

Growth and Financial Markets

Lecture 4

- Innovation in Financial Markets -

Financial Innovation

In **lecture 1** we saw that:

- **Expansion of credit** is a systematic development due to efforts to reduce transaction costs and holding of liquidity and money balances
- **History of money** is a story of continuing innovations so that the existing supply of money can be used more efficiently and of developments of close substitutes for traditional money in order to circumvent formal requirements applied to money

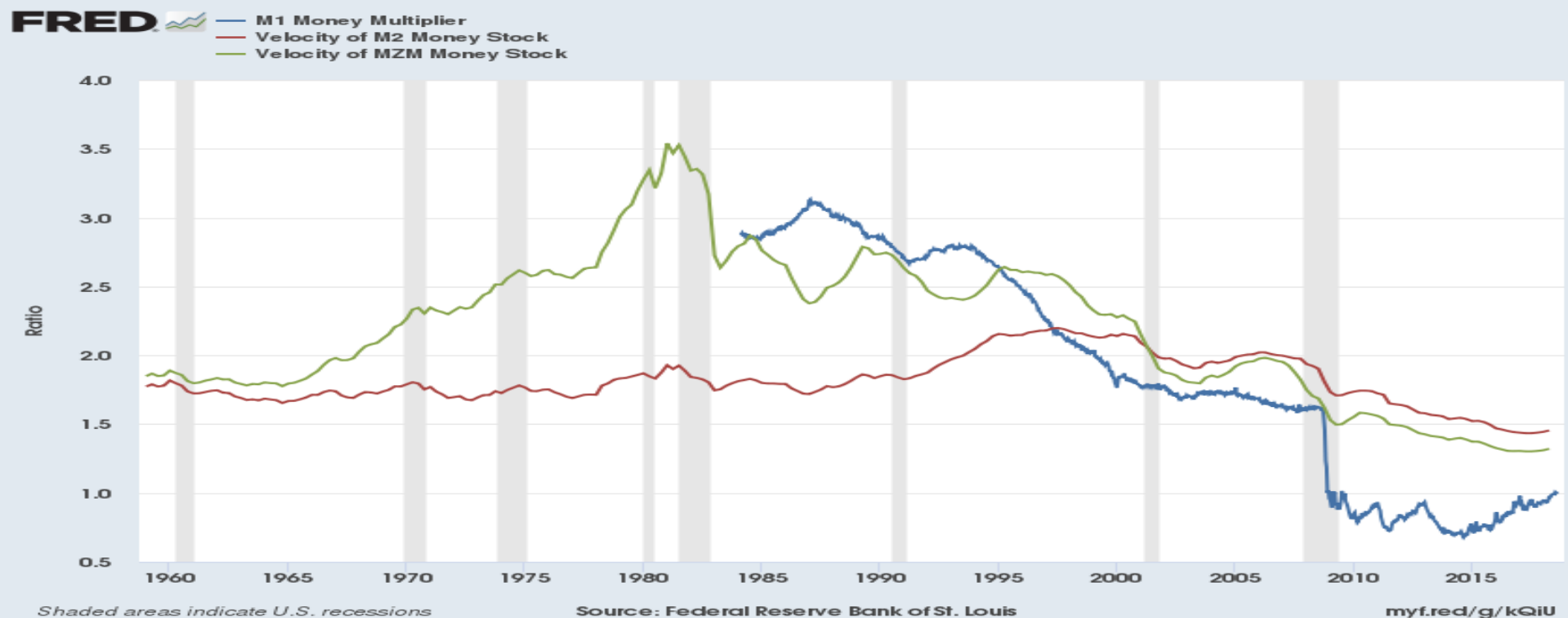
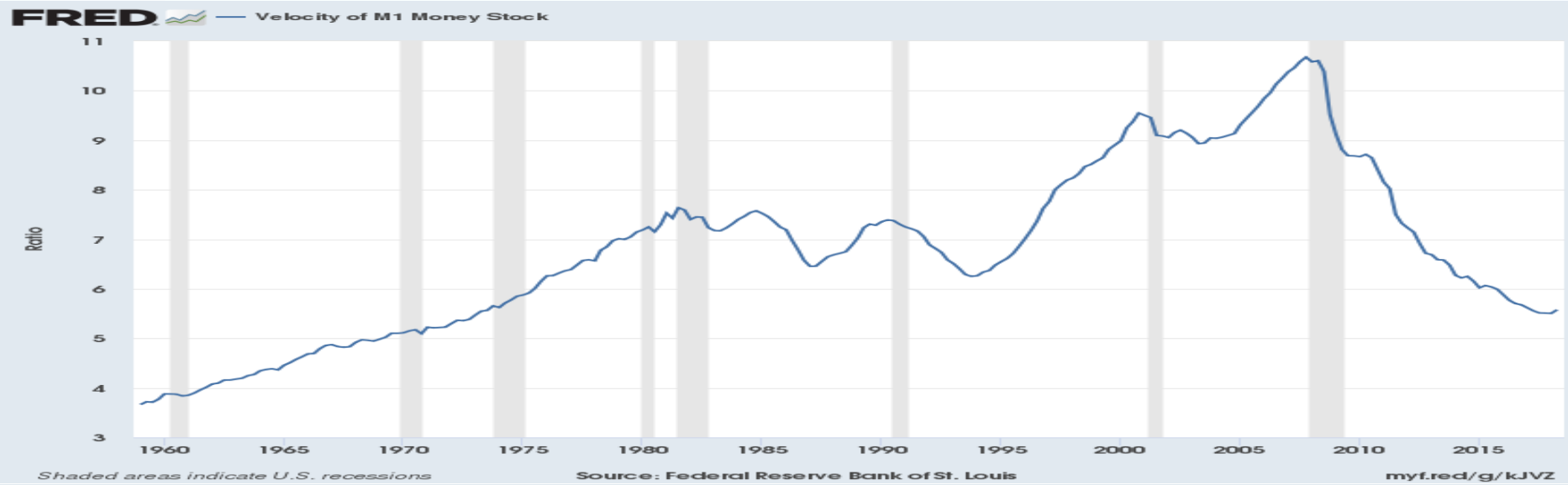
We now look at:

- **Innovation in the structure of the financial sector** (**lecture 4**)
 - The “**regulated**” banking system
 - The “**unregulated**” shadow banking system

The “regulated” banking system

- **A bank is a financial institution or financial intermediary that accepts deposits and channels those deposits into lending activities**, either directly by loaning or indirectly through capital markets. **A bank is the connection between customers that have capital deficits and customers with capital surpluses**
- Banks borrow money by accepting funds deposited on current accounts, by accepting term deposits, and by issuing debt securities (bonds)
- Banks lend money by making loans, and by investing in marketable debt securities and other forms of money lending
- It is important to understand that **banks create new money when they make a loan. New loans throughout the banking system generate new deposits elsewhere in the system.** The money supply is usually increased by the act of lending, and reduced when loans are repaid faster than new ones are generated
- For this reason the **banking sector plays a crucial role in the transmission of monetary policy**: since “credit creates deposit” **the well functioning of the banking sector is essential for the “money multiplier” to work properly**

The Money Velocity and the Money Multiplier (1/V)



Bank balance sheet: a stylized example

Assets

Liabilities

Assets	€ million	Liabilities	€ million
Deposits:		Deposits:	
Required Reserves (RR)	100	Demand Deposit (DD)	1,000
Excess Reserves (ER)	100	Time Deposit (TD)	400
		Certif. of Deposit (CD)	200
Interbank Deposit (ID)	200	Interbank Deposit (ID)	50
REPO		REPO	150
Bonds:		Bonds:	
Government	400	Covered bonds	100
Corporate/Financials	400	Senior Bonds	400
Structured	300	Subordinated Bonds	100
Loans:			
Mortgages	400		
Consumer	300		
Commercial & Industrial	500	Capital and Reserves	300
TOTAL	2700	TOTAL	2700

Bank funding - short term

The **liabilities of the bank** balance sheet – the **funding sources for a bank** – are:

◆ Short term funding

● Deposits

- Demand deposits (DD): Funds held in an account from which deposited funds can be withdrawn at any time without any advance notice to the depository institution. Demand deposits can be "demanded" by an account holder at any time. Many checking and savings accounts today are DD and are accessible by account holders through a variety of banking options, including teller, ATM and online banking
- Term deposit/CD: funds held in an account which cannot be accessed for a predetermined period
- Interbank deposits: funds that banks borrow and lend in the interbank lending market (i.e from and to other banks) in order to manage liquidity and satisfy regulations such as reserve requirements

