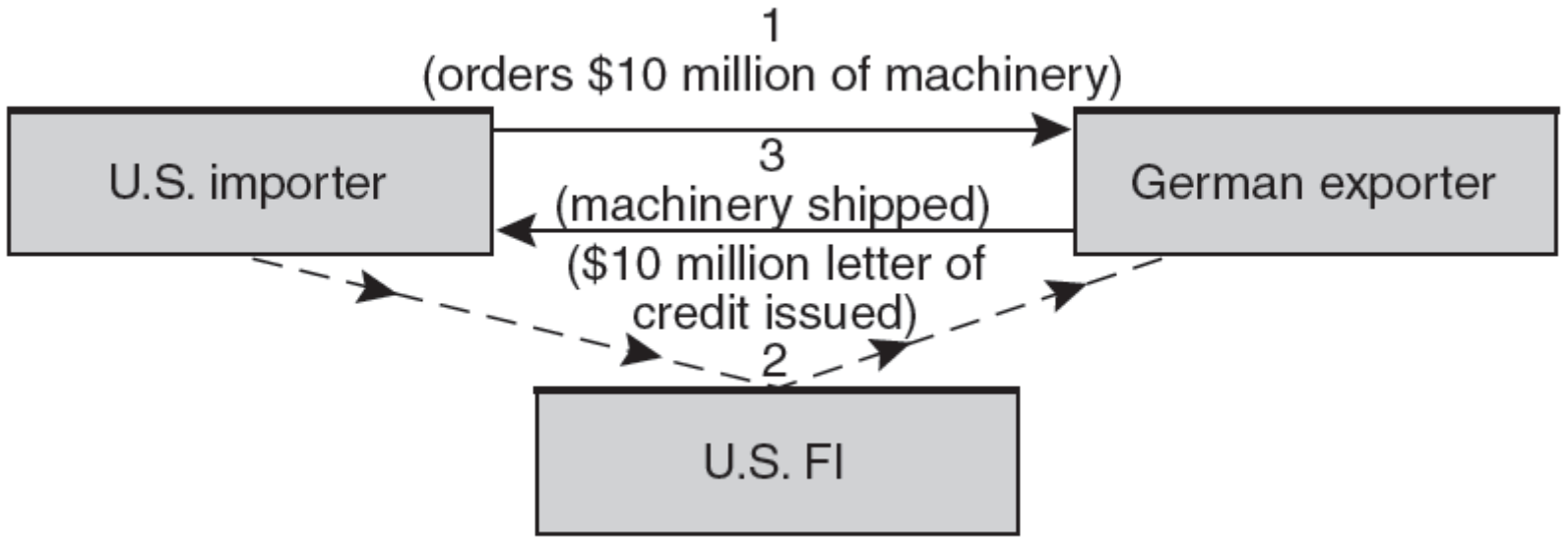
- Credit risk: Credit worthiness of the borrower may deteriorate over life of the commitment

- Aggregate funding risk: During a credit crunch, bank may find it difficult to meet all of the commitments
  - Compounded by externality effect and rising interbank borrowing rates

Commercial LCs and SLCs

- LCs are particularly important for foreign purchases, though are used frequently for domestic trade
  - If creditworthiness of the importer is unknown to seller or lower than the bank's, then gains available through using a LC
- SLCs often used to insure risks that are more severe, less predictable and/or not trade related:
  - Performance bond guarantees
  - P-C insurers also prominent in selling SLCs

Commercial LCs and SLCs (Cont.)



Example

A German bank issues a three-month letter of credit on behalf of its German customer who is planning to import $100,000 worth of goods from the United States. The bank charges an up-front fee of 100 basis points.

If the US exporter decides to discount this letter of credit after it has been accepted by the German bank, how much will the exporter receive, assuming that the interest rate currently is 5% and that 90 days remain before maturity?

Up-front fee earned = $100,000 x 0.0100 = $1,000. This fee will be recorded as noninterest income for the bank.

PV = (1 - (0.05 x 90/365) x $100,000 = $98,767.12

Loan Sale

May be sold with or without recourse

Types of loan sales

- Domestic
  - Traditional short term
  - HLT Loan sales
- Emerging market

Why Loan sell?

