Comprehensive Capital Adequacy Review Challenges Facing Capital Markets Players

CAPITAL MARKETS

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Overview

Since 2011, certain US financial institutions have participated in the Comprehensive Capital Adequacy Review (CCAR) program at the direction of US regulators. Institutions required to participate—bank holding companies (BHCs) with assets greater than $50 billion—have reported projected capital and Pre-Provision Net Revenue (PPNR) estimates based on regulator-prescribed and bank-specific scenarios, as well as their capital plans.

As of 2015, some 31 institutions have reported CCAR results, representing a mix of business lines from traditional banking to capital markets. While the goal of the CCAR program has been to promote soundness and stability in the financial system, financial institutions have experienced a number of challenges in CCAR execution, some of which concern their ability to model banking and trading book performance.

Up to now, regulators and practitioners have placed particular emphasis upon CCAR modeling for an institution's credit portfolios. In fact, regulatory guidance regarding CCAR modeling has been more prescriptive for banking than for capital markets business lines.[1] However, within the capital markets space we see focus shifting towards the trading book, investment banking and

wealth management, implying some unique challenges to banks in those business areas. One such challenge concerns volatility of revenues in capital markets business lines, which directly informs PPNR estimates. Shown below in Figure 1 are revenues reported by US capital markets firms for specific business lines, illustrating wealth management and trading book activities, respectively.

As it includes the recession of 2007-08, Figure 1 highlights both the exceptional volatility to which trading book revenues can be subject, and the marked differences in revenue swings that CCAR participants can observe in capital markets activities across their different businesses. As we will see, these differences have very specific implications for CCAR modeling.

As their capital markets activities evolve, BHCs look for enhanced approaches to CCAR modeling for those business lines. In this paper, we share our experiences with CCAR modeling for capital markets portfolios, some key considerations for CCAR modeling in capital markets, and our recommendations based on our experience with BHCs.

Figure 1. Capital Markets Revenues by Select Lines of Business

Mutual Funds and Asset Management Fees ($b)
2001–2010
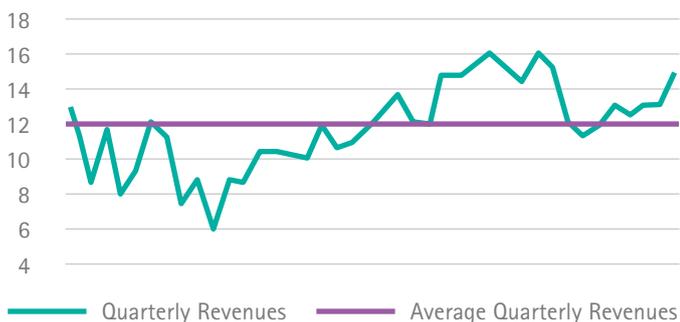
Investment and Trading Gains ($b)
2001–2010

Quarterly Revenues   Average Quarterly Revenues
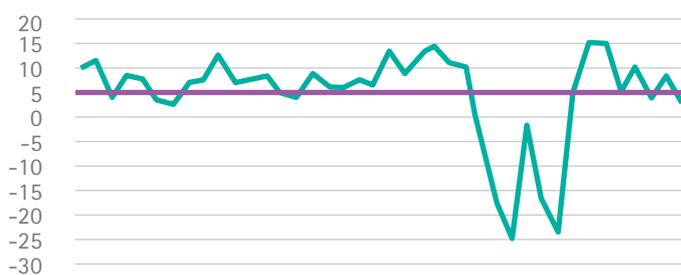
Source: Accenture, compiled from Securities Industry and Financial Markets Association filings of Financial Industry Regulatory Authority registered firms

