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Data: The Tail That Wags the Stress Test

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INTRODUCTION

Among the most significant repercussions of the speculative bubble burst of 2008 is a host of regulations that are making life increasingly difficult for bank compliance departments. Having extended to banks large tax-payer-funded loans after a series of speculative cycles, governments across the globe now treat banks as potential borrowers and perform due diligence that is, well, bank-like in its thoroughness. Regulators now extensively review banks' ability to manage intraday liquidity, analyze risk at various levels, and maintain adequate capital under a variety of projection scenarios. Based on its interpretation of recent documentation from the Basel Committee on Banking Supervision, Aite Group anticipates a broadening of regulatory scope to banks' ability to rapidly aggregate and report on risk exposures based on a variety of parameters, such as geographic area, obligor, or industry sector. Challenging though these regulatory mandates are in their general requirements, they are even more demanding in their execution. In fact, the management of data—its acquisition, management, quality, and monitoring—can be as difficult as the analytical and reporting tasks required by regulators. Worse, banks that struggle with risk-related data challenges during a stress test can be viewed as lacking the ability to monitor their risk, leading to adverse findings and higher capital requirements.

In particular, the completion of a stress test, the pro forma analysis of a bank's capital adequacy, causes significant data challenges. Banks must use existing data stores, which often lack a risk or credit-related context, to ascertain the exact risk profile of each of their exposures so that their financial performance, including losses, can be estimated over a projection period of up to nine fiscal quarters under a variety of projection scenarios. Once extracted, these large and highly granular data sets undergo calculations and transformations that can go awry in the presence of poor data quality. Having discussed stress tests with banks and vendors providing stress-test-related automation, Aite Group sees the complexity of these analyses compounded by data aggregation challenges. The data sources called upon during a stress test typically have little commonality, as they were acquired by different legal entities, deployed by different lines of business, built by different vendors, and customized to achieve unrelated business requirements.

Banks seeking to perform cost-effective stress tests that deliver analytic insights and enable operational improvements must find a way to better manage their stress-test-related data sources. It is this context in which Aite Group, which recently completed a broad study of the stress-test challenges faced by banks and the vendors providing stress-test automation capabilities, analyzes the data-specific challenges banks grapple with when performing stress tests. This Impact Note follows two larger Impact Reports that more broadly covered the topic of stress tests.[1] It is designed for bankers preparing for their first stress test, bankers who have already been through one or more stress tests but want to make these processes more cost effective or analytic (rather than labor intensive and compliance driven), and members of banks' boards of directors or senior management teams seeking information in response to internal capital requests related to stress-testing automation.

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1. See Aite Group's reports, *The Global Stress-Test Automation Market: Stress, Uncertainty, and Moral Hazard*, September 2013, and *Capital Adequacy Testing: Don't Stress, Be Analytic*, May 2013.

METHODOLOGY

This Impact Note is based on Aite Group's Q2 2013 comprehensive study of stress testing, which covered what is required of banks that stress test, the challenges they face when performing stress tests, and the vendors providing capabilities that automate stress tests or portions of these complex projects. This market analysis comprised a comprehensive Aite Group RFI completed by 10 global providers of core stress-test automation tools during Q2 2013 as well as Aite Group discussions with compliance executives at three financial institutions in North America and Europe that use these technologies. The limited number of financial institutions able to participate in Aite Group's research is the result of the sensitive nature of stress tests, which speaks to a bank's ability to maintain sufficient capital to avoid turning to its government for financial assistance during an economic downturn.

