Empirical Asset Pricing

Classes 17-20: Debt Markets and Banks

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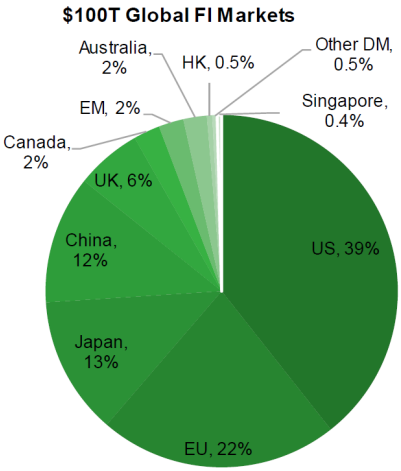
December 9-10, 2019

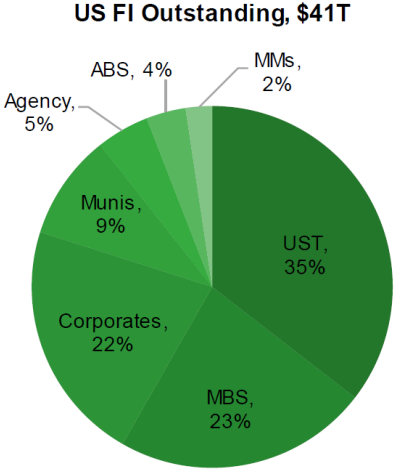
Debt Markets and Banks

- **Capital Markets:** In the US, capital markets, fixed income and equity, are a critical source of capital for businesses and governments (federal, state and local), funding 65% of total U.S. economic activity.
- **Debt Markets:** Compared with bank lending, debt capital markets provide a more efficient form of borrowing for corporations. In the US, the ratio of debt-market financing to bank lending is 80%/20%, and reversed in other developed markets and China.
- **Banks:** The fixed-income markets have historically been bilateral and performed by banks. Post-crisis regulatory constraints on balance sheets have forced banks to pull back from some fixed-income activities.
- **Repo Madness:** The recent repo market disruption (September 2019) is a case in point of unintended consequences of well-meaning regulations.

