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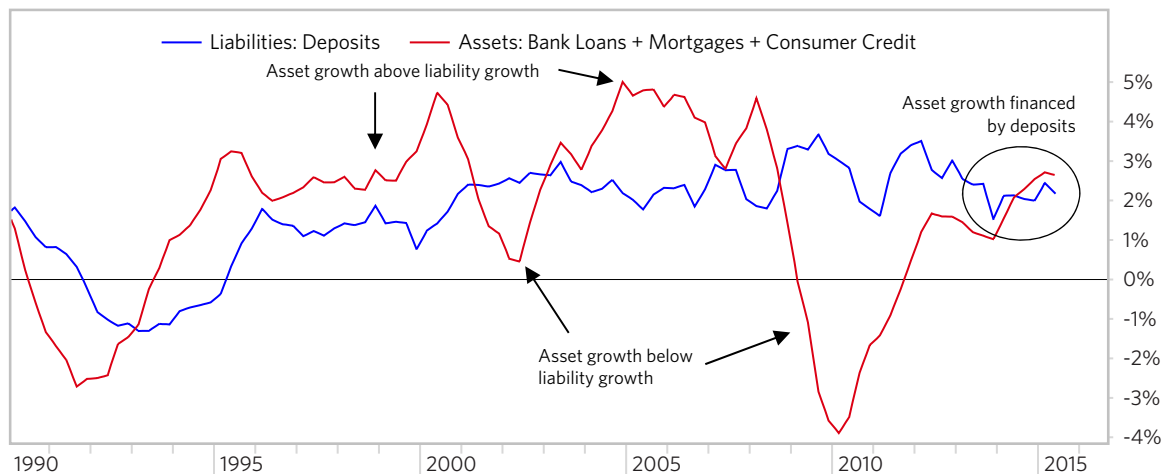
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How Regulatory Constraints Are Changing the Credit Machine

After the financial crisis, global bank regulatory bodies established a number of new banking regulations which are having important effects on the credit machine. Among them, liquidity constraints and capital requirements are the most impactful. These constraints are interacting with one another to have the effect of moving the banking system toward what we might call “old-time banking,” where banks are incentivized to make quality loans that support real economic activity funded by stable core deposits. The incentives are directing banks away from leveraging up low spreads that have high tail risk and away from liquidity mismatches that are prone to squeezes. The net effect is that asset growth is being largely funded by core deposit growth, requiring very little funding in the wholesale markets. This limits the bidding for funds in the money markets, which means less upward pressure on interest rates than would otherwise be the case. These changes are likely to reduce the amplitude of boom-bust leveraging cycles, and it looks to us like the current credit cycle is unfolding along these lines. In our simulations of what these effects would have been over the past 85 years, the only time that they would have impacted bank balance sheets would have been the mid-2000s, which of course would have been a desirable outcome.

A regulatory framework has been put in place for liquidity, in addition to capital, to be a material constraint for banks. For example, banks are now required to hold liquid assets (such as treasuries or reserves) at the Fed against wholesale funding sources. If a bank wants to fund an asset with wholesale funds, which is deemed less sticky, it will need to additionally purchase liquid assets (which do not generally offer high spreads) to be compliant with liquidity regulations. And if a bank does raise the extra funds to purchase the extra liquid asset, it runs into leverage limitations. The combination raises the effective cost of wholesale funding and, at some point, limits it altogether. As shown below, core deposits are now sufficient to fund asset growth.

Bank Balance Sheet (% GDP, 1-Yr Avg)



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Significant New Regulatory Constraints

The most important regulations coming out of the crisis were focused on increasing bank liquidity and bank capital. In addition to generally increasing risk-weighted capital requirements (which is just an extension of pre-crisis requirements), regulators are also now focused on managing banks' liability structures, relative to the types of assets they have, and capping the gross balance sheet. These new rules now are interacting in complex ways that affect bank decision making and affect the cost of credit at the aggregate banking system level. For example, meeting increased liquidity requirements could cause banks to hit new supplemental capital requirements. While we realize there have been a slew of new regulatory changes, including large increases in target capital ratios, below we describe the rules that we believe are the most impactful new regulatory changes.