Trends in Capital Markets and CCAR
The Journey, not the Destination

It has been our observation that, when faced with challenges in CCAR planning, banks should respond rather than react. By this, we mean a more proactive approach to CCAR execution. Typical challenges facing CCAR participants, such as data limitations, less mature risk measurement and identification processes, and integration of business as usual (BAU), often cause participants to scramble for answers and techniques which address these issues immediately.
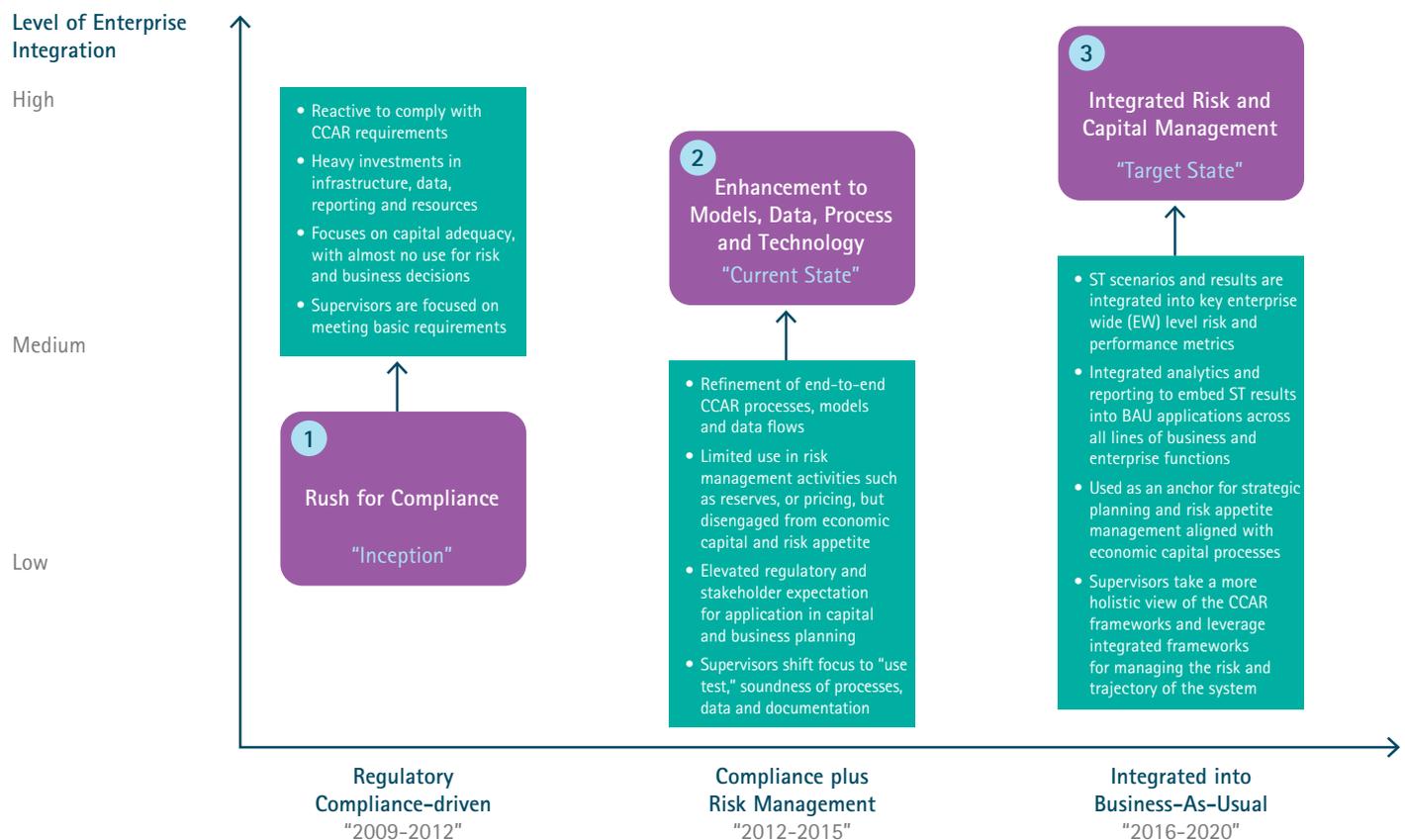
Such an approach can result in CCAR execution plans which produce suboptimal results and use components with limited shelf lives. For example, some banks may want to use their CCAR capabilities for strategic value, such as forecasting, yet find they're limited by modeling and execution choices which are relatively inflexible.

For more desired outcomes in CCAR modeling, banks should avoid a flight-or-fight reactionary view and embrace the notion that it is the journey, not the destination that matters. Once that notion is reflected in their strategy, CCAR participants tend to follow a narrative that aligns model strategy with business strategy and demonstrates a full understanding of risks. For these banks,

their multi-year plan for model maturation is critical; in the majority of cases, this longer-term view produces more satisfactory outcomes than does a band-aid approach.

For our high level vision of how we see the evolution of CCAR stress testing, see Figure 2.

Figure 2. Evolution of Enterprise Stress Testing (ST) – What Lies Ahead?

Level of Enterprise Integration

High

1 Rush for Compliance "Inception"
- Reactive to comply with CCAR requirements
- Heavy investments in infrastructure, data, reporting and resources
- Focuses on capital adequacy, with almost no use for risk and business decisions
- Supervisors are focused on meeting basic requirements

Medium

2 Enhancement to Models, Data, Process and Technology "Current State"
- Refinement of end-to-end CCAR processes, models and data flows
- Limited use in risk management activities such as reserves, or pricing, but disengaged from economic capital and risk appetite
- Elevated regulatory and stakeholder expectation for application in capital and business planning
- Supervisors shift focus to "use test," soundness of processes, data and documentation

Low

3 Integrated Risk and Capital Management "Target State"
- ST scenarios and results are integrated into key enterprise wide (EW) level risk and performance metrics
- Integrated analytics and reporting to embed ST results into BAU applications across all lines of business and enterprise functions
- Used as an anchor for strategic planning and risk appetite management aligned with economic capital processes
- Supervisors take a more holistic view of the CCAR frameworks and leverage integrated frameworks for managing the risk and trajectory of the system

Regulatory Compliance-driven "2009–2012"	Compliance plus Risk Management "2012–2015"	Integrated into Business–As–Usual "2016–2020"

Source: Accenture, July 2016

Risk and Strategy Sometimes Viewed Independently

As institutions implement their CCAR capabilities through multiple reporting cycles, the underlying goal of the CCAR process is sometimes lost. CCAR is in one regard a tool for regulators to measure the extent to which institutions understand their present and potential risk exposure under certain conditions.