Global Fixed Income Markets

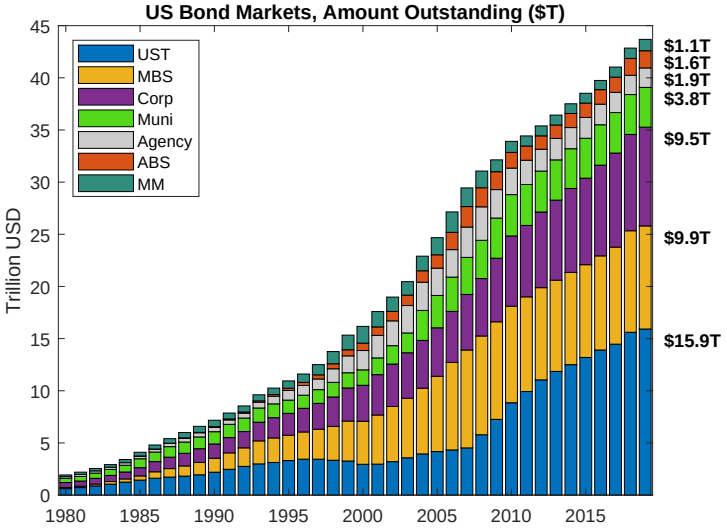


Source: Bank of International Settlements
Note: As of FY17

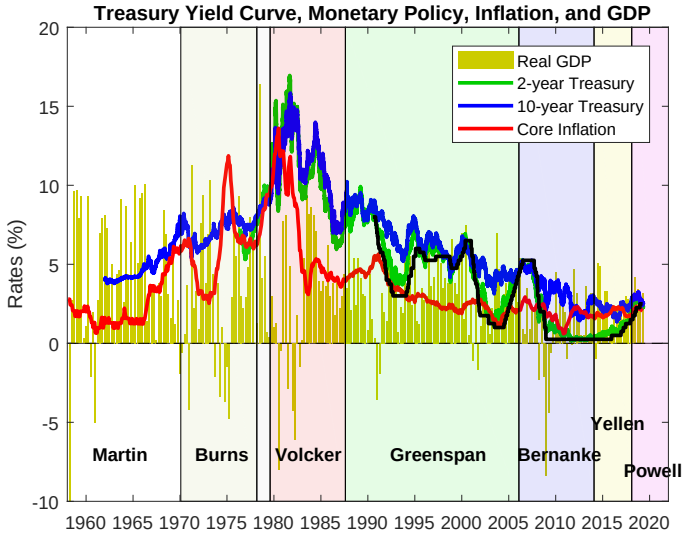


Source: SIFMA

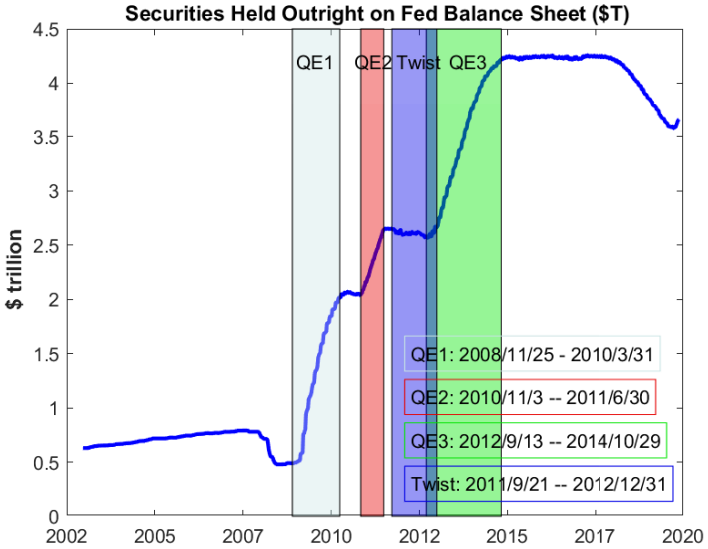
The US Bond Markets



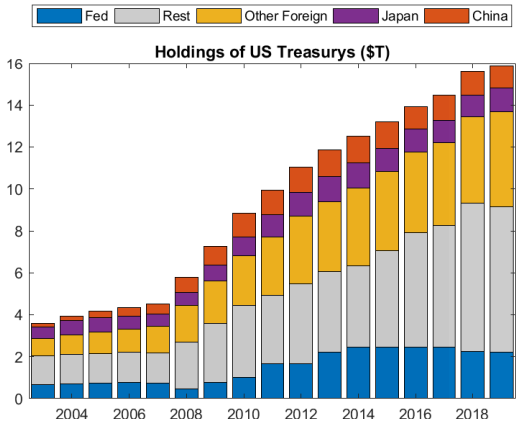
Treasury Yield Curve, Monetary Policy, and Macroeconomic Indicators

