

Why U.S. Bank Regulators Rejected a “Standardised Framework” for Interest Rate Risk in the Banking Book Four Times
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In 1996, the U.S. Board of Governors of the Federal Reserve, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency jointly declared their rejection of a standardised regulatory model for interest rate risk:

“...the agencies have decided that concerns about the burdens, costs, and potential incentives of implementing a standardized measure and explicit capital treatment currently outweigh the potential benefits that such measures would provide. The agencies are cognizant that techniques for measuring interest rate risk are continuing to evolve, and they do not want to impede that progress by mandating or implementing prescribed risk measurement techniques.”²

By contrast, in April 2016 the Basel Committee on Banking Supervision put forth the bluntly titled “Standards, Interest rate risk in the banking book,” which has had the effect of reviving the four decades old interest rate sensitivity gap concept that most risk managers had long abandoned as a crude and inaccurate approximation to modern multi-factor enterprise interest rate risk management. To be specific, with interest rate sensitivity gap analysis at the heart of the “standardised framework,” the Basel Committee stated simply

“Supervisors could mandate their banks to follow the framework set out in this section, or a bank could choose to adopt it.”³

In this note, we repeat the extremely well-thought out analysis of the U.S. bank regulatory bodies as they rejected, not once but four times, the use of the interest rate

¹ Kamakura Corporation in Honolulu, Taipei and Singapore respectively.

² Federal Register, Volume 61, Number 124, June 26, 1996, page 33167.

³ Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, paragraph 99.

sensitivity gap approach as a standardised model. We then explain in summary form the major assumptions and the magnitude of the associated errors that result from the BIS variation on sensitivity gaps. Lastly, we explain why no reputable bank supervisory agency should mandate the BIS standardised framework: because, as in Andrew Haldane's [2012] famous paper "The Dog and the Frisbee," the risk measure is so deeply flawed that it has no predictive power in explaining bank failures due to interest rate risk. For this and many other reasons, responsible bank supervisors should insist on a more sophisticated approach to the supervision of interest rate risk from the institutions that they regulate. No bank should be granted a "safe harbor" using the flawed BIS standardised framework because it is a grossly inaccurate measure of risk and a misleading indicator of appropriate hedges for interest rate risk.

Why U.S. Bank Regulators Rejected a Standardised Model Four Times

How is it possible that the Basel Committee on Banking Supervision reached the opposite conclusion of U.S. bank regulators about the value of a standardised framework using interest rate sensitivity gap analysis? We begin with a short history of pronouncements by U.S. bank regulators on this topic.

The Federal Deposit Insurance Corporation Improvement Act ("FDICIA") of 1991 was passed by the U.S. Congress in the wake of hundreds of failures in the savings and loan industry due to interest rate risk and excessive lending in support of commercial real estate development. Section 305 of FDICIA required the U.S. bank regulatory agencies to revise their risk-based capital guidelines to explicitly incorporate interest rate risk. The first draft of the agencies' standardised framework was incorporated in this Advanced Notice of Proposed Rulemaking ("ANPR") in 1992:

<https://www.dropbox.com/s/tq9pob3dv5o1dto/1992RiskBasedCapitalStandards.pdf?dl=0>

From the perspective of 1996, U.S. regulators summarized their intent and the results as follows:

"The measurement system proposed in the 1992 ANPR would have applied to all banks and used a duration-weighted maturity ladder to estimate the change in a bank's economic value for an assumed 100 basis point parallel shift in market interest rates. Under the 1992 ANPR, a bank whose measured exposure exceeded a threshold level, equivalent to 1 percent of total assets, would have been required to allocate capital sufficient to compensate for the estimated change in economic value above the threshold level."⁴

"The agencies received approximately 180 comment letters on the 1992 ANPR. The majority of commenters raised concerns about the accuracy of the proposed measure and its use as a basis for an explicit capital charge. Therefore, in September 1993, the agencies published a notice of proposed rulemaking which incorporated numerous changes to the 1992 ANPR in an

⁴ Federal Register, Volume 61, Number 124, June 26, 1996, page 33167.

effort to address those concerns and improve the proposed model's accuracy. See 58 FR 48206 (September 14, 1993)."⁵

A copy of the 1993 revisions in the standardised framework is available here:

<https://www.dropbox.com/s/8ko73sr7p00fn07/1993RiskBasedCapitalStandards.pdf?dl=0>

The U.S. regulators explained further that

"These changes included:

- (1) A proposed screen that would exempt banks identified as potentially low-risk from the supervisory measurement framework.
- (2) Various refinements to the supervisory model, including changes to the method for determining risk weights to allow for different risk weights for rising and falling interest rate environments; the specific treatment of non-maturity deposits; the reporting of amortizing and non-amortizing financial instruments; and the addition of another time band to provide for greater accuracy."⁶