While the capital and loss measurements produced by the CCAR process give regulators a metric with which to evaluate CCAR participants (for example, through their capabilities with respect to solvency), those measures cannot be viewed in isolation. They are most meaningful when evaluated along with a clear understanding of the underlying risk exposures, risk management policies and business strategy of the bank.

As most CCAR participants have completed several reporting cycles since 2011, we have seen regulators shift their focus to the implementation and integration of CCAR

processes within BAU risk management and other activities. Thus many banks have had an opportunity to apply this concept to all activities in the CCAR exercise. All activities, from model development to risk identification and scenario development workshops, should clearly demonstrate an understanding of underlying risks and support how the bank manages and mitigates these risks. Risk identification and scenario development processes should be soundly structured, well documented, and governed by common standards that can be consistently applied and easily replicated. Model risk management and development standards should follow

suit, focusing on setting guidelines which consider effective challenge and justification of modeling decisions based upon underlying risk drivers. Finally, banks should demonstrate a clear and complete understanding of their underlying portfolio data, in alignment with their choice of risk drivers.

Figure 3 illustrates our view on key components of an integrated framework for CCAR stress testing, risk management and risk strategy. This includes a continuous alignment and re-balancing of balance sheet, risk and capital decisions.

Figure 3. Key Components of an Integrated Framework for CCAR Stress Testing, Risk Management and Risk Strategy

Strategic Planning/Risk Appetite
- Growth strategies and corporate risk appetite that impact the availability and deployment of capital
- Business plans linked to capital strategies including capital allocation, risk-adjusted performance and incentives
- Dynamic monitoring and re-calibration of risk appetite targets and thresholds

Risk Management
- Identification and assessment of all material risks
- Risk management policies and procedures linked to capital adequacy levels (e.g. limits)
- Stress scenarios that will impact capital access and funding requirements

Balance Sheet Management
- Improving capital structure (equity and debt instruments)
- Determining "strategic buffer" capital levels accounting for cyclicality
- Liquidity stress testing and contingency plans

Capital Management
- Improving sources vs. uses of funds and capital targets formulation
- Refinement of capital distribution plans (dividends, repurchases)
- Capital contingency plans, key reporting indicators and triggers

Source: Accenture, July 2016

CCAR Priorities Tend to Evolve

Effectiveness in the CCAR modeling arena lies first and foremost in the "right-sizing" of an institution's modeling approach. Right-sizing means simply that banks should find an optimal balance among the complexity, granularity, portfolio materiality, business strategy and defensibility criteria. Unlike many other model applications, such as risk rating or pricing, CCAR stress testing models do not follow a common logic regarding accuracy.

Pinpoint accuracy is not, and should not be, a top concern during the model development process, although minimum acceptance criteria (such as explanatory power) should be consistent with the bank's overall risk strategy. Overly complex modeling approaches aimed at increasing accuracy and model fit often produce unsatisfactory results when banks attempt to defend the appropriateness of the approach in stress scenarios that aren't observed in market behavior. A useful concept here is that of the "use test," meaning that institutions should attempt to demonstrate that their CCAR models are consistent with approaches used in BAU loss forecasting and business planning, to the extent possible.

Consider the following example: ARIMAX (autoregressive integrated moving average) models and their variants are often used in CCAR stress testing to reflect autocorrelation in predictors. These models are popular as autocorrelation is commonly observed in the behavior of financial instruments. Theoretically, the observed value of a market instrument on any given day is highly dependent on its value on a prior day. However, to add autoregressive (AR) factors to models, developers have to provide evidence of autocorrelation in the historical data, and be confident that these correlations will hold true in adverse stress situations. Typically we see that the level of justification required increases with the complexity of the modeling approaches, which illustrates the utility of using challenger models whose techniques differ from those of their associated champions. Thus CCAR participants should proactively consider the trade-offs between defensibility and complexity.