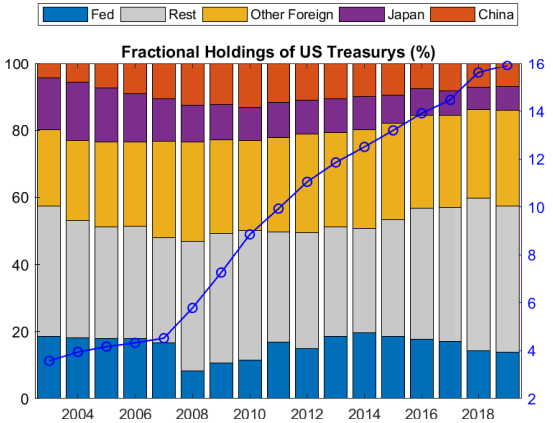


Fed Balance Sheet and Quantitative Easing

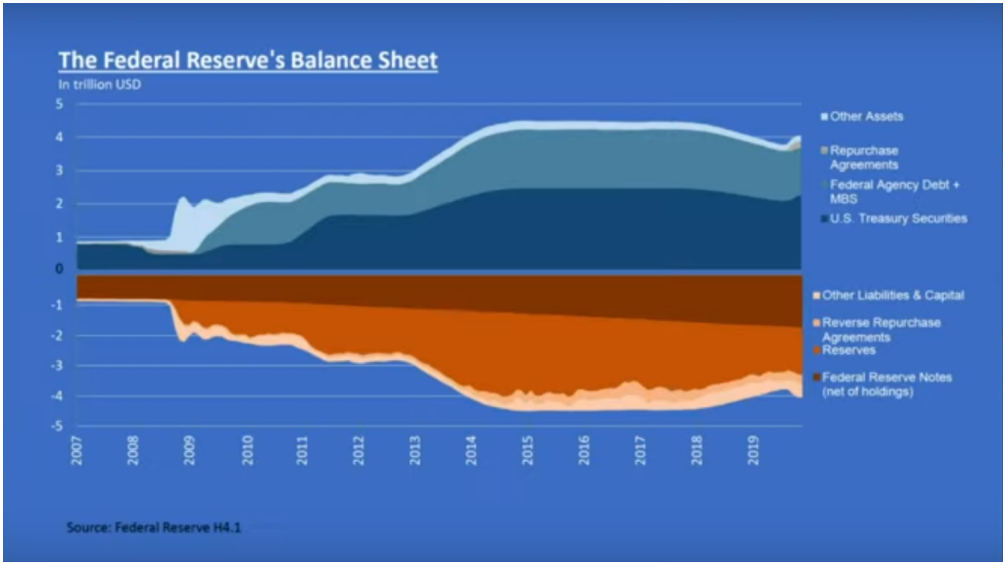


Treasury Amount Outstanding

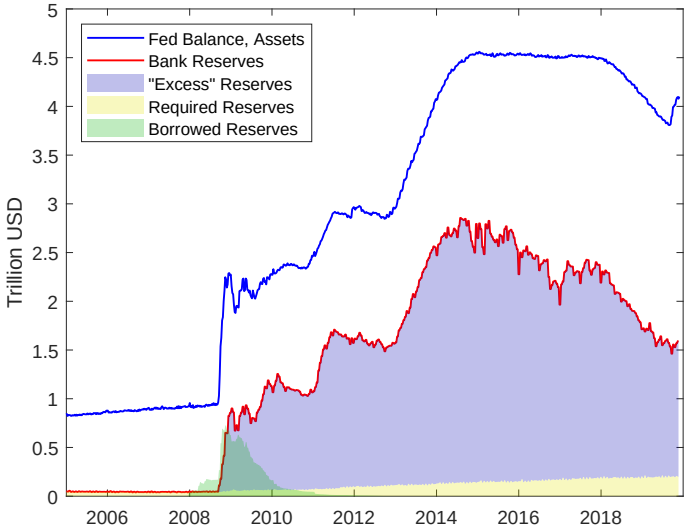




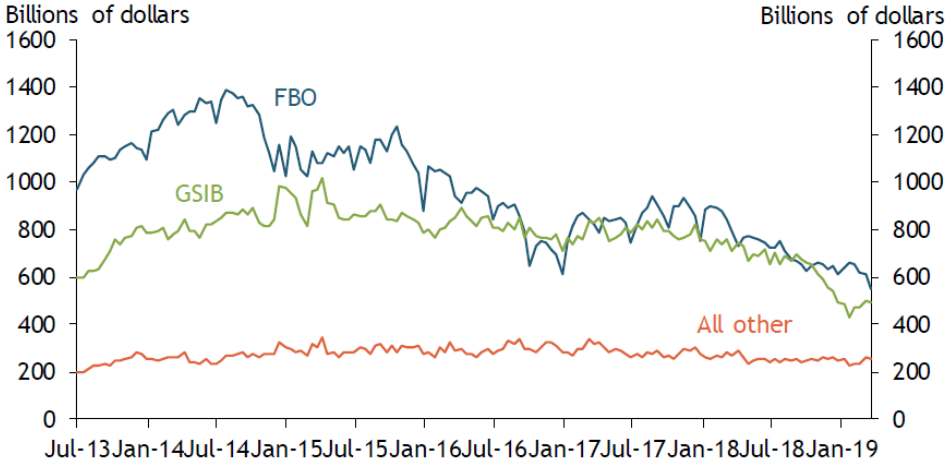
Fed Balance Sheet