1) Liquidity Coverage Ratio (LCR): The LCR requires that banks hold high-quality liquid assets (HQLA) based on the amount of "flighty" liabilities that they have, as determined by regulators. The goal of the LCR is to ensure that banks can survive acute periods of funding withdrawal. From talking to the regulators, it is our understanding that this is meant to be a liquidity buffer that can be drawn down on during times of stress, though it remains to be seen how regulators will practically deal with this when the buffers are tested.

2) Net Stable Funding Ratio (NSFR): The NSFR mandates that banks have stable funding sources based on the types of assets they hold and will come into effect in a couple of years. The NSFR is very similar to the LCR in that it is focused on bank liquidity, but whereas the LCR is focused on the banks surviving short-term liquidity squeezes, the NSFR is meant to reduce banks' funding risk over a longer time horizon. Practically, the impact of NSFR ends up being similar to that of LCR.

3) Supplementary Leverage Ratio (SLR): The SLR forces the banks to hold capital in relation to the size of their overall balance sheets, regardless of what types of assets they hold. While previously bank regulators focused on capital regimes based on risk-weighted assets, now regulators are also capping gross exposures through the SLR. This is likely in response to experiences in the crisis where the risk-weighting system was inadequately measuring the true underlying risk of assets, which is a difficult feat given the complex nature of the credit system.

Tactical Responses When a Bank Hits One of These Regulatory Constraints

When banks fall out of compliance with their liquidity requirements, they have different levers that they can pull to remediate the problem, and these different levers have different impacts on the credit machine. While it is hard to know which levers banks will pull (or would have pulled historically if these regulations had been in place) and what the magnitude of the response will be, all of these levers on the margin will make it more expensive to produce the next unit of credit (relative to when they didn't exist). Below are broadly the levers that banks can pull when they fall out of compliance with their liquidity requirements:

Option 1: Banks shift from non-liquid assets to liquid assets until they meet their liquidity requirements: Swapping riskier credit to buy US treasuries is effectively a reduction in credit to the economy and a hit to bank earnings.

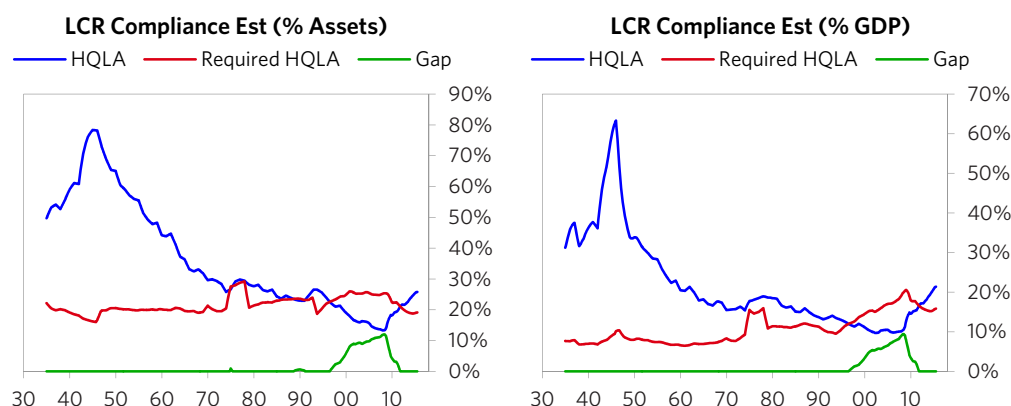
Option 2: Banks shift their liability structures from wholesale funding to stable funding (retail deposits or term funding): Paying up for retail deposits or extending duration of wholesale funding will raise funding costs for banks, likely driving up lending rates and/or reducing bank earnings.

Option 3: Banks lever their balance sheets, attracting stable funding and buying liquid assets: In the short term, this probably means banks issuing longer term liabilities and buying treasuries, which would, on the margin, raise funding costs for banks and increase their balance sheets, potentially requiring some banks to raise more capital as they hit the supplemental leverage ratio.