Supervisory Developments Relevant to CCAR in Capital Markets: SR 15-18 and SR 15-19[2]

In order to address criticism regarding "one size fits all" approaches to the capital plan rule, the Federal Reserve (Fed) recently released differentiated Supervisory Letters SR 15-18 and SR 15-19. These supervisory letters largely consolidate the Fed's existing capital planning guidance, and provide differentiated expectations for large firms by building upon requirements in the following regulations:

- Reg Q - Capital Adequacy Requirements for Board-regulated institutions

- Reg YY - Enhanced Prudential Standards (EPS)

- Reg Y - also known as the Capital Plan Rule

SR 15-18 is applicable to "Large and Complex Firms," which are US BHCs and international holding companies (IHCs) of foreign banking organizations that are either:

- Subject to the Fed's Large Institution Supervision Coordinating Committee (LISCC) framework; or

- Have total consolidated assets of $250 billion or more or consolidated total on-balance sheet foreign exposure of $10 billion or more.

On the other hand, SR 15-19 is applicable to "Smaller and Non-Complex Firms," which are US BHCs and IHCs of foreign banking organizations that have:

- Total consolidated assets of at least $50 billion but less than $250 billion;

- Have consolidated total on-balance sheet foreign exposure of less than $10 billion; and

- Are not otherwise subject to the Federal Reserve's LISCC framework.

In the case of PPNR and RWA (risk-weighted assets) estimation for complex firms, the supervisory expectations are more stringent and include:

- Elevated expectations regarding use of models in loss and revenue estimation.

- Projections based on internal data.

- Higher expectations for estimating certain losses such as fair value losses, mark-to-market, counterparty losses and operational risk losses.

- Higher expectations for support and documentation of assumptions underlying RWA projections including independent review.

- Heightened expectations for variable selection processes, controls for vendor models, and model performance.

- Higher level of model segmentation granularity expected.

- Operational risk—solicit inputs from senior management and use of both internal and external data.

- Strong controls required for all qualitative approaches.

On the other hand, in the case of non-complex firms we observe that the bar is somewhat lowered:

- They may use either quantitative or qualitative approaches.

- They may use either internal or external data for projections.

- There are lower expectations regarding segmentation granularity, identification of key risk drivers and other factors.

- They are not expected to use scenario analysis for operational loss projections.

- They are not expected to estimate certain losses such as fair value losses, mark-to-market, counterparty losses and operational risk losses.

- They are not subject to heightened expectations for RWA projections and not expected to implement an independent review of RWA projections.

- Strong controls are required for material qualitative approaches only.

For firms active in the capital markets space, the modeling elements addressed by the new guidance are challenging in relation to loss modeling and particularly so for firms deemed complex. First, SR 11-18 puts more emphasis on modeled approaches, but such approaches have been difficult to develop for many trading segments. Second, the heightened expectations for a variable selection process, along with enhanced model performance testing requirements, are harder to meet in the capital markets than in lending portfolios. In the trading book, it has been harder to develop more granular segments for many desks, especially when modeled approaches are pursued. Finally, in the case of those segments where models are qualitative, there are stronger control and documentation requirements.

CCAR
MODELING

Unique Aspects of CCAR Models for Capital Markets

Compared to CCAR modeling efforts for lending portfolios, development of forecasting and stress testing models for trading, investment banking and private wealth portfolios present a unique set of challenges. These challenges reflect both the nature of the business lines themselves and the peculiarities of a given approach to modeling.

For example, models based wholly or in part on the judgment of specialists are often appropriate for business lines whose positions are relatively illiquid or immaterial. In addition, modeling approaches which assume position level granularity often face limitations due to a lack of historical data available for macroeconomic factor drivers. This can be seen in cases involving the capture of pricing spreads where historical data includes trade prices but lacks spreads. In all cases, banks should demonstrate to supervisors the range of segmentation options considered and their rationale for the one chosen.

As seen in Figure 4, we identify some key points of differentiation for capital market modeling.

Certain measures of capital markets exposures, such as volatility, are essential to help CCAR models reflect market behaviors. Consider

a "blow out" in which price spreads widen sharply. In such a case, markets can quickly spike in volatility as counterparties look to traders to hedge default risk. Another possibility is that markets may freeze, reflecting concerns about transparency and the ability of market makers to execute. CCAR forecasts should include these types of events in a manner that is empirically defensible, considering assumptions such as constant correlations across market scenarios.

In our experience with CCAR modeling, we have seen regulators react positively to both qualitative and quantitative modeling approaches for capital markets portfolios. In the first case, regulators typically have accepted qualitatively driven balance sheet and income statement forecasts, where criteria such as materiality are applied.

In the second case, regulators have more readily accepted modeling approaches with a low level of granularity, as with PPNR, and losses modeled at the line of business, rather than the desk or product level. Business line-level granularity has been driven by challenges arising from the need to capture movements between business activities and desks, as well as data restrictions.

For both qualitative and quantitative modeling efforts, banks should focus on continual improvement of their documentation standards, in order to provide transparency into the underlying risk and business drivers of modeling decisions, as well as empirical justification of modeling assumptions where possible. In all cases, the supervisory expectation is that such documentation will be self-contained and exhaustive.