Fed Balance and Bank Reserves



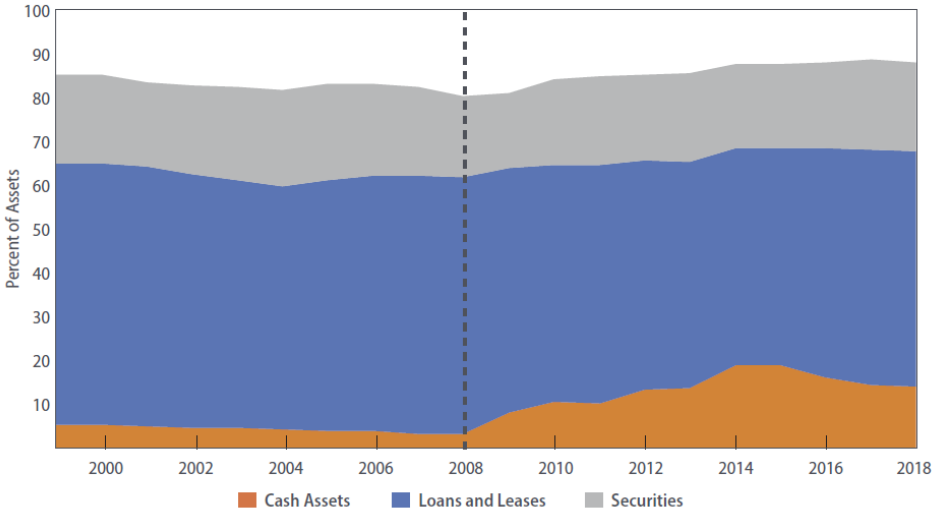
Bank Reserves by Types



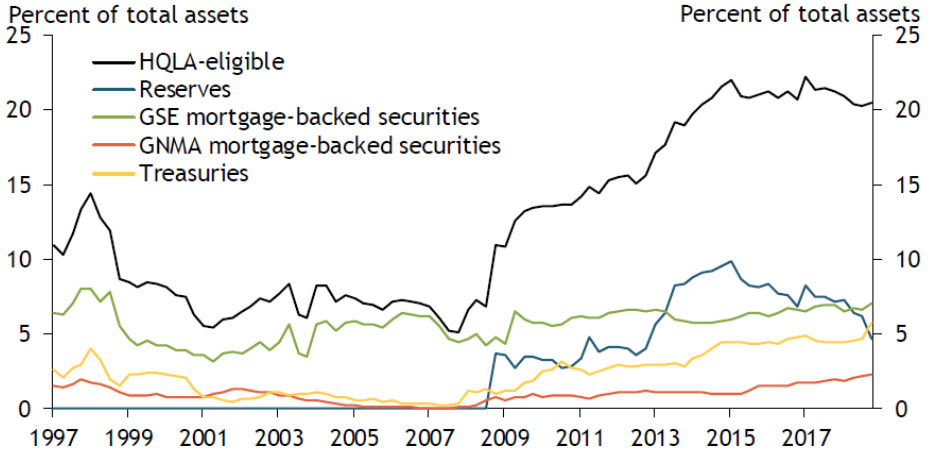
Sources: Board of Governors of the Federal Reserve System and the Federal Financial Institutions Examination Council (FFIEC).