- Credit risk management
- Reserve requirements
- Fee income
- Capital costs
- Liquidity risk reduced by loan sales

Traditional Short-Term

- Key characteristics
  - Secured by assets of borrowing firm
  - Loans to investment grade borrowers or higher
  - Short term
  - Yield closely tied to commercial paper
  - Denominations of $1 million +

- Importance has declined with emergence of HLT and emerging market loan sales
  - Growth of commercial paper markets

HLT Loan Sales

Key characteristics

- Term loans
- Usually senior secured
- Long maturity (often 3- to 6-year maturities)
- Floating at rates tied to LIBOR, prime, or a CD rate
- Strong covenant protection
- Usually distinguished as distressed/non-distressed

Trends in Loan Sales

- Loan sales have taken place for over 100 years
- Correspondent banking
  - Small banks selling parts of loans to larger banks
  - Participations
- Expansion of loan sales during 1980s
- Early 1990s decline in loan sales followed by expansion
  - Expanding economy and resurgence in M&As
  - Early 2000s, economic slowdown triggered growth in distressed loan sales
  - Effects of the crisis on loan sales and the proportion of distressed loan sales

The Buyers

- Often segmented
  - Example: Distressed HLT loan buyers generally investment banks, hedge funds, venture funds
- Foreign banks important buyer of domestic loans
- Insurance companies and pension funds in long-term loans
- Mutual funds and non-financials

The Sellers

Major money center banks, U.S. government, and government agencies

Good Bank - Bad Bank:

- Establishment of subsidiary banks specializing in handling nonperforming loans (NPLs)
- Increases value of Good Bank
- Allows structuring of Bad Bank to improve management incentives and operating efficiency
- Proposed to remove toxic assets in the crisis

Other Sellers

- Foreign banks
  - Japanese banks in California
- Investment Banks
  - Merrill Lynch, generally large HLTs
- U.S. government and agencies (HUD, for example)
  - Increased due to Federal Debt Collection Improvements Act, 1996
  - Largest sales to date, Resolution Trust Corporation

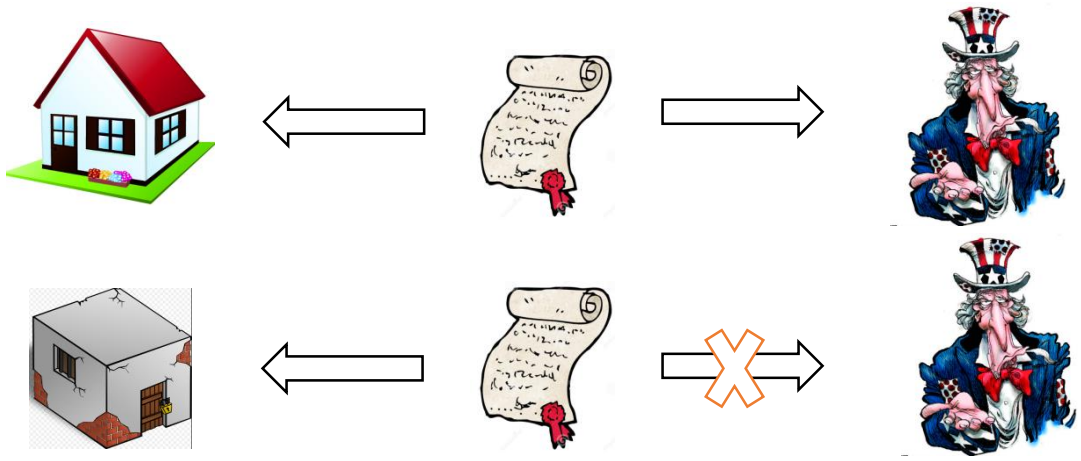
Securitisation

Packaging and selling of loans and other assets backed by securities

- Many types of loans and assets are being repackaged in this fashion
- Original use was to enhance the liquidity of the residential mortgage market
- Separates the risk of assets from lending
  - Perverse incentive effects instrumental in creating the financial crisis