● Repurchase Agreements (Repo)

- funds received in exchange of a temporary sale of securities, with the buyer (effectively the lender or investor) receiving securities as collateral to be protected against default by the seller. The party who initially sells the securities is effectively the borrower. A bank can fund its holdings of bonds through the repo markets and can also fund itself through repos with the Central Bank

Bank funding – medium/long term

The **liabilities of the bank** balance sheet – the **funding sources for a bank** – are:

◆ Medium/long term funding

● Bonds (medium to long term funding)

- Covered Bonds: debt instruments secured by a cover pool of mortgage loans (property as collateral) or public-sector debt to which investors have a preferential claim in the event of default. Bondholders have a claim against a cover pool of financial assets in priority to the unsecured creditors of the credit institution
- Senior Unsecured Bond: traditional debt instruments
- Subordinated Bond: debt instruments that rank below all other debts in case of losses or liquidation of the bank

● Capital and reserves (permanent funding)

- TIER 1 CAPITAL = (paid up capital + statutory reserves + disclosed free reserves) minus (equity investments in subsidiary + intangible assets + current & brought-forward losses)
- TIER 2 CAPITAL = A) Undisclosed Reserves plus B) General Loss reserves plus C) hybrid debt capital instruments and subordinated debts

Bank investments

The **assets** on the bank balance sheet – the **investments of a bank** – are:

- **Deposits** (short term investments, **very liquid**):
 - Required Reserves (RR): a % of deposits, usually only of DD, compulsorily held at the Central Bank (who may or may not pay interest on them)
 - Free (excess) Reserves (ER): any amount held at the Central Bank in excess of RR
 - Repo (repurchase agreements)
- **Bonds** (medium to long term investments, **liquid**):
 - Government Bonds: Bank invest in Government Bonds, **creating a linkage between sovereign credit and bank**
 - Corporate/Financial Bonds
 - Structured Bonds (ABS, CDO, etc.)
- **Loans** (medium to long term investments, **illiquid**)
 - Mortgages
 - Consumer Loans
 - Commercial & Industrial (C&I) Loans

The Activities of a Bank and its Risks

Banks conduct **(1) liquidity, (2) maturity and (3) credit transformation** and are therefore subject to the risks of these activities

1. Banks earn money from the **spread between their funding** – cheaper since it is mainly through liquid instruments and shorter maturities – **and their investments** – offering higher returns because they are more risky, more illiquid and have longer maturities. **Liquidity transformation** refers to the use of liquid instruments to fund illiquid assets. For example, a pool of illiquid whole loans might trade at a lower price than a liquid rated security secured by the same loan pool, as certification by a credible rating agency would reduce information asymmetries between borrowers and savers
2. Because banks fund themselves mainly at short-term maturity and invest in longer-dated bonds and loans, they are subject to **“maturity mismatch”** risks: **if all their customers were to withdraw their demand deposit at once, banks would not be able to pay them off without incurring very high costs**, since they would be forced to sell illiquid investments. **Maturity transformation** refers to the use of short-term deposits to fund long-term loans, which creates liquidity for the saver but **exposes the intermediary to rollover and duration-mismatch risks**
3. Banks are also active in **Credit transformation**: the **enhancement of the credit quality of debt issued by the intermediary through the use of priority of claims**. For example, the credit quality of deposits is better than the credit quality of the underlying loan portfolio due to the presence of junior equity in the bank capital structure

Bank's Risks and Capital Requirements

To ensure that banks do not take on excess leverage and become insolvent, they must comply with **Capital Requirements**

Capital requirements govern the ratio of equity to debt, recorded on the liabilities and equity side of a firm's balance sheet

The **Capital Adequacy Ratio (CAR)** is the percentage of a bank's capital to its **risk-weighted assets**. Regulators track a bank's CAR to ensure that it can absorb a reasonable amount of loss and complies with statutory **Capital Requirements**

Risk-weighted asset (RWA) is a bank's **assets plus off-balance sheet exposures**, weighted according to **risk**

- **CET1 Capital Ratio** = Common Equity Tier1/**RWA**
- **Tier 1 Capital Ratio** = Tier1 capital/**RWA**
- **Total capital ratio** = Total capital (Tier 1 + Tier 2)/**RWA**
- **Leverage Ratio** = Tier1 capital/Average total consolidated assets value

Liquidity Risks & “Bank runs”

The reliance on short-term liabilities by banks to fund illiquid long-term assets is an inherently fragile activity that is prone to “runs”

In the past



In the present



It is important to note that **illiquidity and insolvency** are two different things:

For example, **a bank can be solvent but illiquid** (that is, it can have enough capital but not enough liquidity on its hands).

However, many times, **insolvency and illiquidity come hand in hand**. When there is (or is feared) a major decline in asset values, depositors and other banks borrowers often start feeling uneasy and demand their money back, deepening the bank's troubles

For this reason banks have periodically been subject to **“bank runs”** that can **turn a liquidity crisis into a solvency crisis and can lead a bank to default**

Maturity/Liquidity Mismatches and “Systemic Crisis”

- Moreover a run on a single bank can easily extend to other banks – due to the **interconnectedness of the banking and financial system** – and thus lead to a “**systemic crisis**”
- A **(systemic) banking crisis** occurs when many banks in a country are in serious solvency or liquidity problems at the same time - either because there are all hit by the same outside “shock” or because failure in one bank or a group of banks spreads to other banks in the system
- As the failure of several banks (and even worse a systemic crisis) can have large, adverse effects on the real economy, governments shield the banking sector from the risks inherent in reliance on short-term funding by granting them access to **liquidity (and sometimes even credit) put options** in the form of:
 - **deposit insurance and other bank liabilities’ guarantees**
 - **discount window access (“lender of last resort”)**
- The presence of these **put options**, combined with the difficulty of accurately pricing them, creates well-known **incentives for excessive leverage and risk-taking (moral hazard)**, and motivates the need for prudential regulation and risk limits

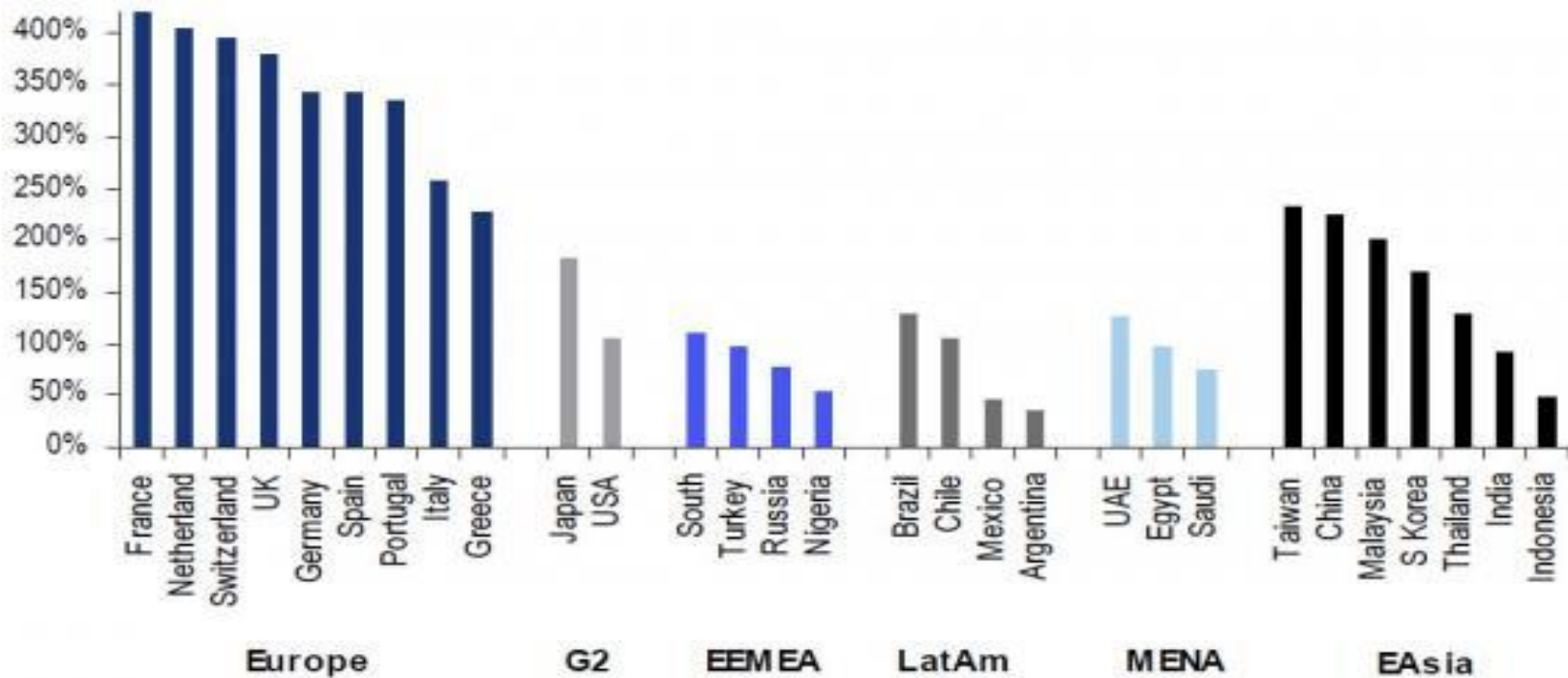
Deposit Insurance + Bank Liabilities' Guarantees