Also examined, though not through an RFI process, are vendors that provide data-related capabilities designed to improve banks' stress-test capabilities. Stress-test-related documentation and guidance provided by both the U.S. Federal Reserve (the Fed) and the Basel Committee on Banking Supervision (the Basel Committee) are also significant data sources for this piece. Productivity-related analyses within this report are the result of interviews with stress-test performing banks. This research is further bolstered by the knowledge of the author, whose career spans 13 years in commercial banking and eight years in software analysis, most of which were spent considering analytics-related deployments and quantifying the benefits of technology investments.
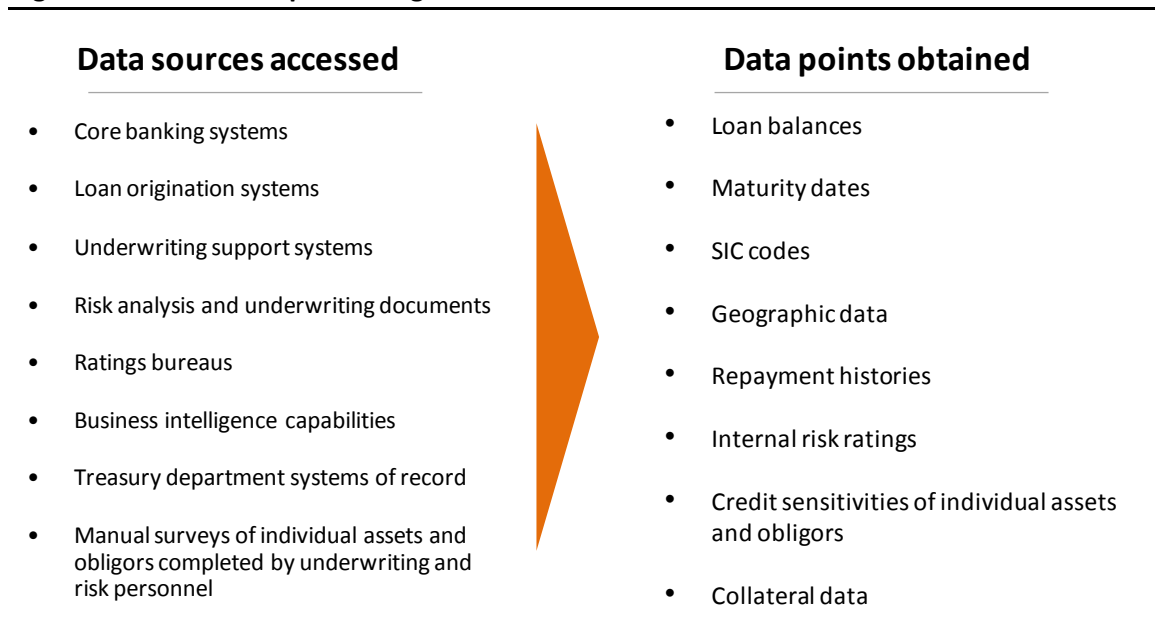
THE CENTRAL ROLE OF DATA IN STRESS TESTS

Asset-related data plays a central role in the completion of a stress test for two reasons. First, for every asset on a bank's balance sheet, a bank requires a large volume of risk-related context in order to estimate how its assets will perform under the various projection scenarios over which the bank will be tested. The better the quality and the context of such data sets, the faster scenario-related calculations can be built and performed without manual repairs to data. Second, given a high level of audits and oversight by stress-test regulators such as the Fed, the presence of poor data quality in a stress test can lead to adverse findings about a bank's ability to accurately monitor the risks in its business model.

DATA AND SCENARIO MODELING

When performing a stress test, a bank must create enterprise-wide projection models that depict the changes in that institution's risk profile, losses, financial performance, and regulatory capital under a variety of scenarios, some of which are quite severe. Projection scenarios, whether supported by automation or not, require a large volume of information from a variety of data sources, examples of which are detailed in Figure 1.

Figure 1: Data Called Upon During a Stress Test

Data sources accessed	Data points obtained
• Core banking systems	• Loan balances
• Loan origination systems	• Maturity dates
• Underwriting support systems	• SIC codes
• Risk analysis and underwriting documents	• Geographic data
• Ratings bureaus	• Repayment histories
• Business intelligence capabilities	• Internal risk ratings
• Treasury department systems of record	• Credit sensitivities of individual assets and obligors
• Manual surveys of individual assets and obligors completed by underwriting and risk personnel	• Collateral data

Source: Aite Group

Once obtained for the simulations of scenarios within a stress test and combined with macroeconomic metrics that comprise a given projection scenario, the data points in Figure 1 enable stress-test teams to calculate a variety of outcomes and key risk indicators, a representative list of which is included as Table A. The minimum level of granularity at which such metrics are tracked is the business-unit or portfolio level, but Aite Group finds that banks commonly track such data points even more granularly, at the individual asset or loan level. The

metrics in Table A are calculated for the end of each quarter over a nine-quarter projection scenario, with the ultimate goal being the calculation of regulatory capital and liquidity throughout the projection period. Transparency and documentation are also key to the stress-test process. In addition to successfully accessing and utilizing these data sources for stress-test, calculations and analysis, banks also need to be able to readily disclose to regulators, in response to both standard reporting requirements and ad hoc requests, the processes used to access data relied upon during a stress test and ensure its accuracy.