At the same time the standardised framework based on interest rate sensitivity gaps was published first in 1992 and then again in 1993, the Office of Thrift Supervision had implemented its own interest rate sensitivity gap model. The three other U.S. bank regulators explained their view of the suitability of that model in this commentary:

"The diversity and complexity of commercial banks' balance sheets is one reason why the banking agencies have decided not to pursue adopting the net portfolio value model developed and used by the Office of Thrift Supervision (OTS) or any uniform supervisory model. Although the banking agencies have benefited a great deal from the expertise and experience of the OTS in this area, the OTS model was designed to ascertain the interest rate risk exposure of insured depository institutions with concentrations of residential mortgage assets, especially adjustable rate mortgages. These instruments require data-intensive, complex models to obtain accurate valuations and interest rate sensitivities. Since most commercial banks do not hold high concentrations of these instruments, the agencies were concerned about the substantial reporting requirements and measurement complexity that would be associated with an OTS type of model if applied to commercial banks."⁷

The three major U.S. bank regulators continued their efforts to improve the proposed standardised approach with a revision in 1995, a copy of which is available at this link:

<https://www.dropbox.com/s/aglqedg22xkuinl/1995RiskBasedCapitalStandards.pdf?dl=0>

⁵ Federal Register, Volume 61, Number 124, June 26, 1996, page 33167.

⁶ Federal Register, Volume 61, Number 124, June 26, 1996, page 33167.

⁷ Federal Register, Volume 61, Number 124, June 26, 1996, page 33169.

The 1995 revision continued to be subject to harsh criticism from banks, regulators and financial economists. The 1996 review of these critiques is given here:

“Throughout the evolution of the agencies’ efforts to incorporate an explicit capital charge for interest rate risk into their risk-based capital standards, industry comments have expressed four fundamental concerns:

- (1) An approach whose sole focus is on economic value, rather than on reported earnings, may be inappropriate;
- (2) A supervisory measure that by necessity, makes uniform and simplifying assumptions about the characteristics of a typical bank’s assets and liabilities may be inaccurate for a given institution;
- (3) The proposed treatment for nonmaturity deposits may be inappropriate in many cases; and
- (4) Any supervisory model may create improper incentives for internal risk management and measurement.”⁸

“By giving the appearance of providing a more precise measure of risk, they also increased the likelihood that the standardized measure would replace or stifle development of yet more accurate internal measures of risk exposure.”⁹

“Increasingly, banks have a variety of pricing indices and embedded options incorporated into their commercial and retail bank products, making it increasingly difficult to model these products with any simple and uniform measure.”¹⁰

“Many commenters voiced broader concerns about the potential incentives that a standardized supervisory model may have on how banks manage and measure their risk. A frequent concern has been that a supervisory model would become the industry standard against which internal models would be benchmarked and tested, thus diverting resources away from improving internal models and assumptions.”¹¹

After four years of effort, the primary U.S. bank regulatory bodies

1. Rejected the 1992 model
2. Rejected the 1993 model
3. Rejected the 1995 model, and
4. Rejected the Office of Thrift Supervision model

A copy of the 1996 policy statement is given here:

https://www.dropbox.com/s/rfc285qnonuole3/1996_33167FinalRule.pdf?dl=0

⁸ Federal Register, Volume 61, Number 124, June 26, 1996, page 33168.

⁹ Federal Register, Volume 61, Number 124, June 26, 1996, page 33168.

¹⁰ Federal Register, Volume 61, Number 124, June 26, 1996, page 33169.

¹¹ Federal Register, Volume 61, Number 124, June 26, 1996, page 33169.

They concluded their pronouncements in 1996 as follows:

“The agencies neither wish to create inappropriate incentives, nor divert industry resources from the development of better interest rate risk measurements. The policy statement consequently emphasizes each institution’s responsibility to develop and refine interest rate risk management practices that are appropriate and effective for its specific circumstances.”¹²

“Hence, the agencies have concluded that the best course of action at this time, is to continue to assess capital adequacy for interest rate risk under a risk assessment approach and to provide the industry with further guidance on prudent interest rate risk management practices.”¹³

In plain English, the inaccuracies and potential adverse incentives of a simplistic interest rate sensitivity gap “standardised framework” were such serious problems that no standardised framework was adopted. Instead, interest rate risk supervisory efforts are institution-specific and described in numerous publications from the U.S. bank regulatory agencies over the last two decades.