Composition of Bank Assets

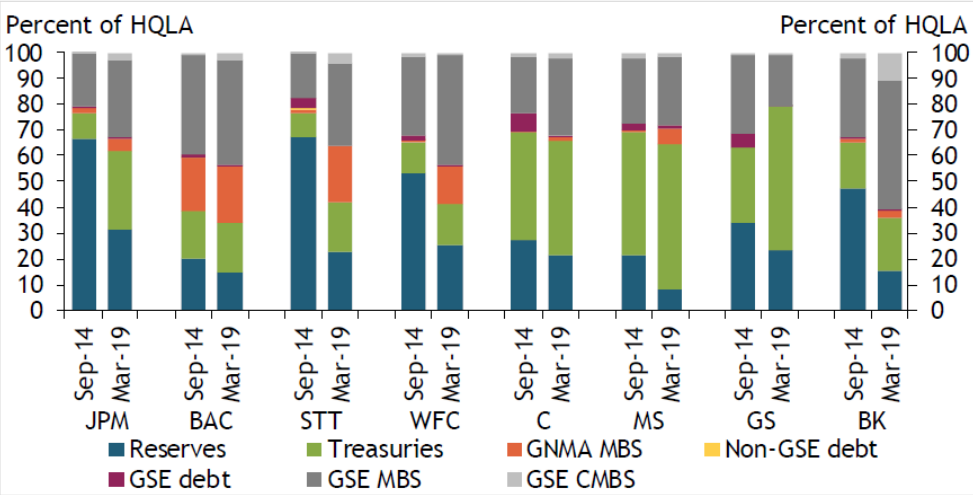
Figure 1: Composition of U.S. Commercial Bank Assets before and after 2008



Banks' HQLA Assets

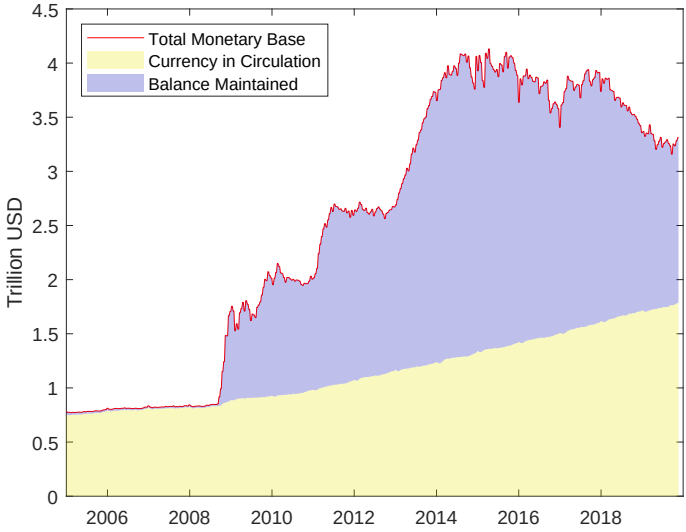


Composition of Banks' HQLA Assets

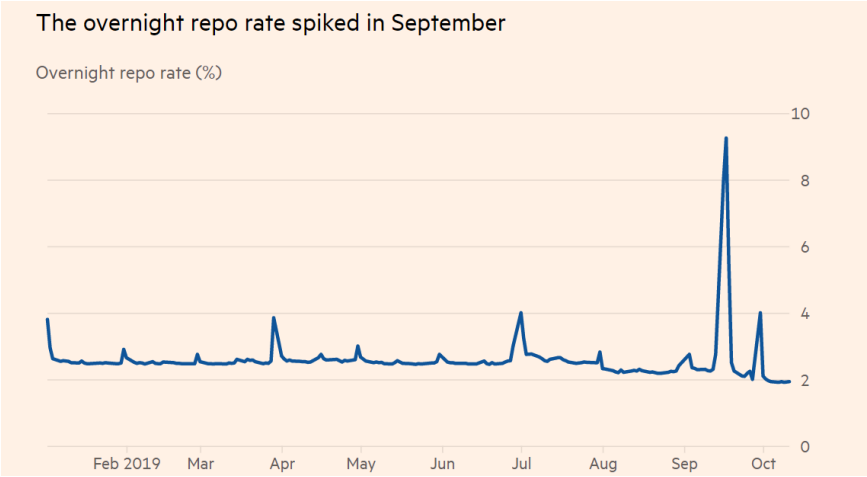


Note: GSIBs include J.P. Morgan Chase and Company (JPM), Bank of America Corporation (BAC), State Street Corporation (STT), Wells Fargo and Company (WFC), Citigroup Inc. (C), Morgan Stanley Mellon Corporation (BK).