- **Deposit insurance** is aimed at **preventing bank runs from occurring** (and contagion from spreading from one bank to the whole banking system) **by reassuring depositors that they will get their money back if the bank becomes illiquid or even insolvent**
 - In the US Deposit insurance came into being in 1934 when the New Deal banking legislation created the Federal Deposit Insurance Corporation (FDIC)
 - Initially deposits were guaranteed up to US\$ 10,000, but the limit was gradually increased to US\$ 100,000. Moreover, when large banks got into trouble (Continental Illinois in 1984 and First Republic of Dallas in 1988) FDIC deliberately removed all limits on the amount of deposits covered by guarantees
 - Deposit insurance exists in almost all countries and, until the outbreak of the 2007 crisis, it prevented any bank runs “in modern time”
 - During the 2007 crisis “modern era” bank runs took place on Countrywide, Indymac and WaMu in the US and Northern Rock in the UK. The US\$ 100,000 insurance limit still left upwards of 40% of deposit with US banks uninsured: to prevent other banks run, most countries extended (implicitly and often explicitly) deposit insurance to cover deposits of almost all sizes
- Bank problems can also be triggered or deepened **if a bank faces too many liabilities coming due and does not have enough cash** (or other assets that can be easily turned into cash) **to satisfy those liabilities**. Besides deposits, **banks fund themselves also by issuing bonds**. As **these bonds come to maturity they need to be refinanced, else banks may run into liquidity problems** (or have to shrink credit, leading to a “credit crunch” in the economy and a widespread recession)
 - In 2008, at the height of the financial crisis, both the EU countries and the US issued **guarantees on the principal and interest payments of bank debt**, enabling banks to roll over their unsecured bond funding

Deposit Insurance + Bank Liabilities' Guarantees

- Deposit insurance and other bank liabilities guarantees can put a big strain on a country's finances, almost bankrupting a sovereign, as witnessed by Ireland
- In fact in many countries – especially in Europe - **banks' total balance sheets are a multiple of GDP**
- Since 1980s there has been a remarkable worldwide growth in capital flows and banking, both domestically and across borders, especially strong within Europe, in part due to the increasing (and policy-driven) integration of euro zone financial markets. **That development, however, undermined the ability of some member states credibly to backstop their national banking systems through purely fiscal means**

Chart 3: Total banking assets as % of GDP



Banks assets to GDP in € area

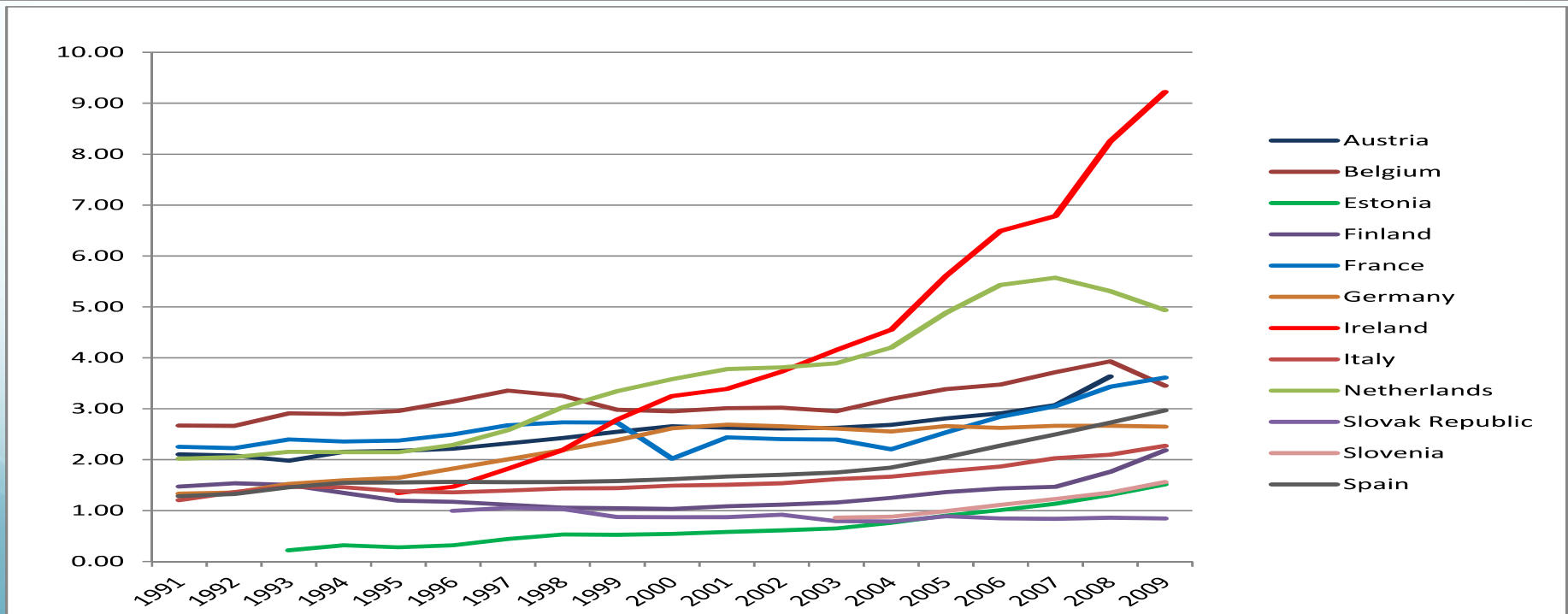
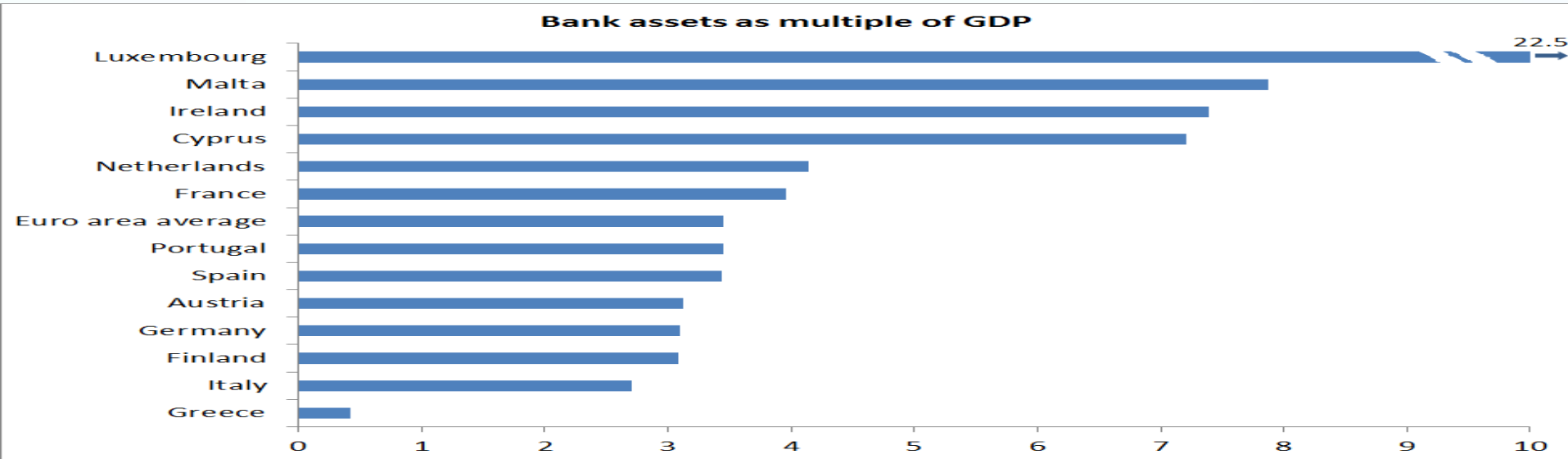