Figure 4. Key Capital Markets Differentiators in CCAR Modeling Aspects

Capital Markets Differentiator	Key Points
Specific focus on PPNR and non-interest revenue modeling	At a fundamental level, PPNR projections for non-interest revenue are generally more critical for capital markets players than for banks with traditional business lines. For these institutions, their fee-based revenues play a proportionally greater role as compared to their net interest margin (NIM) revenue.
Inclusion of market entrance/exit and changes in desk strategies	Consideration of anticipated changes in business strategy is paramount for capital markets participants. As market conditions change, movement of portfolio positions between desks and business lines is all but guaranteed for most firms. Both should be considered as driven by macro factor scenarios.
Macro factors that balance business drivers and underlying risk factors	Capital markets revenues are predominantly volume-driven, with changes in underlying risk exposures not necessarily having direct or intuitive impact on deal/trade volumes. We frequently see profitable strategies for which changing spreads of macro factors indicate higher overall position/exposure risk. These contributors need to be considered and included in the majority of forecasting models as they can result in seeming contradictory rank ordering of scenario factors, reflecting the non-linear impact of market volatility on trading revenues.
Multi-tiered modeling requirement	Modeling for trading and sales, investment banking, and private equity business lines requires that institutions forecast more than just volumes. A firm's risk profile for these portfolios is informed by pricing, average deal sizes and market share, among other factors. These factors may present particular modeling challenges, such as data availability at an adequate level of granularity.
Increased complexity with forecasting trading schedules and RWA	Capital markets groups, particularly trading and sales, face complex challenges in forecasting Value-at-Risk (VaR) and Stressed VaR (SVaR), RWA, and counterparty exposures required for trading schedules. VaR forecasting methodologies vary widely between institutions; factors driving complexity in projections include warehouse volumes, asset class mixes, and counterparty volumes.

Source: Accenture, July 2016

A Look into CCAR Modeling by Market Segment

As we have observed with CCAR participants, forecasting, loss and capital modeling approaches vary widely in the marketplace. Institutions choose between modeling alternatives based on their portfolio operating legacy, currently understood preferred practices, and other factors. However, we have seen some recurring themes that appear across different business lines. See Tables 1-3.

Table 1. Capital Markets CCAR Modeling Considerations for the Trading and Sales Segment

Theme	Key Considerations For Model Development
Revenue Forecasting	Modeling should consider trade volumes and changes in pricing spreads simultaneously. Banks should explicitly consider methodologies for modeling correlations between spreads and trade volumes in both baseline and stress scenarios.
Expense Forecasting	Expenses are driven by compensation and generally modeled as a percent of business volumes, modified by qualitative forecasted changes in compensation structures/levels to reflect bank executive planning. Banks should justify their approach for this calculation, e.g. the time period over which expenses are estimated.
Loss Forecasting	Losses on AFS (available for sale) assets and on-hand warehoused assets generally use existing market risk measurement frameworks. Here a critical concern is the selection of macroeconomic variables and proxies for inclusion in forecasting models. Qualitative overlays are common as measurements generally are static.
Scenario Development	Scenarios should include macro and micro impacts of historical trade volumes across desks in adverse conditions, specifically the capture of volume shifts between desks that do not signal a loss of volume to the market.
Granularity	Movement to desk-based forecasting present challenges as correlations between desk trade volumes should be captured, in order to differentiate movements in trade volumes between desks from an overall reduction in trade volume at the firm.
Other	Proxy choices: In choosing proxies for macro or micro business drivers, it's critical to understand the relationship of proxies to the factors of interest, i.e. correlation, and under what conditions those relationships hold. Under specific conditions, proxies might no longer have sufficient explanatory power or may go out of scale.
	Model segmentation: Bottom-up vs. top-down choice of modeling approach may depend upon process maturity, products and volumes. Correlations between segments may be considered as well when appropriate.

Source: Accenture, July 2016

Table 2. Capital Markets CCAR Modeling Considerations for the Investment Banking Segment

Theme	Key Considerations For Model Development
Revenue Forecasting	Revenue modeling should include forecasting of deal volumes as well as pricing spreads. Deal volume forecasts should include number of deals, average deal sizes and market share.
Expense Forecasting	Expenses are driven by compensation and generally modeled as a percent of business volumes, modified by qualitative forecasted changes in compensation structures/levels to reflect bank executive planning regarding the expected future macroeconomic environment.
Loss Forecasting	Losses are often forecasted using qualitative assessments as limited IB (investment bank) assets are held on an institution's balance sheet.
Scenario Development	Macroeconomic factors should include business line drivers from both lower-tier and higher-tier banks, to capture movements between desks separately from movements away from the firm. In addition, scenarios should include regional factors for specialized business types.
Granularity	Bottom-up modeling of IB positions may be used to reflect unique deal structures as markets react to changing economic conditions.
Other	Market saturation: Deal volumes need to reflect market saturation and competition to capture slowdowns in market deal volumes, as well as the ability of the firm to retain market share.