Option 4: Banks delever their balance sheets, getting rid of wholesale funding and illiquid assets: Reduces credit to supply of credit and hits bank earnings.

Historically These Regulations Would Only Have Been a Constraint in 2000s

When we study what banks would look like if these regulatory regimes had been in place over the past 85 years, the main period in which the new liquidity requirements would have been an issue is during the bubble years starting in the late 1990s and lasting into 2008. At the peak of the boom, banks would have been short by around 12% of assets (around 10% of GDP). Prior to the 2000s, banks would have largely met the liquidity requirements, though there are some periods when this may have been more of a constraint, such as the 1970s. Note that before the 1960s, banks operated very differently, holding large amounts of cash and treasuries from World War II, and so most of their balance sheets was liquid assets. To illustrate this point, the charts below show how banks would have complied historically with the liquidity coverage ratio (LCR). The lines represent our estimate of how many high-quality liquid assets banks held through time relative to what was required.

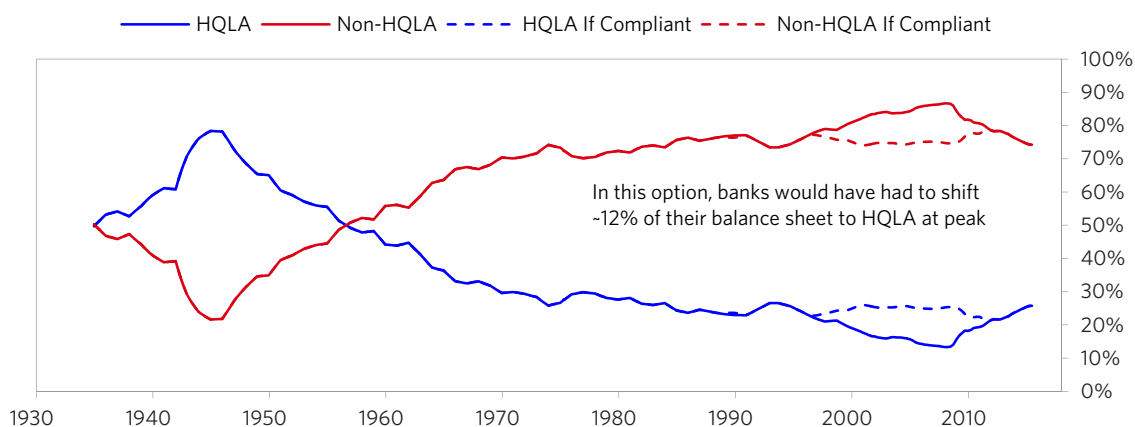


Below we walk through how each of these options that we laid above play out historically.

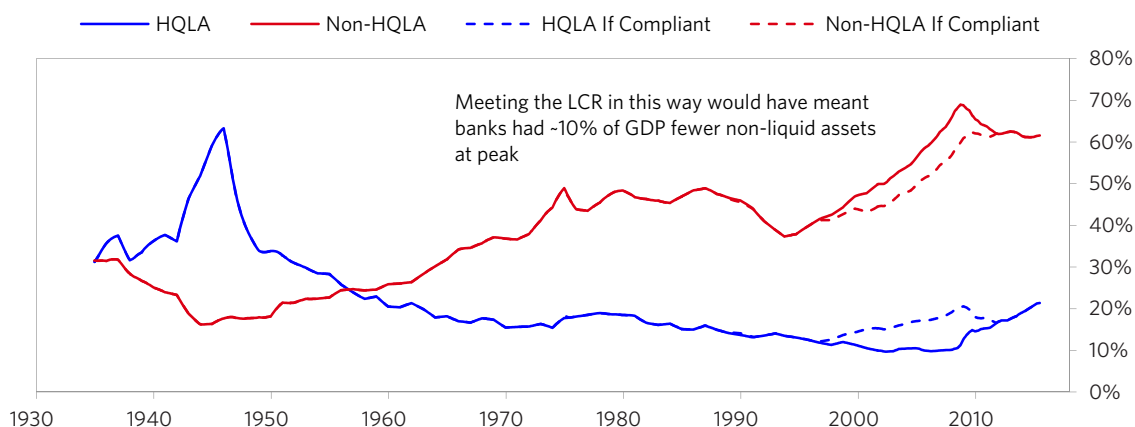
Option 1: Banks shift from non-liquid assets to liquid assets until they meet their high-quality liquid asset (HQLA) requirement.