Figure 1 Bank assets relative to GDP, selected countries

The Costs of Deposit Insurance in the US

- In the US, where the deposit insurance combines features of an insurance fund – whose premiums are paid by participating banks - with a federal guarantee, the system did not require government funding until the 1980, when a couple of large banks and more than a thousand S&L became insolvent. The total losses to the US taxpayer of these banking crises of the 1980s were around US\$ 100 bn
- The costs for deposit insurance following the 2007 crisis will not be known for years to come, but will certainly amount to several hundred billions
- There are proposals to reduce a portion of these costs by increasing the insurance premiums on bank deposits – a suggestion resoundingly opposed by sound banks
- **Deposit insurance scheme face problems of:**
 - **Adverse selection** (when a bank's demand for deposit insurance is positively correlated with that bank's risk of default)
 - **Moral Hazard** (when both banks and depositors will be more willing to take a risk, knowing that the potential costs or burdens of taking such risk will be borne, in whole or in part, by others - eventually by the government/the taxpayers)

Discount window access (Lender of Last Resort)

- Banks can borrow money at the “**discount window**” from the central bank, usually on a short-term basis, to meet temporary shortages of liquidity caused by internal or external disruptions
 - The term “discount window” originated with the practice of sending a bank representative to a reserve bank teller window when the bank needed to borrow money.
 - The interest rate charged on such loans by a central bank is called **discount rate** (base rate, or repo rate) and in some circumstances it can be an **important monetary policy tool**
- In the eurozone the discount window is called **Standing Facilities**. Qualifying counterparties can use the Standing Facilities to increase the amount of cash they have available for overnight settlements using the Marginal Lending Facility. Conversely, excess funds can be deposited within the European Central Bank System (ECBS) and earn interest using the Deposit facility
 - Counterparties must have proper collateral for the funds they receive from the Marginal Lending Facility (the rules on the quality of collateral have been substantially eased after the euro crisis) and will be charged the overnight rate set by the ECBS. Excess capital can be deposited with the Deposit facility and will earn interest at the rate offered by the ECBS
 - **The rates for these two facilities** signal the ECB outlook for commercial interest rates and **set the upper and lower limit for interest rates on the overnight market**

Lender of Last Resort

- **Lender of last resort (LLR) support** is aimed at preventing bank runs from occurring (and contagion from spreading from one bank to the whole banking system) by giving banks ready access to cash so that they can pay off their depositors. During a crisis, the LLR must stand ready to halt a run out of real assets and illiquid financial assets into money by supplying as much money as may be necessary to forestall the run
- However if investors believe that banks and perhaps other selected borrowers will be supported in moments of distress by a lender of last resort, they would be less cautious in the extension of loans during the next boom (inter-temporal moral hazard problem)
- In a panic the rush from the sales of securities and commodities into money leads to the “**fallacy of composition**”: the sale of these assets by investors in the effort to minimize losses leads to declines in the asset prices, with the consequence that a large number of otherwise previously solvent and well-capitalized banks may become bankrupt
- The development of the LLR doctrine evolved in the UK at the end of eighteenth century when “it was recognized that the remedy [in financial crisis] was for the monetary authority (Bank of England/the Government) to make an emergency issue of some kind of paper which bankers, merchants and the general public would accept. When this was done the panic was allayed”
- **Bagehot**, the famous Governor of the Bank of England in the nineteenth century, articulated the doctrine of the LLR in 1848: “It is a great defect of a purely metallic circulation that the quantity of it cannot be readily suited to any sudden demand Now as paper money can be supplied in unlimited quantities, however sudden the demand may be, it does not appear to us that there is any objection on principle to sudden issues of paper money to meet sudden and large extensions of demand This power of issuing notes is one excessively liable to abuse ... It should only be used in rare and exceptional cases”
- Key questions:
 - Who should be in charge (acting as LLR) during a crisis? The Government or the Central Bank?
 - Who should have access to the LLR? Only regulated banks or all financial intermediaries?
 - How much and on what terms should be lent by the LLR?
 - Against what collateral?

Lender of Last Resort & Open Market Operations

- The Bagehot' rule was that the **Central Bank should grant loans to all comers on the basis of sound collateral “as largely as the public asks for them”**
- Bagehot's advise is to **lend freely at a penalty rate**. “Freely” means only to solvent borrowers and with good collateral

Accessing the discount window (i.e. relying on the LLR) can have a stigma attached to it and, especially during systemic crisis, banks try to avoid it

- The LLR can supply funds to the system also through **open market operations** (OMO) – sales or purchases of securities (usually government bonds) in the open market - rather than through the discount mechanism

OMO are nowadays key tools of monetary policy for Central Banks

- The Fed was woefully inadequate with its OMO in October-November 1929 but under Greenspan it acted decidedly after the Black Monday Crash of October 1987, the LTCM default in September 2009 and the Twin Towers attack in September 2001: given a seizure of credit in the system, the Greenspan's approach has been “more is safer than less, since the excess can be mopped up later”
- The LLR, through the discount window or through OMO, can help overcome a liquidity crisis – that is **Central Banks can help sustain the liability side of the banking sector's balance sheet**

But what about the other side of the balance sheet, i.e. the quality of the assets?

Credit Risk in the Banking Sector

- Banks are subject to **credit risks**: they can make bad investment decisions and the value of their assets (bonds and loans) can fall if the borrowers are not able to repay the interest or principal due
- The **decrease the value of banks' assets (credit risk) can endanger a bank**
The deterioration in asset values can occur, for example, due to a collapse in real estate prices (that will hit directly mortgages as well as MBS and other structured bonds held on the bank's balance sheet) or from an increased number of bankruptcies in the nonfinancial sector. Or, if a government stops paying its obligations, this can trigger a sharp decline in value of bonds held by banks in their portfolios, creating a very dangerous link between sovereign risk and banking sector solvency
- During the 2007 crisis investors did not know how much each bank was exposed to "toxic" structured credit instruments – directly, on its balance sheet, and indirectly, through derivative products and through the bank's links with the "shadow" banking system – nor were they in a position to correctly value this kind of exposure
- Concerns during 2007 crisis centered primarily on the **uncertainty of the amount of the losses due to underpricing of risk**
- When asset values decrease substantially, a bank can end up with liabilities that are bigger than its assets (meaning that the bank has negative capital, or is "**insolvent**"). Or, the bank can still have some capital, but less than a minimum required by regulations (sometimes called "**technical insolvency**")

Insolvency and bank “resolution”

- The first and easiest response to a bank’s solvency problem is **regulatory forbearance**, as in the banking and S&L crisis of the 1980s: government and regulators allowed banks to operate with lower than minimum required capital by pretending that the assets on their balance sheet were still viable (accounting at historical cost)
- **Weaker banks can be taken over by stronger ones**, often with the government’s “moral suasion” and financial support (JP Morgan takeover of Bear Stearns, “arranged mergers” between BoA and ML, etc.)
- If a bank needs capital, and it cannot be provided by the market, rather than letting it default **the Government can step in**, either buying a minority stake or taking over the whole bank (RBS and Lloyds’ bank in the UK)
- The “definitive” way of **dealing with insolvent banks is to fully nationalize them and, where appropriate, close them down**. In this process not only shareholders and subordinated bond holders, but also unsecured bond holder can incur in substantial or even total losses, therefore there is a very high systemic risk
- The usual operating procedure is to carve a “**good bank**” from the rescued institution while the remaining assets of the failed institution would be retained for eventual sale by a newly created “**bad bank**”, supported by government guarantees
- A smooth “resolution” of complex financial institution is always a very difficult process and, although now banks are required to put in place plans for such an event, it is better to **prevent insolvency through good corporate governance and better and stronger regulations**