Source: Accenture, July 2016

Table 3. Capital Markets CCAR Modeling Considerations for the Private Wealth Segment

Theme	Key Considerations For Model Development
Revenue Forecasting	Revenue should be modeled as a percent of assets under management (AUM), additional per-account fees and individual account lending.
Expense Forecasting	Expenses are driven by compensation and generally modeled as a percent of business volumes, modified by qualitative forecasted changes in compensation structures/levels to reflect bank executive planning regarding the expected future macroeconomic environment.
Loss Forecasting	Losses forecasted are proportional to lending volume. These are typically modeled at the loan level, with losses driven by factors similar to those of wholesale and retail lending. Collateral should be considered in loss forecasts, as well as total assets held within the bank.
Scenario Development	Macroeconomic factors should include business drivers of fund performance, as well as investor volume drivers to reflect lower volumes in deteriorating economic conditions.
Granularity	Fund or product type level modeling should be used to capture the unique behavior of fund types. Proxies may be used in lieu of individual funds, subject to validation of their suitability.
Other	Movement of account funds: Modeling should differentiate movements between product types and movement of funds outside the firm. Revenue forecasts should capture these product movements as pricing can vary significantly as clients move from high risk, high return assets with large pricing spreads to more traditional and safe investments. Movements from fee generating accounts to deposits or non-fee offerings should also be considered.

Source: Accenture, July 2016

RISK AND STRATEGY

CCAR Modeling for Capital Markets

Model Development is a Multi-Year Journey

CCAR participants set modeling priorities based on both internally perceived limitations and on feedback from external sources. We frequently see institutions attempting to address all modeling concerns within a single reporting cycle. This approach is impractical, and, in some cases, detrimental to the bank's overall model management effort.

Each bank has its own journey towards advanced CCAR models with regards to data usage, model methodology, granularity, challenge framework and validation approaches. That journey evolves over time, and individual banks are on a unique trajectory driven by certain forces and subject to specific limitations.

The complexity and granularity of CCAR models should be viewed in terms of a maturity curve. The stages in that maturity c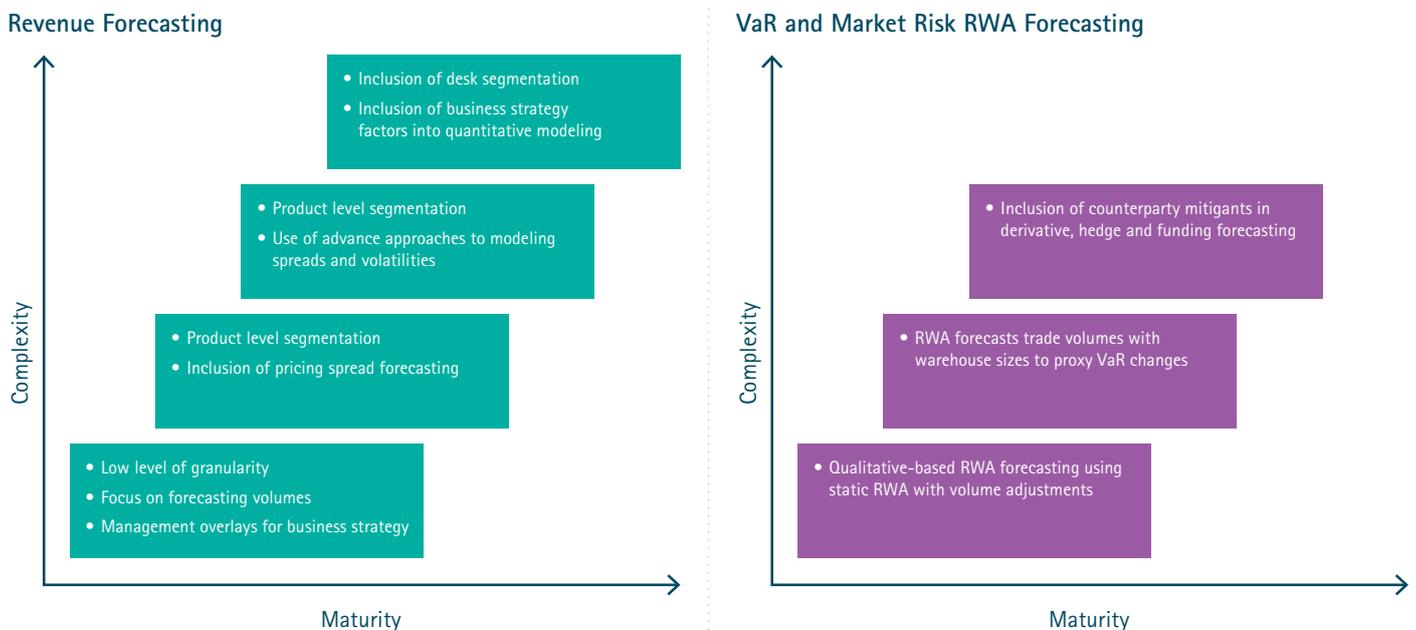urve can vary by CCAR measurement and business line of interest. Figure 5 illustrates the maturity curve we often see in the trading/sales operations of BHCs. Over successive CCAR submissions and model generations, banks have faced a tradeoff between model complexity (risk differentiation at more granular levels) and maturity of methodology (rigor in model management, validation and execution).