After hitting these constraints, banks can shift their asset allocations from holding non-liquid assets to buying liquid assets such as treasuries or agencies (note that the banking system as a whole cannot increase its reserve holdings). This would likely have the impact of lowering bank earnings, since those types of assets are generally lower yielding than non-liquid assets, such as loans. It would also likely be less stimulative to the economy. When banks make loans, the money goes directly into the hands of someone who wants to spend, which tends to have a high flow-through to growth. Buying a riskless asset (such as a treasury bond) has a much less direct and lower effect on economic activity. As can be seen in the charts below, if banks met their liquidity requirements through this mechanism, much of the leveraging that occurred during the pre-crisis boom years could not have gone into riskier, non-HQLA assets. At the peak, banks would have had to hold ~12% of their assets, or roughly 10% of GDP, in additional HQLA. The red and blue dotted lines on the chart below highlight the balance sheet that would have been occurred if banks chose this lever.

US Bank Asset Allocation (% Assets)

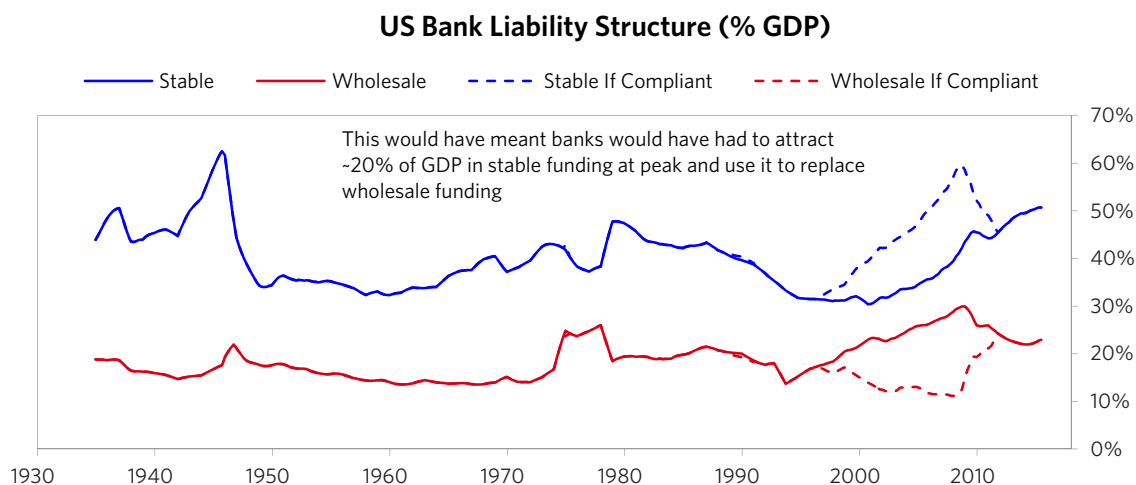
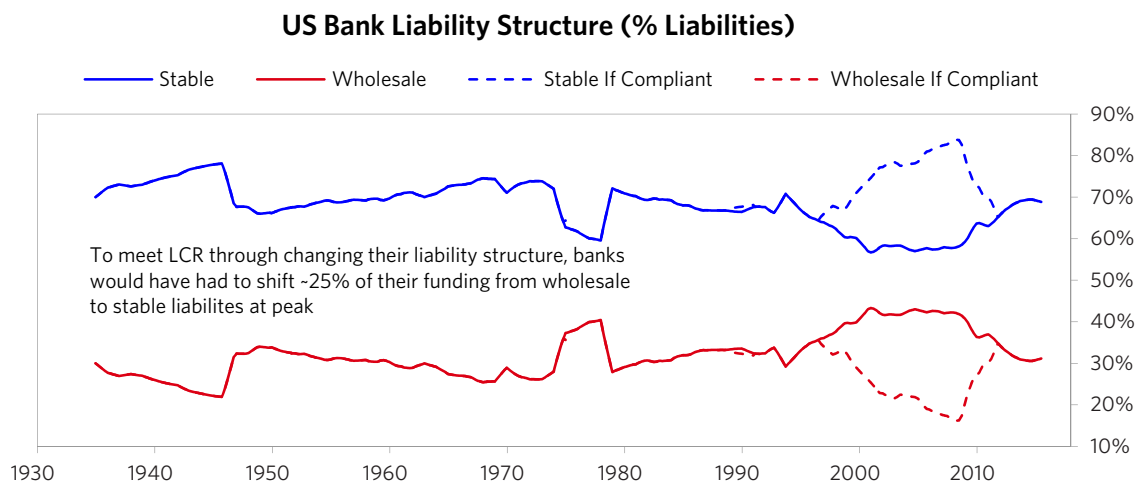