Governance in the Banking Sector

- Besides shareholders, the **stakeholders in banks are both numerous** (depositors, debtholders, and the government as both insurer of deposits and residual claimant on systemic externalities) **and large** (over 90% of the balance sheet of banks is debt, as opposed to 40% for non financial firms)
- Yet shareholders control the firm, and evidence shows that both the Boards and the compensation package for CEOs represent the shareholders' preference for increasing risks. That preference, however, is in conflict with the preference of other stakeholders
- Despite the multitude of stakeholders, **banks Board represents solely the views of shareholders**, subject to regulatory constraints. Shareholders' interests may diverge substantially from those of other stakeholders, especially on risk, where shareholders prefer volatility and may have short-term perspectives. Debtholders and regulators prefer low volatility and take longer-term views. Bank boards should challenge management and engage in good dialogue to ensure that the company's actions and decisions take into account the wide range of factors that could affect all stakeholders
- **Bank executive compensation** should be designed to protect debtholders, rather than enhance risk taking and only create value for shareholders
- **The structure of incentives in the modern financial system leads financiers to take excessive "tail risks"** - e.g. bet against "rare" events that would though have very serious consequences – **to produce "alpha"** – e.g. "extra-return" or "extra-performance"
- The **risk management function** should be led by an experienced and independent CRO, given appropriate status and compensation in line with the importance of the role
- A **well-designed regime for capital adequacy and banking regulations** may serve as a partial substitute for formal corporate governance rules, **because proper capital regulation can strengthen market incentives for bank shareholders and managers to act in the interest of all stakeholders**

Banking Regulation-Basel 1 & 2

- Banks, due to their involvement in monetary and payment system and their key role in transmission of monetary policy, have long been **under strict prudential regulations**
- The foundations for today's financial regulatory framework were laid in the 1980s
- The **Basel Accord** of 1988 was the first-ever international prudential regulatory agreement. For the first time in fin. history, a minimum standard had been established for all internationally-active banks. The Basel I agreement was only 30 pages long
- **Basel I** focused on a limited set of credit risks measured at a broad asset class, rather than individual exposure, level. Only **five different risk weights** were defined under Basel I, varying from zero to 100%. Calculating regulatory capital ratios was very simple since **the aim of Basel I rules were there to support, not supplant, commercial risk decisions**
- During the 1990s, the bluntness of the risk judgements embodied in Basel I came increasingly to be questioned – and arbitrated. Basel I was perceived as lacking risk-sensitivity, at least by comparison with the new wave of credit and market risk models emerging at the time: **in 1996 the Market Risk Amendment allowed banks to use internal models to calculate regulatory capital vs market risk**
- **Basel II**, was agreed in 2004. Internal risk models were allowed as a means of calibrating credit risk: actually they were actively encouraged, with **internal risk models designed to deliver lower capital charges**. **Basel II served as an incentive device for banks to upgrade their risk management technology**
- As a by-product, there was a step change in the granularity of the Basel framework. **Risk exposures were no longer captured at a broad asset class level. Risk weights on these exposures were no longer confined to five buckets. That added greater details and complexity.** Reflecting these changes, Basel II came in at 347 pages – an order of magnitude longer than its predecessor

Banking Regulation-Basel 3

- The financial crisis struck exposed gaping holes in the Basel II agreement
- An underlying cause of the global financial crisis was the build-up of excessive on- and off- balance sheet leverage in the banking system.

In many cases, banks built up excessive leverage while apparently maintaining strong risk-based capital ratios. At the height of the crisis, financial markets forced the banking sector to reduce its leverage in a manner that amplified downward pressures on asset prices. This deleveraging process exacerbated the feedback loop between losses, falling bank capital and shrinking credit availability.

Risk-weighted asset (RWA) is a bank's **assets plus off-balance sheet exposures**, weighted according to **risk**. The problem is:

- What are the correct weights for each of a bank's assets and off-balance sheet exposures?
- Who is in charge of calculating these weights (standard model vs internal model) and who will control that these weights are correct?

The response has been: fill the largest gaps of Basel II, with large upwards revisions to the calibration of the Basel framework. Agreement on this revised framework, **Basel III**, was reached in 2010. In line with historical trends the documents making up Basel III added up to 616 pages, almost double Basel II

- The Basel III framework introduced a simple, transparent, non-risk based **leverage ratio** to act as a credible supplementary measure to the risk-based capital requirements (see slide 9). The leverage ratio is intended to:
 - restrict the build-up of leverage in the banking sector to avoid destabilising deleveraging processes that can damage the broader financial system and the economy; and
 - reinforce the risk-based requirements with a simple, non-risk based “backstop” measure.

The Complexity of Basel 3

- **The length of the Basel III rulebook understates its complexity.** The move to internal models, and from broad asset classes to individual loan exposures, has resulted in a ballooning in the number of estimated risk weights. For a large, complex bank, this has meant a rise in the number of calculations required from single figures a generation ago to several million today
- That increases **opacity**. It also raises questions about **regulatory robustness** since it places reliance on a large number of estimated parameters
- Across the banking book, a large bank might need to estimate several thousand default probability and loss-given-default parameters. To turn these into regulatory capital requirements, the number of parameters increases by another order of magnitude
- If that sounds large, the parameter set for the trading book is almost certainly larger still. To give some sense of scale, consider model-based estimates of portfolio Value at Risk (VaR), a commonly-used technique for measuring risk and regulatory capital in the trading book. A large firm would typically have several thousand risk factors in its VaR model. Estimating the covariance matrix for all of the risk factors means estimating several million individual risk parameters. Multiple pricing models are then typically used to map from these risk factors to the valuation of individual instruments, each with several estimated pricing parameters

Over-Regulation

- **In the 1980s the 30 pages of Basel I were translated into 18 pages in the US and 13 pages in the UK. With Basel III, the domestic documentation topped 1,000 pages in both countries**
- Contrast the legislative responses in the US to the two largest financial crises of the past century – the Great Depression and the Great Recession:
 - The single most important legislative response to the Great Depression was the Glass-Steagall Act (GSA) of 1933: this may well have been the single most influential piece of financial legislation of the 20th century. Yet it ran to a mere 37 pages
 - The legislative response to this time's crisis, culminating in the Dodd-Frank Act (DFA) of 2010, could not have been more different. On its own, the Act runs to 848 pages – more than 20 Glass-Steagalls. That is just the starting point. For implementation, DFA requires an additional almost 400 pieces of detailed rule-making by a variety of US regulatory agencies. Two years after the enactment of DFA, only a third of the required rules had been finalised. Those completed have added a further 8,843 pages to the rulebook: once completed DFA could comprise 30,000 pages of rulemaking, roughly a thousand times larger than its closest legislative cousin, GSA
- The situation in Europe, while different in detail, is similar in substance. More than a dozen European regulatory directives or regulations have been initiated/reviewed, covering capital requirements, crisis management, deposit guarantees, short-selling, market abuse, investment funds, alternative investments, venture capital, OTC derivatives, markets in financial instruments, insurance, auditing and credit ratings. These are at various stages of completion. So far, they cover over 2000 pages. That total is set to increase dramatically as primary legislation is translated into detailed rule-writing, with estimates up to 60,000 pages
- **As the density and complexity of financial regulation increase so did the scale and scope of regulatory resources. Numbers of regulators have risen, both in absolute number and relative to the people controlled and so too have regulatory reporting requirements**

Over-(complex)/Ineffective Regulation

1. **Primary source of complexity in Basel II: granular, model-based risk-weighting**
 - How do banks themselves estimate risk to their asset portfolios through their internal models? What **size of time-series sample is needed** for a more complex model to outperform a simple model?
 - Haldane (2012) shows that when sample sizes are small, simpler models are unambiguously superior. With highly imperfect information, adding model complexity simply increases prediction errors. As the sample size expands, model uncertainty decreases and prediction errors fall. But it is only at sample sizes in excess of 100,000 days (400 years) that estimates of the “true” model outperform a much simpler one. Moreover, the simple model is only materially worse than complex models when the sample size rises to around 250,000 days (1,000 years)
 - Heightened risk-sensitivity of the regulatory framework intended to improve detection of bank weakness. **If the financial environment is uncertain, complex risk-weighting may be sub-optimal.** Simpler weighting measures, like simple leverage ratios - with assets equally-weighted -, may be more robust in predicting “tail events” (like bank failures)
2. **Complexity in “definition of capital”: simpler measures of accounting capital based on equity capital (core Tier 1) outperform broader, more complex, measures**
 - Basel III rules prescribed a 3% max leverage ratio: banks’ equity can in principle be leveraged up to 33x. Most banks would say a loan-to-value ratio of 97% was imprudent for a borrower. A 3% leverage ratio means banks are such a borrower! For the world’s largest banks, the leverage ratio needed to guard against failure in this crisis would have been above 7%
 - The “Tower” of Basel is underpinned by three pillars: **Pillar 1 (regulatory rules); Pillar 2 (supervisory discretion); and Pillar 3 (market discipline).** To date, the weight borne by these three pillars has been heavily unbalanced, with most of the strain taken by Pillar 1. Simplifying Pillar 1 rules would help rebalance the Basel scales. That would not only strengthen Pillar 1, but could simultaneously strengthen Pillars 2 and 3