To evaluate their CCAR planning in terms of the maturity curve, institutions should identify the "right-sized" approach as a starting point, then refine their process from left to right on the curve. All too often, banks focus on a level of granularity that exceeds their capabilities, resulting in model failures and inadequate risk measurement. A right-sized effort should be realistic and strike a balance between line of business complexity and internal modeling capabilities. Starting at the most summary level of granularity using a top-down approach typically is the easiest and most readily justifiable approach, as this limits the number of assumptions or elements that should be quantitatively or qualitatively justified.

Figure 5. A Bank's Multi-Year Model Development Journey for Trading and Sales CCAR

Trading and Sales Example

Revenue Forecasting

- Inclusion of desk segmentation
- Inclusion of business strategy factors into quantitative modeling

- Product level segmentation
- Use of advance approaches to modeling spreads and volatilities

- Product level segmentation
- Inclusion of pricing spread forecasting

- Low level of granularity
- Focus on forecasting volumes
- Management overlays for business strategy

VaR and Market Risk RWA Forecasting

- Inclusion of counterparty mitigants in derivative, hedge and funding forecasting

- RWA forecasts trade volumes with warehouse sizes to proxy VaR changes

- Qualitative-based RWA forecasting using static RWA with volume adjustments

Source: Accenture, July 2016

Start With a Firm Understanding of the Data

As observed over a number of CCAR reporting cycles, we have noted that, for capital market portfolios, regulators tend to criticize quantitative aspects of model building methodologies less frequently than other aspects. We believe that the most likely reason for this is that regulators are prone to criticize CCAR participants for not demonstrating a thorough understanding of their underlying portfolio data than for other reasons.

Therefore, the choice of model building methodology often carries less weight than does a clear understanding of the firm's portfolio and a demonstration of how portfolio data supports the implemented approach. In fact, data considerations may drive modeling choices, such as level of product type or portfolio segmentation. Thus CCAR participants should start first with developing a solid understanding of granular and aggregated data available, prior to creating detailed model development plans. Particular care should be paid to data exclusions, definition of outliers, and the rationale for making such distinctions.

As an example, consider a bank with extensive historical trade data. This data can easily be used to model and forecast trading volumes and build a statistically sound forecasting model. However, this data may also reflect large movements in trading volume averages due to a multitude of business strategy changes that shifted the firm's focus among different product areas. Without a complete understanding of the drivers of these changes within empirical data, modelers will often make non-justified assumptions about volume drivers and incorrectly model data shifts based upon underlying risk factors, as opposed to changes in business strategy.

Create an Environment for Greater Effectiveness

Once banks view CCAR as a journey whose outcomes can be actively managed, it becomes important for these institutions to implement robust operating models with a long-term strategic orientation. Operating models for CCAR execution can span a number of different divisions within a bank. When this is the case, banks tend to leverage existing processes and architectures when fortifying their CCAR capabilities.

We often see banks struggle in aligning CCAR operating models with their overarching strategic goals. This situation is particularly prevalent in capital markets business lines, where banks start with longstanding line of business operating models that are intended to run on a desk-by-desk basis to hit short-term profit targets. In these cases, system processes and infrastructures tend to be fragmented and often controlled by entities with competing priorities. Compounding this situation is a frequent shortage of CCAR-experienced risk subject matter knowledge, since CCAR as a discipline is relatively new and continually evolving. Given the convergence of these factors, it is not surprising when institutions are challenged in executing CCAR in a manner that supports their larger strategic goals.

In order to clear these hurdles, both experienced CCAR participants and upcoming entrants should understand the importance of a strong governance framework as a foundational step. When designing this framework, CCAR participants should consider the elements in Table 4 as they pertain to capital markets.

For a more extensive view of governance issues pertaining to model management, we encourage readers to review the Accenture document entitled "Emerging Trends in Model Risk Management."[3]

Table 4. Capital Markets CCAR Modeling Governance Considerations by Key Theme

Theme	Key Considerations For Governance Framework
CCAR Organizational Structure	Committee structures, roles and responsibilities, and lines of accountability should be clearly defined, with oversight provided by senior management from capital markets business lines.
Validation of Outcomes	Banks should develop a consensus view of effective challenges within stress testing, capital planning and reporting processes. Establishing three lines of defense is a common approach to validating the CCAR outcomes.
Operating Model Architecture	Banks should consider the benefits and limitations of a central versus a federated organization in planning for CCAR model management, informed by the institution's chosen time horizon for planning.
Consistency of Internal Standards	CCAR model management should align with model development and documentation standards, as efficiencies are gained by adopting common standards.
Alignment with Regulatory Expectations	Banks should provide sufficient rigor to their CCAR narrative development to meet regulatory expectations, as this also helps with organizational alignment.