The Dog, the Frisbee, and the Basel Standardised Framework for Interest Rate Risk in the Banking Book

In Andrew Haldane’s classic review [2012] of the Basel Capital Framework, he pointed out that a simple credit model using logistic regression was a more accurate predictor of bank failure than the enormously expensive but simplistic BIS risk-weighted assets approach. While the U.S. regulators avoided saying this directly, market participants involved in interest rate risk management at U.S. institutions in the 1980s were fully aware of the fact that interest rate sensitivity gap analysis and net income simulation risk management systems did not save the savings and loan institutions, which failed because of false assumptions about the nature of “nonmaturity deposits.” The short-term forecasts of net income were poor substitutes for a true market-value based multiple risk-factor analysis that is standard today among institutions of all sizes around the world today. The interest rate risk contribution of non-maturity deposits is now much better understood (see Jarrow et al, 1996, 1998, and 1999), and the multi-factor interest rate risk models in the Heath, Jarrow and Morton framework [1992] are much more powerful.

How did the Basel Committee reach the opposite conclusions from the Board of Governors of the Federal Reserve, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency? There are only two possibilities:

- a. Perhaps the Basel model is simply more accurate, more powerful and less costly than the 1992, 1993, 1995 and OTS models considered in the U.S.
- b. Perhaps the Basel Committee simply made a mistake.

¹² Federal Register, Volume 61, Number 124, June 26, 1996, page 33169.

¹³ Federal Register, Volume 61, Number 124, June 26, 1996, page 33167.

Our view is that the Basel standardised framework contains all of the flaws of the four models considered in the United States, plus it has created even more perverse behavioral problems than the U.S. authorities worried about in this quote:

“Many commenters voiced broader concerns about the potential incentives that a standardized supervisory model may have on how banks manage and measure their risk. A frequent concern has been that a supervisory model would become the industry standard against which internal models would be benchmarked and tested, thus diverting resources away from improving internal models and assumptions.”¹⁴

Our own extensive contacts with clients and potential clients at financial firms around the world who are potentially subject to the Basel IRRBB rules indicate that some banks are guilty of exactly what the U.S. regulators feared:

- Banks are asking risk software vendors to divert development resources from best practice models to implement a Rube Goldberg variation on the four models that were rejected by U.S. regulators.
- Banks hope local supervisors will require the Basel standardised framework, despite its obvious inaccuracy, so the banks can check the box and avoid a more challenging regulatory inspection of interest rate risk management policies, procedures, and systems.
- Less sophisticated banks assume that the Basel standardised framework is “best practice.” While more sophisticated banks would view the Basel standardised framework as a rejected worst practice and an unacceptable “minimum standard,” less sophisticated banks are viewing it as a “maximum standard” that they need not exceed.

The fears of U.S. commentators and regulators were real, but now they are playing out internationally instead of being confined to just to the U.S. The existence of such a flawed “standardised approach” is having the opposite effect of the presumed intent of the Basel Committee on Banking Supervision: an increase in the sophistication of interest rate management practices.

¹⁴ Federal Register, Volume 61, Number 124, June 26, 1996, page 33169.

A Summary of the Largest Errors in the Basel Standardised Framework for Interest Rate Risk in the Banking Book

Before presenting problems with the standardised framework, it is important to realize that more than 2,000 banks around the world are now using interest rate risk systems and enterprise risk systems with some or all of the following characteristics:

- All relevant assets and liabilities are loaded into the risk management system on a transaction level basis using data fields that fully describe the counterparty and the nature of the transaction. The largest transaction count of which we are aware exceeds 200 million transactions.
- A full Monte Carlo simulation over multiple periods is conducted. We are aware of systems that allow up to 999 periods, one million risk factors, and one billion scenarios.¹⁵
- Interest rate factors and other macro factors are simulated on a correlated basis.
- In each scenario and at each time step, probabilities are updated for default risk, prepayment risk, and mortality risk and those probabilistic outcomes are simulated
- Valuations are benchmarked to be “no arbitrage,” so that all observable security prices at time zero are correctly priced using the simulated Monte Carlo scenarios.
- The same simulation produces value at risk, credit-adjusted value at risk, net income at risk, credit-adjusted net income at risk, interest-rate-factor driven variation in net income and net interest income, economic capital, regulatory capital, liquidity risk, and so on.

Given that this capability exists and is very widely used today, the adverse impact of such a flawed “standardised framework” is an unfortunate international incident that could have easily been avoided. In fact, the “standardized framework” requires a comparison of what the bank views as best practice with the standardized approach, with the implication that any difference is an error in best practice, not an error in the standardized framework:

“49. Banks should be able to test the appropriateness of key behavioural assumptions, and all changes to the assumptions of key parameters should be documented (e.g. by comparing the economic value of equity measured under their [internal measurement system] with the standardised framework in Section IV).”¹⁶

Sadly, the flaws in the Basel standardised framework are exactly the same as the flaws in the rejected U.S. models (1992, 1993, 1995, and OTS). Differences are modest. We briefly compare the Basel standardised framework with best practice:

¹⁵ For more information, please contact info@kamakuraco.com.