Re-regulating Finance

- Over the past 30y, the regulatory direction of travel has been towards pricing risk in the financial system, rather than outright prohibiting or restricting it. **“Regulators have pursued price over quantity-based regulation”**
 - That makes sense when optimising in a “risky” world. It may make less sense when optimising in an “uncertain” world
 - In an “uncertain world” **Quantity-based restrictions may be more robust to mis-calibration.** Simple, quantity-based restrictions are the equivalent of a regulatory commandment: “Thou shalt not”. These are likely to be less fallible than: “Thou shalt, provided the internal model is correct”. [That is one reason why Glass-Steagall lasted for 60 years longer than Basel II]
 - Quantity-based regulatory solutions have gained currency during the course of the crisis. In the US, the Volcker rule is a quantity-based regulatory commandment: “Thou shalt not engage in proprietary trading”. In the UK, the Independent (“Vickers”) Commission on Banking has also proposed structural, quantity-based reforms: “Thou shalt not co-mingle retail deposit-taking and investment banking”. In Europe the Liikanen Report recommended actions such as:
 1. Mandatory separation of proprietary trading and other high-risk trading
 2. Additional separation of activities, conditional on the recovery and resolution plan (RRP)
 3. Toughening of capital requirements on trading assets and real estate related loans (i.e. mortgages)
 4. Strengthening the governance and control of banks – including measures to rein in or bail-in bonuses

“The problems that exist in the world today cannot be solved by the level of thinking that created them” (A. Einstein)

- **New regulation should be non-discretionary, contingent, cost effective and – above all – comprehensive:**
 - Non-discretionary and transparently enforced, in order to have a greater chance of being adhered to, even in times of great optimism
 - Contingent, in order to come in force only if circumstances warrant it, strictly necessary
 - Cost effective, in order to reduce the incentives to evade the new rules
 - Comprehensive, to avoid “regulatory arbitrage” and abnormal growth of the “shadow banking system”

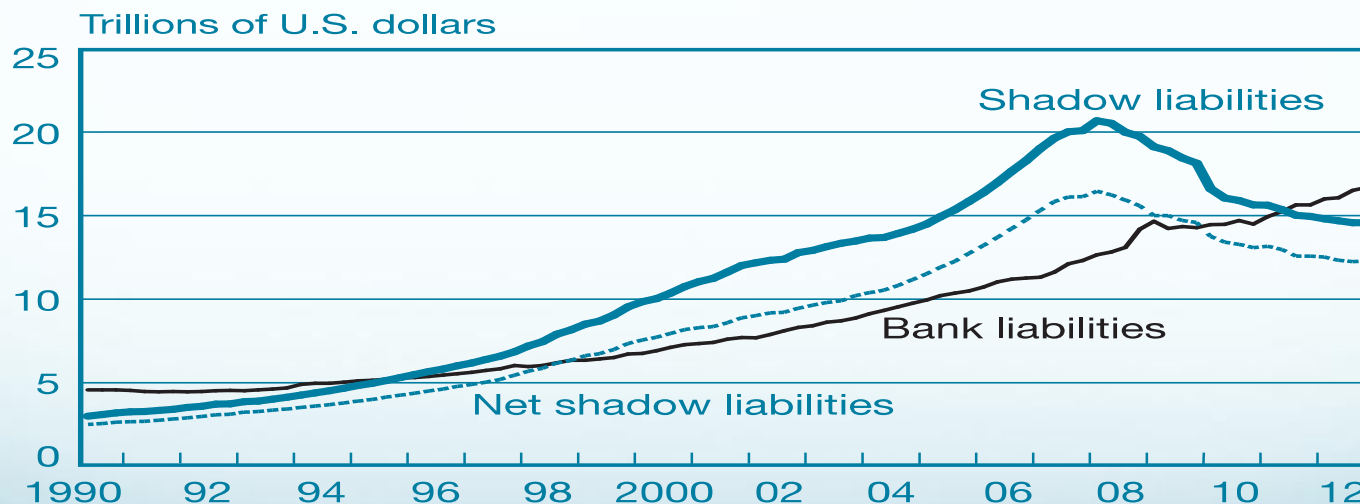
Off Balance Sheet Operations and “Shadow Banks”

- Drawing lessons from the crisis, **regulators are significantly tightening banks’ capital and liquidity requirement:** but emphasis on capital and liquidity requirements as a percentage of assets or other liabilities lead banks to switch to “**off-balance sheet operations**” [“Risk will move from the regulated more transparent banking sector to a less regulated, more opaque sector”, Gary Cohn, President of Goldman Sachs]
- “**Off-balance sheet operations**” generate fees or commissions for banks, but assets or liabilities are “contingent” (or “committed”) therefore not shown on the balance sheet, except as a footnote. **Banks’ RoE increases**, apparently at no cost [**Regulatory Arbitrage**], as do bankers’ remunerations
- **Off-balance sheet transactions include** interest rate & currency swaps, futures, options, underwriting risks, “repos” and securitized credit
- **Shadow banks (SB)** are financial intermediaries that conduct maturity, credit, and liquidity transformation without access to “explicit” central bank liquidity or public sector credit guarantees. Therefore “shadow banks” (SB) are more lightly regulated (if at all)
- **SB include** finance companies, asset-backed commercial paper (ABCP) conduits, limited-purpose finance companies, structured investment vehicles (SIV), credit hedge funds (HF), money market mutual funds (MMFs), securities lenders, government-sponsored enterprises (GSE)

The size of the Shadow Banking System (SBS)

- The involvement of SB in the financial system has increased significantly over time: since 1995 in the US the gross size of SB has been estimated to be larger than the banking sector. At the eve of the financial crisis, the volume of credit intermediated by the shadow banking system was close to \$20 trillion, or nearly twice as large as the volume of credit intermediated by the traditional banking system at roughly \$11 trillion.
- Prior to the 2007-09 financial crisis, the SBS provided credit by issuing liquid, short-term liabilities against risky, long-term, and often opaque assets. The large amounts of credit intermediation provided by the SBS contributed to asset price appreciation in residential and commercial real estate markets and to the expansion of credit more generally

Shadow Bank Liabilities versus Traditional Bank Liabilities



Sources: Board of Governors of the Federal Reserve System, “Flow of Funds Accounts of the United States” (as of 2011:Q3); Federal Reserve Bank of New York.

The Shadow Banking System (SBS)

- **Credit, maturity, and liquidity transformation - the three functions of credit intermediation - are three independent concepts.** They are normally “lumped” together on the balance sheets of banks, but the securitization-based shadow credit intermediation process allows the separation of these three functions
- **The SBS** can thus be interpreted as a system which **reallocates the three functions of banks across a variety of specialist, non-bank financial intermediaries, each of which has a distinctive comparative advantage**
- Unlike in the traditional banking system, however, in the SBS savers do not place their funds with banks, but rather with MMFs and similar funds (credit HF) – representing the liabilities of the SB - which offer investors a wide spectrum of seniority and duration, and correspondingly, of risk and return
- **SBS performs its activities without access to “explicit” public support** (e.g. central bank liquidity provisions or public sector credit guarantees): but **in a long and complex value chain where no one takes responsibility for the whole chain, the moral hazard is high** and may lead to the **“too interconnected to fail”** problem
- **Securitization-based credit intermediation potentially increases the efficiency of credit intermediation.** However, it also creates agency problems that do not exist when these activities are conducted within a bank. If these agency problems are not adequately mitigated, **the SBS is prone to excessive lowering of underwriting standards and to overly aggressive structuring of securities**