Loan sale and Securitisation

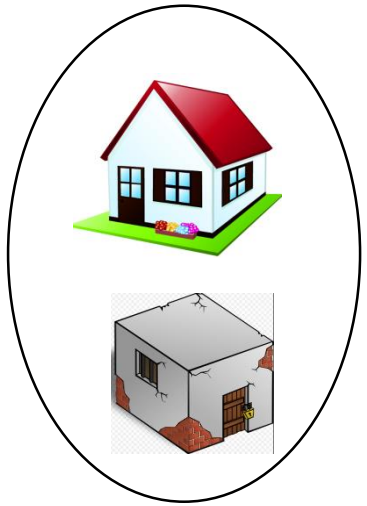
The bad assets on the originators' balance sheet normally are difficult to sell.



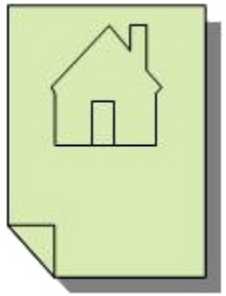
As a result, only good assets can be sold and bad assets will remain on the originators' balance sheet.

To enhance the sale

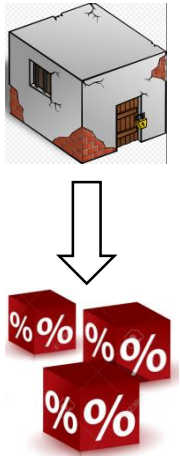
To sell bad assets



Step 1: pack bad assets with health assets



Step 2: rename the package as Mortgage Backed Securities (MBS)