Table A: Outcomes and Key Risk Indicators Tracked During a Stress Test

Key stress-test metrics		
Expected default (ED)	Loss given default (LGD)	Regulatory capital
Libor spreads	Net income	Risk ratings
Liquidity	Prepayments	Write-offs
Loan to value (LTV)	Probability of default (PD)	

Source: Aite Group

THE CHALLENGE OF DATA COMPLEXITY

Stress testing is no easy task. In addition to estimating the impacts of assumed projection scenarios on the outcomes in Table A over a nine-quarter projection period, stress-test teams must also track the impacts of changes in the outcomes on one another. For example, an increase in the PD and LGD of a commercial loan to a retailer will be the likely result of an assumed increase in the national unemployment rate. The increased riskiness of such a loan will also cause the bank to earn a higher risk premium charged on this asset, increasing earnings, capital, and liquidity—all of which must be accounted for within a stress test.

And problems often abound with the data itself, both when it is extracted and after it is acted upon during the stress-test process. Compounding the difficulty of complex data are the many people, applications, events, and processes acting upon in-flight data during a stress test. For example, the IT staff responsible for extracting data from the sources Figure 1 might lack sufficient knowledge about stress tests, leading to insufficient extraction of metadata (data about data), risk context, or data lineage. Combining data sets that have similar meanings but different interpretations can also be problematic. For example, combining risk-related data from two acquired lending operations, one with a 5-point risk-rating scale and one with a 7-point scale, can lead to poorly integrated data. Data shortcomings, such as a hyphenated last name that makes a customer's record difficult to find, can cause significant stress-test issues that are difficult to anticipate and troubleshoot. Finally, data quality can also erode as a result of changes in the business environment. Once captured within a stress-testing capability, risk-related data must be regularly updated for real-world events that result in material changes to factors such as loan balances, risk ratings, and lending terms.

DATA AND QUALITATIVE REGULATORY REQUIREMENTS

Accompanying the quantitative analytical demands of stress tests is a variety of challenging qualitative regulatory requirements, the achievement of which relies upon ready access to large amounts of credit and risk-related data. Although the various governments enforcing liquidity- and capital-related requirements tend to have their own evolving approaches, the U.S. Fed's qualitative requirements for capital adequacy tests serves as a representative list of criteria that banks in a variety of markets must meet to satisfy post-2008 regulatory requirements. Listed below, these criteria can be found lacking or suspect by regulators should data audits reveal inconsistencies or manual workarounds:

- **An adequate capital plan:** Components of a capital plan as required by the Fed include an assessment of expected sources and uses of capital over the planning horizon, a description of any material changes to the institution's business plan, and a description of both internal capital policies and internal processes for assessing capital adequacy.

- **Risk management analysis:** Regulators require stress-tested banks to have internal analytical capabilities that enable the rapid identification, measurement, assessment, monitoring, and control of all material risks.

- **Capital management:** Stress-tested banks are required to prove access to clearly defined and well-documented capital resources and assets that they can call upon should an adverse scenario materialize. Banks must be able to assess the value and availability of those resources over the range of stress scenarios, including the impact of write-downs, losses, and ratings downgrades. Banks should also have ongoing and granular processes and practices for establishing capital goals, determining capital adequacy, and crafting contingency plans that can be relied upon should capital levels become insufficient.

- **Managerial involvement:** The Fed requires that the boards and senior management teams of stress-tested banks have effective oversight of their institutions' capital adequacy planning and the use of analytics to monitor and evaluate risk. This includes a periodic review of each bank's methodologies for assessing risk and capital adequacy and estimating losses.

STRESS-TEST-SPECIFIC DATA ASSURANCE CAPABILITIES

Given the importance of data in the stress-test process, Aite Group examined its existing research into the state of banks' data management capabilities and found that the majority of banks are dissatisfied with their capabilities in data warehousing and data management. Most want to improve these capabilities and are as likely to build new capabilities as they are to turn to external vendors (Table B).