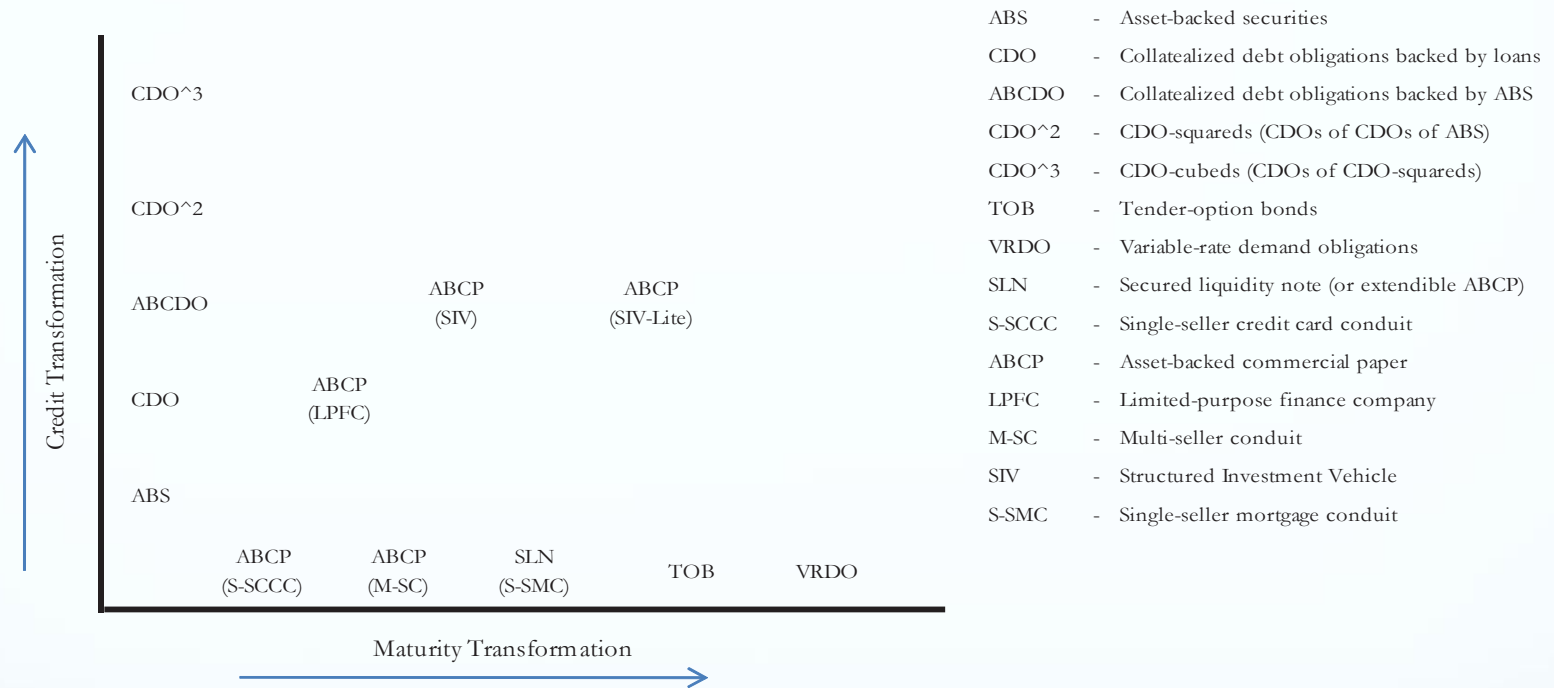
Credit Intermediation in the SBS

Amounts to “**vertical slicing**” of traditional banks’ credit intermediation process:

1. **Loan origination** (auto loans and leases, student loans or non-conforming mortgages) is performed by finance companies which are funded through commercial paper (CP) and medium-term notes (MTNs)
2. **Loan warehousing** is conducted by single- and multi-seller conduits and is funded through asset-backed commercial paper (ABCP)
3. **ABS issuance**: The pooling and structuring of loans into term asset-backed securities (ABS) is conducted by broker-dealers’ ABS syndicate desks
4. **ABS warehousing** is facilitated by traditional banks (and investment banks) through trading books and is funded through repurchase agreements (repo), total return swaps or hybrid and repo/TRS conduits.
5. **ABS/CDO issuance**: The pooling/structuring of ABS into CDOs is also conducted by broker-dealers’ ABS syndicate desks
6. **ABS intermediation** is performed by limited purpose finance companies (LPFCs), structured investment vehicles (SIVs), securities arbitrage conduits and credit hedge funds (HF), which are funded in a variety of ways including for example repo, ABCP, MTNs, bonds and capital notes
7. **Wholesale funding**: The funding of all the above activities and entities is conducted in wholesale funding markets by funding providers such as:
 - regulated and unregulated money market intermediaries (MMMFs and enhanced cash funds, respectively) and direct money market investors (such as securities lenders), which fund shadow banks through short-term repo, CP and ABCP instruments
 - fixed income mutual funds, credit HF, pension funds and insurance companies also fund shadow banks by investing in their longer-term MTNs and bonds

Credit/Maturity Transformation of SBS (II)

Structured Credit Assets and Shadow Bank Liabilities on a Credit/ Maturity Transformation Spectrum - **Illustrative**

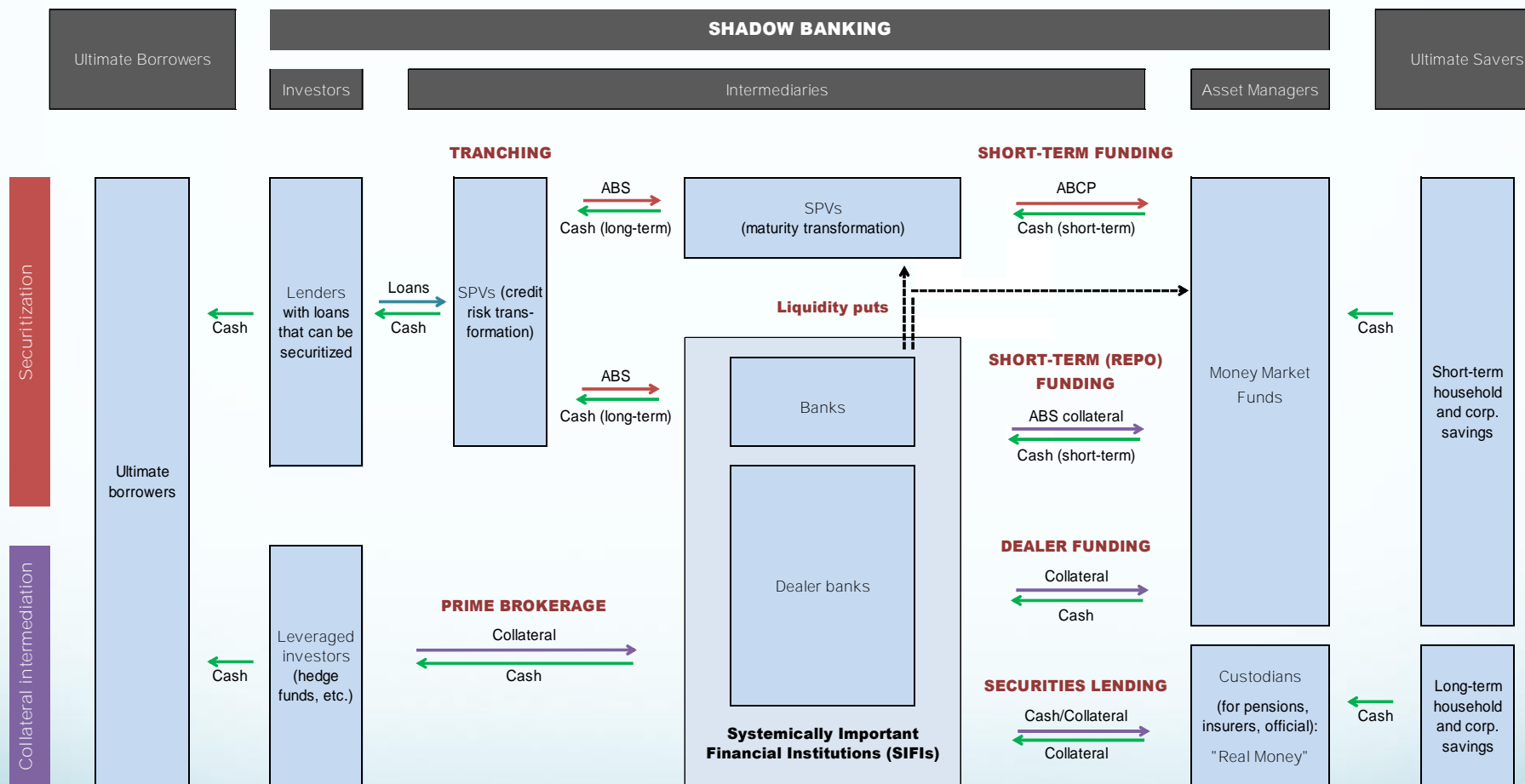


Source: Shadow Banking (Pozsar, Adrian, Ashcraft, Boesky (2010))