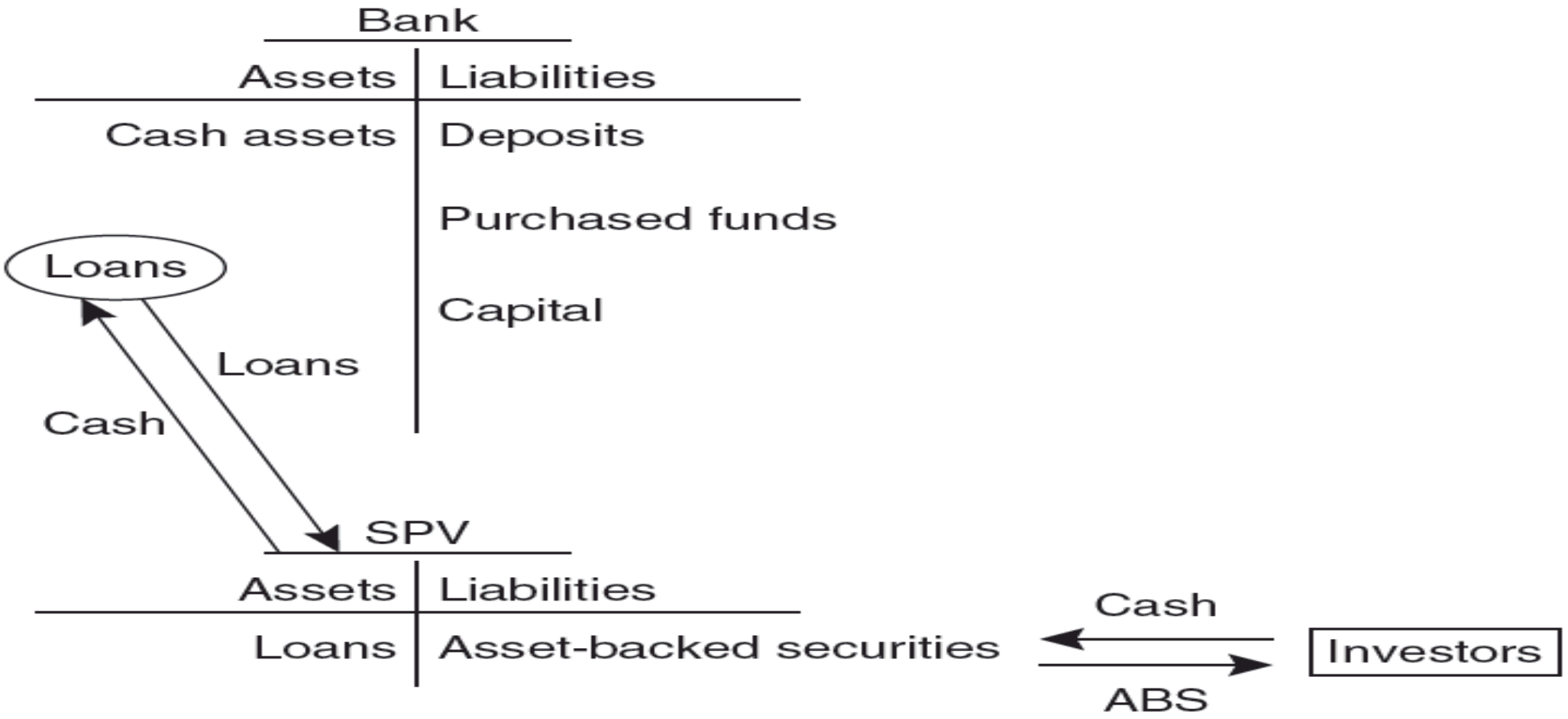


The bad assets are turned into the default possibility of MBS.

Securitisation (Cont.)

- Creation of special purpose vehicle, or SPV, to facilitate the removal of assets from the balance sheet
- SPV earns fees from creation and servicing
- All cash flows pass through the SPV according to terms of the ABS contract
- SPV exists until cash flows from the assets are fully distributed
- Structured investment vehicle, or SIV, issues commercial paper to purchase bank loans
  - SIV essentially an asset-backed security

Traditional Process using SPV



The Pass-Through Security

- Government National Mortgage Association (GNMA)
  - Sponsors MBS programs and acts as a guarantor
  - Timing insurance

- FNMA actually creates MBSs by purchasing packages of mortgage loans
  - Fully guarantees the securities

Freddie Mac

Federal Home Loan Mortgage Corporation

- Similar function to GNMA except major role has involved savings institutions
- Stockholder owned with line of credit from the Treasury
- In conservatorship with the FHFA
- Sponsors conventional loan pools as well as FHA/VA mortgage pools

Incentives & Mechanics of Pass-Through Security Creation

- Example: Create a mortgage pool from one-thousand $100,000 mortgages (results in $100 million mortgage pool)
- Each mortgage receives credit risk protection from FHA
- Capital requirement: $4.5 million
- Must issue *more than* $96 million in liabilities due to reserve requirements (+ FDIC premia)
- Reduces regulatory tax burden

Further Incentives

- Gap exposure
- Illiquidity exposure
- Default risk by mortgagees
  - FHA/VA bears the default risk
- Default risk by bank/trustee
  - GNMA responsible for payments to bondholders

GNMA Pass Through Payments

Assume there is no prepayment

For monthly payments (PMT), the monthly interest rate equals r/m, where r is the APR and m = 12 months

$$PV_n = PMT \times \left(\frac{1}{\frac{r}{m}}\right) \times \left[1 - \frac{1}{\left(1+\frac{r}{m}\right)^{nm}}\right]$$

Deduct the fees and arrangement costs

GNMA Pass Through Payments (Cont.)

Consider a GNMA mortgage pool with principal of $20 million. The maturity is 30 years with a monthly mortgage payment of 10 percent per year. Assume no prepayments.

a) What is the monthly mortgage payment (100 percent amortizing) on the pool of mortgages?

b) If the GNMA insurance fee is 6 basis points and the servicing fee is 44 basis points, what is the yield on the GNMA pass-through?

a) $20{,}000{,}000 = \text{PMT} \times \left(\frac{1}{10\%/12}\right) \times \left[1 - \frac{1}{\left(1+10\%/12\right)^{30\times 12}}\right]$, therefore PMT = $175,514.31

b) Annual rate is 10%-0.44%-0.06%=9.5%, the monthly rate is 9.5%/12=0.7917%

Prepayment Effects

Prepayments result of:

- Refinancing
  - Prepayment penalties and points
- Housing turnover

Most GNMA pools allow assumable mortgages

- Not the case for FNMA or FHLMC pass-throughs