US Bank Asset Allocation (% GDP)



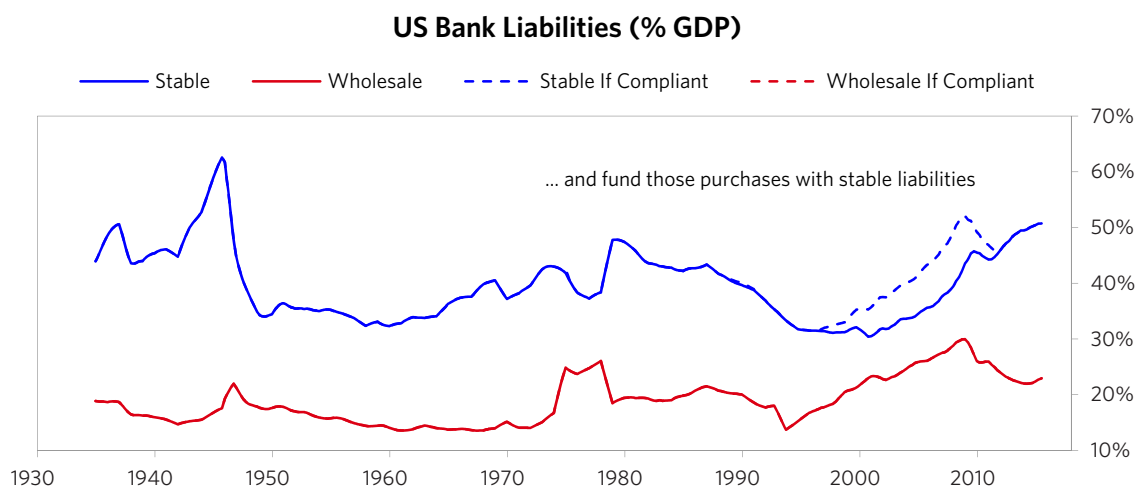
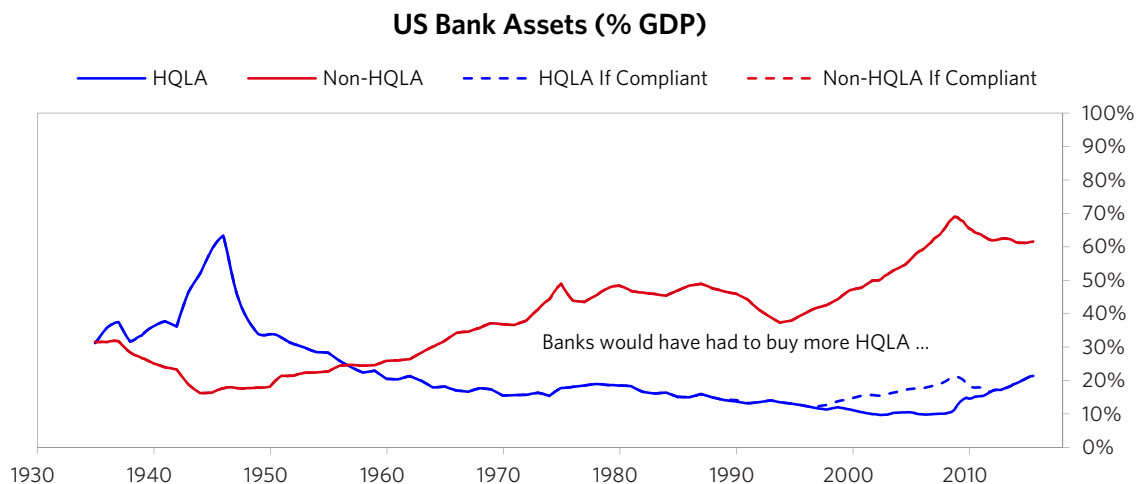
Option 2: Banks shift their liability structures from wholesale funding to stable funding.