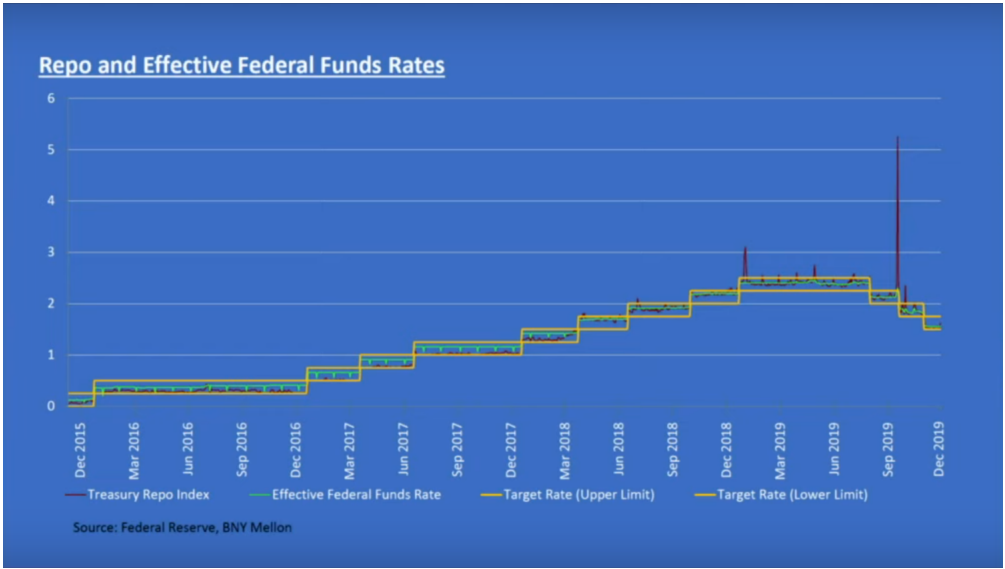
Monetary Base



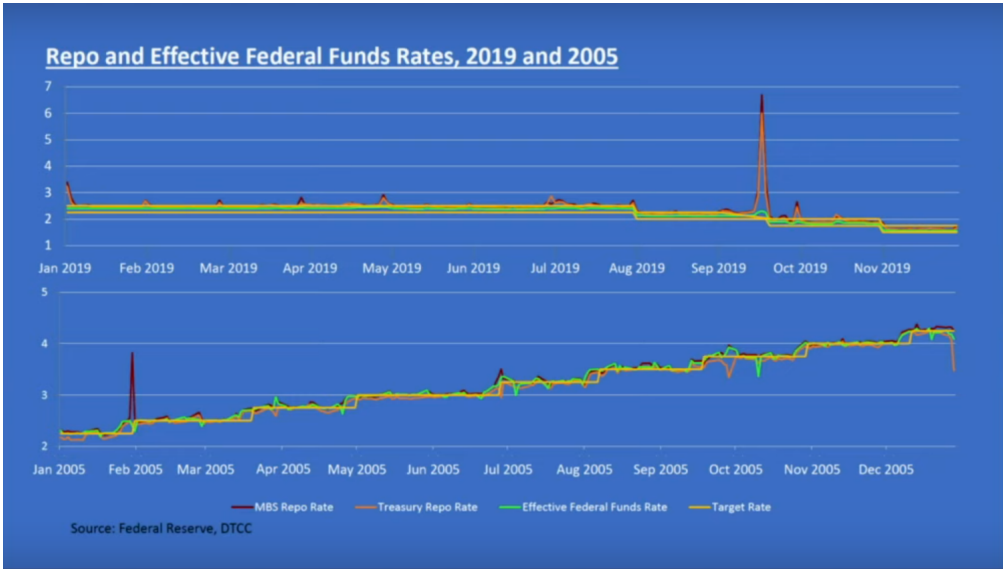
Repo Scares


The overnight repo rate spiked in September
Overnight repo rate (%)
10
8
6
4
2
0
Feb 2019
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct

Money Market Rates: Fund Fund and Repo



Before and After the Crisis



Intermediary Capital and Asset Pricing, Theoretical Development

- Shleifer and Vishny (1997): The limits of arbitrage.
- Gromb and Vayanos (2002): Equilibrium and welfare in markets with financially constrained arbitrageurs.
- Brunnermeier and Pedersen (2007): Market liquidity and funding liquidity.
- He and Krishnamurthy (2013): Intermediary asset pricing.
- Brunnermeier and Sannikov (2014): A macroeconomic model with a financial sector.