¹⁶ Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, paragraph 49.

1. Time periods simulated: The Basel standardised economic value of equity (“EVE”) calculation essentially represents one time step (an instantaneous yield curve shift), instead of a best practice of up to 999 user-defined time steps.
2. Monte Carlo scenarios used: 6 yield curve shifts in the Basel standardised framework, compared to up to one billion scenarios in a modern risk management system.
3. Interest rate risk factors used: 2 (the short rate shift and the long rate shift), compared to 10 in the BIS’s own Fundamental Review of the Trading Book, more than 10 in most modern term structure models, and up to one million risk factors in a modern risk management system.
4. Default probabilities used: 0 in the Basel standardised framework, one factor-dependent default probability for every counterparty in a modern risk system
5. Maturity and reset dates used: 19 dates, the mid-points of the 19 “slots” mandated by Basel, compared to 365 x 30 years = 10,950 actual dates for an institution with 30-year assets or liabilities in a modern risk management system.¹⁷ The Basel document claims that expanding the number of time buckets from 6 or 7 in the proposed U.S. rules to 19 is enough to offset the fact that the effective interest rate maturity of assets and liabilities on 10,950 – 19 = 10,931 dates is misclassified, often in a massive way.¹⁸
6. Non-maturity deposit assumptions: Arbitrary ratios supplied with no justification by the BIS in the standardised framework, compared with a fully stochastic simulation of balances, rates and own-bank default probabilities over all scenarios in a modern risk management system. The standardized framework requires use of one’s own data to determine what is “core” and what is “non-core,”¹⁹ which is the most fundamental mistake one can make in analyzing liquidity risk and the risk embedded in non-maturity deposits. Unless one’s own bank has had a “near death” experience due to high own-default risk, the bank’s own deposit balances are an excessively optimistic measure for what non-maturity deposits will remain if default is near due to a high level of interest rate or other risks. The anecdotal history of the failures of U.S. savings and loan associations provides ample evidence of this fundamental risk management tenet.
7. Own probability of default: not available in the Basel standardised approach, although this is the event that justifies the imposition of the standardised framework. This is a standard output in a modern risk management system where a mark-to-market of “own capital” is available at every time step in every scenario.
8. Duration of own equity capital: The Basel framework includes conflicting references²⁰ to the effective interest rate sensitivity gap impact of a bank’s own equity. A modern risk management system recognizes the Nobel Prize winning insight of Merton [1974] that the equity and debt of a firm (including a bank,

¹⁷ This requirement is contained in the following paragraph: Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, paragraph 101.

¹⁸ Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, footnote 27.

¹⁹ Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, paragraphs 112, 113 and 114.

²⁰ See, for example, this paragraph which implies that a bank’s own equity is relevant to the interest rate sensitivity gap: Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, paragraph 44. See also pages 40 and 41.

obviously) are derivative products that are a function of the full range of assets held and the seniority structure of liabilities. In short, the interest rate risk of equity, as the most junior liability of a bank, is an OUTPUT of risk analysis, not an input as the Basel document occasionally implies. The view that the duration of equity is an input to the risk calculations is rarely seen around the world outside of selected institutions in Australia and South Africa.

While the full list of flaws in the Basel standardised framework is much longer than the list above, we stop with the major flaws in the interests of brevity. The net effects of the standardized framework are multiple conflicts with these pronouncements:

“46. Modelling assumptions should be conceptually sound and reasonable, and consistent with historical experience.”²¹

“Principle 6: Measurement systems and models used for IRRBB should be based on accurate data, and subject to appropriate documentation, testing and controls to give assurance on the accuracy of calculations.”²²

“52. Accurate and timely measurement of IRRBB is necessary for effective risk management and control.”²³

Conclusion

U.S. banking regulators were correct in their rejection of the interest sensitivity gap models proposed in 1992, 1993, 1995 and earlier by the Office of Thrift Supervision. The Basel standardised framework is equally flawed and should be rejected both by national regulators and by the banks they regulate, especially since best practice in risk management has advanced so much since the 1970s when the interest rate sensitivity gap was invented as a crude proxy for today’s best practice. The most serious flaw in the Basel standardised framework was clearly foreseen by both U.S. regulators and commentators on those early models: a standardised approach provides a safe harbor for laziness, incompetence, and interest rate risk management mistakes on the part of regulated banks for whom the standardised approach is deemed by some regulators to be “good enough.”

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²¹ Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, paragraph 46.

²² Basel Committee on Banking Supervision, “Standards, Interest rate risk in the banking book,” April 2016, page 12.

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