Banks can also address their liquidity shortfall by changing their liquidity structures from short-dated wholesale funding to stable funding (either retail or longer dated wholesale). This would likely raise bank funding costs and, on the margin, reduce the amount of credit that would be created (as stable funding, such as long-term bonds and retail deposits, would likely be more expensive than wholesale funding, especially if they are in high demand with the liquidity requirements). If banks had met their liquidity requirements through this channel, in the pre-crisis years at the peak of their liquidity shortfalls, they would have needed to swap around 25% of their liabilities from wholesale funding to stable funding, which at the time would have been around 20% of GDP. This implies a massive shift, and it is unclear how much of an impact on rates that would have had. Note that this path requires a larger magnitude of action because the average wholesale funding source incurs a 50-60% HQLA requirement, so banks have to swap roughly twice as many liabilities to meet their liquidity requirements through the liability structure rather than switching assets.



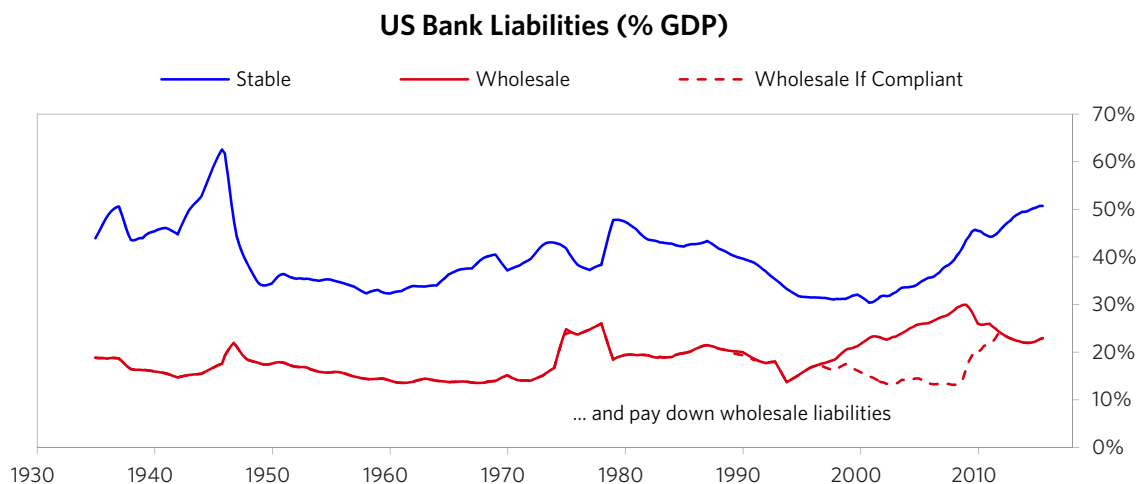
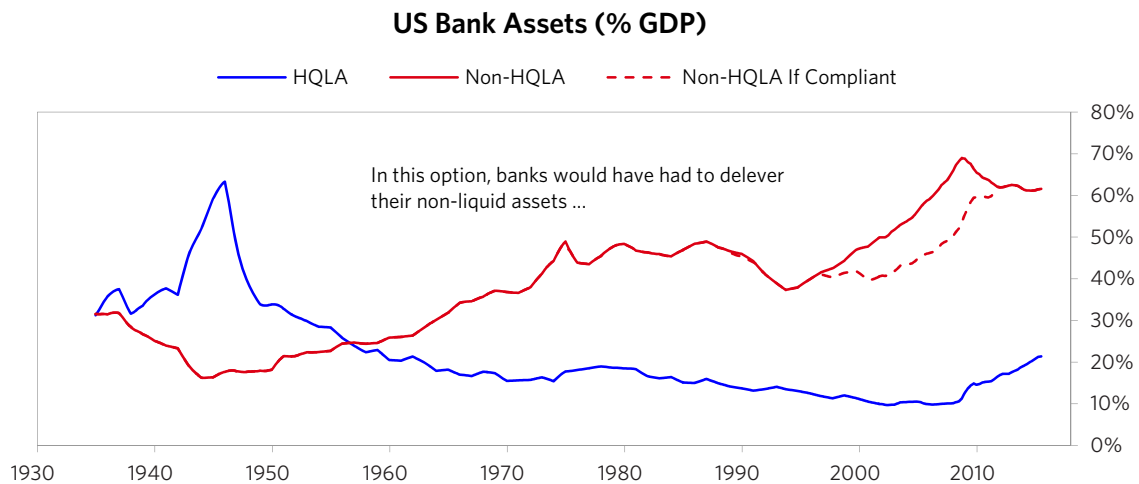
Option 3: Banks lever their balance sheets, attracting stable funding and buying HQLA assets.