**Table B: Banks' Satisfaction and Goals in Data Warehouse Management Technology**

Q. Please help us understand your institution's data-related IT initiatives for *data warehouse management*. (N=26)										
Firm's satisfaction		Firm's goal		24-month IT spending forecast			Likelihood to				
Yes	No	Be good enough	Be stellar	Down	Flat	Up	Build new software	Buy new software	Out-source	Bring in-house	Hire vendor
22%	78%	43%	57%	0%	36%	64%	39%	39%	9%	9%	26%

Source: Aite Group's global survey of banks with more than US$10 billion in assets, Q2 2012

Aite Group also finds that despite the importance of stress testing as a regulatory regime, few banks have fully automated stress tests. The majority of banks appear to be "partially automated," a significant minority is primarily manual, and few, if any, appear to be "fully or primarily automated" (Figure 2).

Figure 2: Stress Tests Are Supported With Low Levels of Automation

Q. Which of the following best describes the level of stress-test automation at your bank? (n=13)

Fully or primarily automated
0

Fully or primarily manual
4

Partially manual, partially automated
9
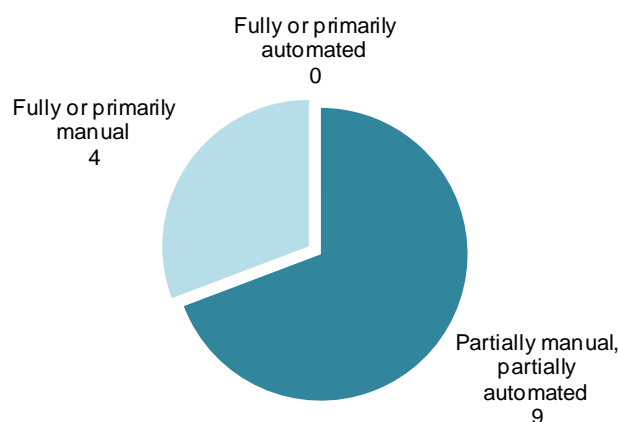
Source: Aite Group survey of 13 banking professionals involved in their bank's stress-test processes, July 2013

Given the lack of automation in banks' stress-test processes and banks' goal of improving their data management capabilities, Aite Group examined the offerings of vendors providing stress-test-relevant data assurance capabilities and identified six primary areas in which automation could improve data-related processes during a stress test (Table C).

Table C: Critical Data-Related Stress-Test Capabilities

Task	Outcome
Monitoring quality	The use of analytics to continuously evaluate the condition of data based on preset parameters that accommodate a particular business process or requirement
Setting limits	The determination and setting of limits for use in the monitoring of characteristics of a given data set
Alerts	The use of notifications to initiate business processes that are required when the characteristics of a given data set go beyond tolerable limits
Dashboards	Graphic depictions that detail a variety of characteristics, including a bank's proximity to tolerable limits, in monitoring the quality of data sets
Documentation	The ability to determine and report on the source, lineage, and changes to data assets such as applications, databases, or individual data points
Self-service capabilities	Many, but not all, data assurance capabilities are designed for use by professionals in compliance, rather than IT

Source: Aite Group

Table D shows a representative list of leading global vendors providing data assurance capabilities that have either been configured specifically for stress-test automation or which can readily be configured for such use.

Table D: Leading Data Assurance Vendors

A selection of leading vendors	
Datawatch	SAP
IBM	SAS
Informatica	Tableau
Oracle	Tibco Spotfire
Pervasive	Trillium

Source: Aite Group

BENEFITS OF DATA ASSURANCE CAPABILITIES

Given banks' appetites to enhance their data management capabilities, signs that banks support their stress tests with limited automation, and the presence of related off-the-shelf capabilities, Aite Group examined these data assurance solutions to identify the benefits that compliance departments can achieve when banks invest in such automation.

IMPROVED REGULATORY OUTCOMES

Though many factors come into play during a stress test, regulatory findings and outcomes can depend upon the quality and documentation of data relied upon during a bank's stress test. In fact, Aite Group sees two areas in which automated reporting from data assurance capabilities on the condition, source, and lineage of stress-test-related data can improve a regulator's opinion of a bank's stress test.

- **Risk monitoring:** The more a regulator is assured that a bank's tracked key-risk indicators are based on accurate data, the more likely that regulator is to perceive the bank as able to monitor and detect changes in its risk profile and the less likely it is to levy a fine or require costly additions to staff or IT for improved risk monitoring.