Not all forms of securitizations facilitate maturity, credit and liquidity transformation: ABCP performs maturity, credit as well as liquidity transformation, however, term ABS and ABS CDO primarily perform credit and liquidity transformation, but due to their maturity-matched nature, no maturity transformation. Moreover, there are other forms of securitization, such as tender option bonds (TOBs) and variable rate demand obligations (VRDOs) that conduct purely maturity transformation, and instruments such as auction rate securities (ARS) that conduct purely liquidity transformation (through liquidity puts), but no maturity or credit transformation

Financial Intermediation through the SBS

- Simplified Description



Notes: ABS = asset-backed securities; ABCP = asset-backed commercial paper; SPV = special-purpose vehicle

Financial Intermediation through the SBS

The SBS is a complex ecosystem,

combining multiple nonbank agents, linked to traditional banks, and using the services of dealer banks. There are two key processes:

1. **Securitization chains** (top row of previous slide), which transform risky assets into safe and liquid claims through the “tranching” of claims and the use of puts from the main banking system
 2. **Collateral chains** (bottom row), which re-use collateral to reduce counterparty risk between borrowers and lenders. Note that, unlike in one-way securitization chains, here the providers of collateral (hedge funds, real money, and custodians operating on behalf of the pension, insurance, and official sector) are scattered across the financial system
- There are **important links with regulated (bank) and semi-regulated (broker-dealer) entities**, which commonly (for broker-dealers, always) are Systematically Important Financial Institutions (SIFIs) :
 - **Commercial banks** are active in securitization chains. They offer explicit and implicit support to SPVs, and also directly invest in safe tranches of securitized debt
 - **Dealer banks** play a central role in intermediating collateral
 - **The system links the ultimate savers and borrowers:**
 - **Ultimate savers** (right column of previous slide), which include short-term household and corporate savings and long-term household savings. The shadow banking system liaises with savers through the **asset management complex** (next-to-right column), which includes money funds and real investors (insurance, pension funds)
 - **Ultimate borrowers** (left column), which include corporations and households, and associated **investors** (next-to-left column), which include lenders wishing to securitize assets and leveraged investors (primarily hedge funds) that seek to borrow against collateral

“Interconnectedness” between traditional banks and SB

- **SB are interconnected** along a vertically integrated, long intermediation chain, which intermediates credit, maturity and liquidity through a wide range of securitization and secured funding techniques such as ABCP, ABS, CDO, and repo. In this chain **banks are providing SB with liquidity and credit and often interface them with customers**
- In contrast to traditional banking’s public sector guarantees, the shadow banking system, prior to the onset of the financial crisis, was presumed to be safe, owing to liquidity backstops in the form of contingent lines of credit and tail-risk insurance in the form of wraps and guarantees. **The credit lines and tail-risk insurance filled a backstop role for shadow banks** (much like the role discount window and deposit insurance play for the commercial banking sector), **but they were provided by the private, not the public, sector**
- These forms of liquidity and credit insurance provided by the private sector, particularly commercial banks and insurance companies, allowed shadow banks to perform credit, liquidity, and maturity transformation by issuing highly rated and liquid short-term liabilities. However, **these guarantees also acted to transfer systemic risk between “traditional” (regulated) financial institutions and the SB**
- The failure of private sector guarantees to support the SBS occurred mainly because the relevant parties—credit rating agencies, risk managers, investors, and regulators—underestimated the aggregate risk and asset price correlations: the market did not correctly price for the fact that valuations of highly rated structured securities become much more correlated in extreme environments than during normal times. In a major systemic event, the price behaviour of diverse assets becomes highly correlated, as investors and levered institutions are forced to shed assets in order to generate the liquidity necessary to meet margin calls

The weaknesses of the SBS

- SBS intermediaries' reliance on **short-term liabilities to fund illiquid long-term assets** is an inherently fragile activity that can make the SBS prone to runs. During the financial crisis, the system came under severe strain, and many parts of it collapsed. The SBS thus shifted the systemic risk-return trade-off toward cheaper credit intermediation during booms, at the cost of more severe crises and more expensive intermediation during downturns (pro-cyclical)
- Long and complex financial intermediation chains in which SB are embedded and interlinked raise concerns, particularly because of increased **information asymmetries** between the various participants alongside the chains:
 - increasing the number of players involved in a financial assembly makes it more difficult to determine where the risks are and which players will actually cover them
 - with an increase in opacity or complexity of financial assemblies, it becomes extremely difficult to continuously assess the value and risk of the assets involved
- Along the chain of specialist intermediaries in the SBS, the **weakest link in the chain is the pinch-point that can destabilize the entire chain**:
 - Over the course of the financial crisis, the main pinch-points were the providers of wholesale funding (money market investors, such as money market mutual funds, for example), which withdrew funding at the end of the chain and lead to funding problems further up the chain, all the way to the ultimate borrowers
- **Systemic risk is an externality arising from the activities of individual financial institutions**. Even if each institution of the SBS manages credit, market, and liquidity risk prudently, the system as a whole can be vulnerable to shocks:
 - For all types of SB that fall under the same functional step along the shadow credit intermediation process, forced deleveraging by a “badly-run” SB will impact the pricing of all assets in the market place, which moves prices for all other institutions, many of which will be “well-run” shadow banks. In turn, the collapse of the balance sheet capacity of one institution thus impacts the balance sheet capacity of similar institutions (performing the same functional step) through the revaluation of asset prices

The systemic risks of the SBS

The financial crisis has highlighted the systemic risks that the SBS can pose:

1. The securitization function to create private “safe” assets broke down, as it became apparent that the process ignored some aggregate risks. The breakdown had significant real and financial spill-overs
 2. Collateral intermediation generated systemic risks, notably the inherent instability of the dealer-bank business model with risk of runs by customers and providers of short-term funding (both retail and institutional)
 3. There was widespread regulatory arbitrage
 4. High procyclicality of SBS (with implications for monetary policy)
 5. Fiscal risks associated with crisis management in shadow banking
- The SBS has many links, internally and between the SBS and banks/SIFIs, involving complex contractual arrangements and many implicit commitments (**interconnectedness**)
 - The design of financial instruments changes continuously with financial innovation, and the **risks involved in holding those new instruments are often not fully understood** by potential investors or even by those who design the instruments.

Complex systems are hard to resolve in times of stress

Addressing the issues of the SBS

Three possible solutions:

1. Regulating the SBS so as to turn it into the “regulated” banking system
 2. Developing dedicated regulations for each type of SB
 3. Separating SB from traditional banks by severing links and establishing firewalls, and then leaving SB relatively unregulated
- So far regulators have come up with regulations combining ring fencing and specific SB regulations.
 - Basel III’s general higher bank capital and liquidity requirements will enhance systemic stability. Basel III also includes a number of specific elements that should reduce the risks resulting from the SBS, e.g. heavier risk weightings for securitization exposure and off-balance sheet vehicles
 - Many regulatory efforts have involved SB regulations: MMF investment rules have been adjusted, Alternative Investment Fund Management Directive (AIFMD) in Europe and Dodd-Frank law in US have been approved and are in the process of implementation

Properly addressing SBS is still work in progress for regulators and policymakers

Required Readings

- Raghuram G. Rajan: **Fault Lines, How Hidden Fractures still Threaten the World Economy**, Princeton University Press, 2010, Chapters 6, 7, 8

Suggested Readings

- Charles P. Kindleberger, Robert Z. Aliber: **Manias, Panics and Crashes: A History of Financial Crises**, Fifth Edition, Palgrave 2005, Chapters 10, 11
- Nouriel Roubini, Steven Mihm: **Crisis Economics**, Penguin Books, 2011, Chapters 3, 6
- Andrew G Haldane, Executive Director, & Vasileios Madouros, Economist, Bank of England: **The dog and the frisbee**, Federal Reserve Bank of Kansas City's 36th economic policy symposium, "The Changing Policy Landscape", Jackson Hole, Wyoming,
<http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech596.pdf>
- NY Fed, Staff Report: **Shadow Banking**, rev 2012,
<http://www.newyorkfed.org/research/epr/2013/0713adri.pdf>
- IMF, Staff Discussion Note: **Shadow Banking**, Economics and Policy, 2012
www.imf.org/external/pubs/ft/sdn/2012/sdn1212.pdf