Source: Accenture, July 2016

Focus on Defensibility and Development of Model Narratives

New entrants to CCAR reporting often seek to develop highly complex and sophisticated modeling approaches, as these are often viewed as "stronger" or more accurate in baseline projections. Although more complex approaches may have their merits, an underlying principle of CCAR modeling is improving the performance of implemented models in both normal and adverse conditions.

Targeting a complex approach too early in the model lifecycle places increased pressure on the modeling teams and lines of business owners to justify the use of chosen approaches and defend the reasonability of modeling assumptions. Furthermore, data limitations and challenges often do not allow modelers to capture known and anticipated market impacts at a desired level of granularity. Choosing more complex approaches with assumptions that cannot be justified due to data limitations can often result in regulators asking institutions to "prove why" a particular approach is appropriate.

Times series autoregression in modeling provides a good example. Recent regulatory scrutiny of autoregressive (AR) modeling approaches highlights defensibility as a high priority for CCAR participants. In other applications, such as macroeconometric forecasting, AR terms are frequently included to improve explanatory power. However, banks frequently have to define the impact of the AR term under stress conditions. In adverse and/or severely adverse scenarios, it is not unusual to see AR terms in models dominate other risk factors (namely macroeconomic drivers), and the ensuing results may not adequately reflect macroeconomic

factor sensitivities. In addition, banks frequently are challenged to justify assumptions of constant correlations under stress conditions. Taken in combination, one can readily see these issues resulting in a regulatory challenge as to whether such models are defensible.

Leverage a Champion/Challenger Framework

The CCAR exercise is based upon the effective challenge of assumptions, demonstrating the appropriateness of forecasts, and exercising a solid understanding of risk exposures to the firm; a company's model development strategy should consider all these stated requirements. Use of a champion/challenger framework can contribute to the goal of producing forecasts which accurately assess risks faced. When used within a strategy informed by a model maturity curve, a champion/challenger framework positions banks to develop the required support and model narratives for more complex modeling approaches in the future.

As BHCs move out on the maturity axis, successive steps reflect increased use of champion/challenger pairs to improve modeling performance. The critical element here is setting up clear requirements for challenger model adoption criteria and benchmarking challenger models against champion models. Used consistently, these two metrics will help banks align the "prove why" questions posed by regulators with their "here is why" responses.

As is the case with their risk-rating cousins, stress testing models are assessed from the perspective of whether their results are as expected given portfolio information available and the model methodology employed. In such a case, the criterion of "as expected" may be most meaningful on a relative basis. If a champion model uses one methodological approach, and a challenger model uses another, a bank might expect to see markedly different results. If this

champion/challenger pair under consideration produces very similar results, banks might be prompted to more carefully scrutinize the champion model for appropriateness and applicability. In all cases, banks will want to choose a particular challenger model class such that differences between champion and challenger results are clearly explainable.

How Accenture Can Help

Through our experience with a broad range of financial services companies, Accenture has developed extensive know-how, knowledge and capabilities to help companies deal with CCAR challenges. Our advisory, modeling and implementation services reflect:

- In-depth knowledge of the full range of methodologies and validation processes, gained from CCAR experience across a range of participant banks. This gives Accenture the ability to "right-size" and design an appropriate modeling solution for each organization.

- Our understanding of the key drivers of modeling-related regulatory feedback, such as resolution of MRAs (matters requiring attention) and MRIAs (matters requiring immediate attention).

- Proprietary assets for accelerated PPNR and loss model development, model validation and documentation.

MODEL RISK MANAGEMENT

CHAMPION–
CHALLENGER
FRAMEWORKS

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Mike is Principal Director, Accenture Risk Analytics. He has over 25 years of financial risk modeling and analytics experience in industry and consultancy. Specialized in model development and validation for CCAR, PPNR, credit/market/operational risk; Basel and ICAAPP; model risk management; financial regulation; advanced statistical and optimization methodologies. Mike has presented at high profile industry venues and been referenced in both practitioner and academic journals.

Joshua M. Gorrera, FRM

Josh is a Senior Manager within the Accenture Digital Risk Analytics practice where he leads the capital markets analytics teams. He has extensive experience in market risk, stress testing, and operational risk areas and is focused on serving capital markets, asset management, fund and banking clients. Specialized in risk analytics strategy and model development, Josh works extensively with CCAR clients in all areas including modeling, program strategy, risk identification, scenario analysis and the data analysis and management spaces.

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