- **Stress-test scenario evaluation**: When performing a stress test, a bank is required to test its pro forma capital adequacy based in large part upon a "bank-specific adverse scenario" that reflects its particular risk profile and exposures. The more a regulator is assured that a bank is able to monitor and detect changes in its risk profile, the less likely that regulator is to call a bank's specific adverse scenario into question.

  In fact, during the most recent round of stress testing in the United States, the severity of banks' bank-specific scenarios were called into question by the Fed. While the cited banks protested these findings, it is Aite Group's opinion that had those banks protested based on the quality of the underlying data with which they had evaluated their risk profile and adverse scenarios, a more fruitful dialogue might have been the result.

INCREASED PRODUCTIVITY

Aite Group identified three sources of increased productivity when stress-testing banks use automated data assurance capabilities: less troubleshooting of data disruptions, less double-checking, and reduced manual reporting.

FEWER DATA MANAGEMENT FIRE DRILLS

With automated data assurance capabilities in place, compliance teams dedicate less productivity to data-quality mishaps and troubleshooting during a stress test. As a result of the diversity of data and data sources called upon during a stress test, it is common for bank compliance departments to experience a number of data-related fire drills when performing a stress test. For example, if rules for combining credit-ratings databases from different

subsidiaries are not crafted properly, scores can default to zero or "not applicable." Many banks remedy such problems by having administrative or underwriting staff rebuild such data sets from scratch, a process that is lengthy, costly, and error-prone. Such disruptions and productivity losses are far less likely to occur when properly configured alerts, dashboards, and reporting within data assurance systems continually monitor the data accessed and acted upon by stress-test processes.

LESS DATA VERIFICATION

Although data sets can be rebuilt or repaired when data problems disrupt a stress test, lingering doubts about the data can be costly. When unsure about the quality that underlies a stress test, managers—both in compliance roles and in the lines of business impacted by the results—typically respond with multiple layers of verification. In such environments, underwriters often confirm that the source data is accurate, loan officers perform a sanity check on the performance of their loans under projected conditions, and managers who supervise teams of lenders examine the underlying data used to stress the portfolios for which they are responsible. Conversely, when compliance departments are equipped with data assurance capabilities, automated reporting, dashboards, and alerts prevent the data disruptions and fire drills that cause the lines of business to distrust stress-test-related data sources.

LESS MANUAL REPORT BUILDING

In data assurance capabilities, Aite Group sees the opportunity for compliance departments, as well as the lines of business that contribute data to the stress-test process, to reduce the amount of staff time dedicated to building reports manually. Banks build a variety of reports for internal and external audiences when performing stress tests. First, many banks report on the quality of the data they have extracted from source systems for the stress-test process. Once in scenario-modeling capabilities, both source data and key outcomes are often monitored and reported upon to avoid potential problems. Second, all banks must create a variety of reports—including highly governed reports such as the FR Y-9 and FR Y-14 documents required by the Fed—that disclose the results of their stress tests and document the condition and veracity of the data behind them. Lastly, based on its interpretation of the Basel Committee's guidance that regulators will increasingly demand—through both formal requirements and ad hoc requests—that banks prove they can rapidly and accurately aggregate and report on risk exposures examined within stress tests based on a variety of parameters, such as geographic area, obligor, or industry sector. By automating the creation of these and other stress-test-related reports with data assurance capabilities, banks' compliance departments and lines of business can significantly improve productivity.

QUANTIFYING THE PRODUCTIVITY BENEFIT

Typically requiring manual labor from a variety of functional roles, stress tests involve a challenging process. The impacts of automation are worth a close examination for any bank seeking to make its compliance processes more cost effective. Having examined the benefits that quality assurance automation in the stress-test process can achieve, Aite Group has identified seven functional roles that would benefit from such automation. An estimation of the value of this productivity benefit to a bank that performs two stress tests a year and encounters at least one data disruption during each is included as Table E.