Intermediary Capital and Asset Pricing, Empirical Findings

- Adrian and Shin (2010): Aggregate liquidity can be seen as the rate of change of the aggregate balance sheet of the financial intermediaries, whose marked-to-market leverage is found in this paper to be strongly procyclical.
- Hu, Pan, and Wang (2013): Use price deviations in the US Treasury market to measure the amount of arbitrage capital in the financial markets; estimate the premium for this aggregate liquidity risk using cross-sectional returns on hedge funds and currency carry trades, both known to be sensitive to the general liquidity conditions of the market.
- Adrian, Etula, and Muir (2014): Use shocks to the leverage of securities broker-dealers to construct an intermediary stochastic discount factor. The single-factor model prices size, book-to-market, momentum, and bond portfolios with an R2 of 77% and an average annual pricing error of 1%.
- He, Kelly and Manela (2017): Shocks to the equity capital ratio of financial intermediaries possess significant explanatory power for cross-sectional variation in expected returns on many asset classes.

Adrian and Shin (2010)

- In a financial system where balance sheets are continuously marked to market, changes in asset prices show up immediately on balance sheets, and have an instant impact on the net worth of all constituents of the financial system.
- The net worth of financial intermediaries are especially sensitive to fluctuations in asset prices given the highly leveraged nature of such intermediaries' balance sheets.
- If financial intermediaries were passive and did not adjust their balance sheets to changes in net worth, then leverage would fall when total assets rise. Change in leverage and change in balance sheet size would then be negatively related.
- Far from being passive, the evidence points to financial intermediaries adjusting their balance sheets actively, and doing so in such a way that leverage is high during booms and low during busts. That is, leverage is procyclical.
- There are aggregate consequences of such behavior for the financial system as a whole that might not be taken into consideration by individual institutions. We exhibit evidence that procyclical leverage affects aggregate volatility and particularly the price of risk.

Adrian, Etula, and Muir (2014)

- This paper shifts attention from measuring the SDF of the average household to measuring a "financial intermediary SDF."
- Financial intermediaries fit the assumptions of modern finance theory nicely: they trade in many asset classes following often complex investment strategies; they face low transaction costs, which allows trading at high frequencies; and they use sophisticated, continuously updated models and extensive data to form forward-looking expectations of asset returns.
- Therefore, if we can measure the marginal value of wealth for these active investors, we can expect to price a broad class of assets. In other words, the marginal value of wealth of intermediaries can be expected to provide a more informative SDF.

Adrian, Etula, and Muir (2014)

- As funding constraints tighten, balance sheet capacity falls and intermediaries are forced to deleverage by selling assets at fire sale prices, as in the recent financial crisis.
- These are times when intermediaries' marginal value of wealth is high. Assets that pay off poorly when constraints tighten and leverage falls are therefore risky and must offer high returns.
- Equivalently, the cross-sectional price of leverage risk should be positive. These theories imply that leverage captures aspects of the intermediary SDF that other measures (such as aggregate consumption growth or the return on the market portfolio) do not capture.
- We provide empirical support for the view that leverage represents funding constraints by showing that our leverage factor correlates with funding constraint proxies such as volatility, the Baa-Aaa spread, asset growth, and a betting-against-beta factor that goes long leveraged low-beta securities and short high-beta securities.

He, Kelly, and Manela (2017)

- We define the intermediary capital ratio, denoted η_t, as the aggregate value of market equity divided by aggregate market equity plus aggregate book debt of primary dealers active in quarter t.
- Our main empirical result is that assets' exposure to intermediary capital ratio shocks (innovations in η_t) possess a strong and consistent ability to explain cross-sectional differences in average returns for assets in seven different markets, including equities, US government and corporate bonds, foreign sovereign bonds, options, credit default swaps (CDS), commodities, and foreign exchange (FX).
- Assets that pay more in states of the world with a low intermediary capital ratio (that is, assets with low betas on η_t shocks) also have lower expected returns in equilibrium. This implies that low capital-risk-beta assets are viewed as valuable hedges by marginal investors or, in other words, that primary dealers have high marginal value of wealth when their capital ratio is low.