Banks can also do a combination of these factors, one of which is leveraging up their gross balance sheets by attracting stable funding and buying HQLA assets. If there are still attractive opportunities and banks are not hitting another constraint (such as the supplemental leverage ratio), they may choose to lever up to meet their HQLA requirements. This would likely still put pressure on rates for stable funding (as the banks compete for that funding) and bank margins. The impact on economic activity would be positive, though, as banks buy more assets and don't slow lending (although that would need to be offset with any rise in rates). At the peak of the boom years in 2008, banks would have had to lever up by around 10% of GDP, raising stable funding and buying high-quality liquid assets.



Option 4: Banks delever their balance sheets, getting rid of wholesale funding and non-HQLA assets.

Another option that banks have is to simply delever their aggregate balance sheet, shedding wholesale funding and non-HQLA compliant assets until they meet their liquidity requirements. This would be a clear negative for the economy and bank earnings. The charts below show what this would mean on the asset and liability side of the banks' aggregate balance sheet. As shown in the following charts, banks would have had to delever by about 20% of their assets, or around 15% of GDP, at the peak period in 2008. This would have been a very large impact on the economy, if banks had chosen this path. However, if there are still profitable opportunities, banks would likely choose to meet the liquidity requirements in the other ways described above.



Summary

At the present time, new regulations pertaining to bank liquidity and capital are having a stabilizing impact on the financial system. Core deposits are growing in sync with assets, reducing banks' need to bid for funds in the wholesale funding markets. This is reducing upward pressure on short-term interest rates.

The new liquidity requirements also operate as modern-day reserve requirements against hot money funding. "Excess reserves" held at the Fed count as "high-quality liquid assets," which count against these modern-day reserve requirements. And the amount of excess reserves held by banks is roughly what they now require to meet the new liquidity requirements. Given that these excess reserves are needed to meet these requirements, if the Fed drains these reserves, banks will hold inadequate high-quality liquid assets (HQLA) and will have to either shift their asset mixes away from loans to the equivalent of treasuries, or reduce their dependence on funding sources that require those HQLA. Either way, the required shifts would add to the tightening pressure. In the other direction, though it was not the intention, these liquidity requirements, which are de-facto reserve requirements, are also a new potential easing tool. Cutting these liquidity requirements can operate as a de-facto cut in reserve requirements, freeing up funds that can be lent into the economy or invested in riskier assets.

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