Table E: Estimating the Potential Benefits of Stress-Test-Related Data Assurance

Role	Benefit	Hours of work eliminated per cycle	Average fully loaded cost per hour (US$)	Head-count	Gross annual savings (US$)
Underwriter	Avoided data reconstruction; eliminated verification of risk data at the loan level	40	$51.92	60	$249,231
Loan officer	Eliminated verification of risk data at the portfolio level	20	$97.36	10	$38,942
Lending group manager	Eliminated verification of risk data at the portfolio level	20	$129.81	3	$15,577
Mid-level compliance staffer	Avoided data reconstruction, eliminated verification of risk data at various levels, reduced manual reporting	120	$58.41	20	$280,385
Senior-level compliance staffer	Avoided verification of risk data at the portfolio level and manual reports	60	$84.38	3	$30,375
Chief compliance officer	Reduced time spent verifying and auditing stress-test inputs and results	30	$129.81	1	$7,788
Chief risk officer	Reduced time verifying and auditing stress-test inputs and results	30	$129.81	1	$7,788
Total					$630,087

Source: Aite Group

A NOTE ON STRESS-TEST-RELATED PRODUCTIVITY IMPROVEMENTS

When evaluating the business cases of potential technology deployments, banks' investment committees and other decision-makers often downplay the importance of productivity benefits, typically citing the absence of visible reductions to cash outflows. In fact, many banks completely ignore indirect benefits such as productivity increases when they evaluate business cases for technology investments. Although this logic can lead to cautious and conservative evaluations of business cases, Aite Group advises that it not be applied to stress-test automation.

Headcount increases and productivity reductions caused by stress testing are so significant that senior management should seek to avoid them by embracing automation and related productivity benefits. In its investigation of the impact of stress-testing mandates on commercial banks, Aite Group finds that some top-tier banks with limited stress-testing automation hired more than 100 report-builders specifically to conduct stress tests. Additionally, the data-

gathering demands on underwriters, lenders, and their managers are significant enough that they divert them from underwriting and lending while stress-test-related deadlines remain significant.

IMPROVED REGULATORY RESPONSIVENESS

Automated data assurance in the stress-test process also creates a more agile stress-testing capability, indirect and non-quantifiable though it may be. In the United States, annual regulatory stress-test cycles for the largest banks are relatively short and demanding. In fact, they are shorter than many IT-related project cycle times. For example, the Fed typically releases its guidance for bank stress tests during the first week of November and requires submission of capital plans and stress-test results during the first week of the following January. In addition to annual stress-test calendars imposed by regulators such as the Fed, this regulator and others typically release new requirements, announcements, and guidance on a monthly basis. Supported by IT departments that are often unable to turn around complex data-related business requirements in less than 60 days, compliance departments are at an advantage when they are equipped with data assurance capabilities—particularly capabilities with parameters and limits that compliance staff can configure independently, without the assistance of IT professionals. In the absence of such responsiveness, new stress-test business requirements arising from updated regulatory requirements are likely to be met with manual work flows that give rise to productivity losses, data-quality challenges, and distrust of the data by project stakeholders.

CONCLUSION

Given the availability of technology that can improve the analysis and monitoring of data relied upon during a stress test, banks should consider adding data assurance technologies to their stress-test roadmaps. By helping banks examine the quality of data extracted into the stress-test process and monitor its ongoing accuracy throughout this lengthy and complex compliance process, data assurance capabilities enable banks to improve productivity during stress tests, respond more rapidly to regulatory changes, and even achieve more favorable regulatory outcomes. With the ability to better manage risk-related data, banks that use these capabilities are more likely to be viewed by regulators as able to accurately monitor their risks, making adverse findings and higher regulatory requirements less likely.

Increased productivity can be the result of data-assurance capabilities that give banks the analytics required to better monitor their stress-test projects and prevent poor data from disrupting stress tests. Stress tests in general, and their data-related troubleshooting projects in particular, demand significant time commitments from personnel in not only the compliance department but across the lines of business, where time should be dedicated to booking and underwriting loans. To estimate the potential economic benefit of a data assurance deployment, banks that have experienced even minor data-quality disruptions during stress tests should investigate the productivity impacts of these incidents on roles such as underwriters, lenders, lending managers, and compliance staff at all levels. The less often stress-test-related data disruptions reduce productivity, the more lending staff can focus on lending and the more compliance staff can focus on compliance-related analysis instead of data repair.

RELATED AITE GROUP RESEARCH

The Global Stress-Test Automation Market: Stress, Uncertainty, and Moral Hazard, September 2013.

Capital Adequacy Testing: Don't Stress, Be Analytic, June 2013.

Predictive Analytics in Commercial Banking: Cashing In on All That Data, August 2012.

Commercial Loan Underwriting: Opportunities for Lenders, Vendors, and Ratings Agencies, November 2012.

ABOUT AITE GROUP

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