

# Cloud adoption

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# Consensus needed on cloud security

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If banks had been hesitant to move their data and processes to the cloud, recent regulatory requirements have certainly provided a final nudge in that direction.

The revised market risk regulation finalised by the Basel Committee on Banking Supervision at the start of 2016 – the Fundamental Review of the Trading Book (FRTB) – is expected to overhaul existing risk calculations at banks, making them more computationally demanding. One recent industry analysis estimates portfolio risk calculations could be expected to increase as much as tenfold.<sup>1</sup>

It doesn't help that pricing calculations are also becoming increasingly complex, requiring banks to factor in adjustments because of various costs associated with counterparty risk, funding, capital and initial margin – collectively known as valuation adjustments, or XVAs – into prices.

In the past, larger banks have thrown money at computational problems, investing heavily in their own data centres and advanced technologies such as graphics processing units. Banks that failed to join the bandwagon mostly did so because of restrictive IT budgets or legacy systems, which made the transition enormously challenging.

Cloud computing has been around for many years as a potential means of expanding the computing capacity of banks, but security concerns had largely kept most firms from taking the plunge.

However, that is about to change – whether the industry likes it or not. The additional strain on resources because of increased competition and regulations such as FRTB means banks are left with no other choice.

“There is no other way,” said one risk manager at a European bank earlier this year when the bank was starting to transition its FRTB and XVA calculations to cloud.

Three European banks have so far confirmed they have plans to use the cloud for FRTB and XVA calculations. One US bank is already using it to run stress tests. Some buy-side firms are exploring its use in machine learning, portfolio optimisation and disaster recovery.

This all means that firms need to get with the times. They also need to become comfortable with the idea that their sensitive data and calculations will be hosted on an external platform that can, in theory, be accessed by anyone if security is insufficient – and the industry is far from reaching that level of comfort.

Security and compliance seem to be the major obstacles to more widespread adoption of the technology. Some vendors even argue cloud solutions have better security than in-house security. However, many market participants are still hesitant to move their sensitive data to the cloud.

What the industry needs at this point is to put the issue of security in the spotlight and aim to build consensus between clients, vendors and regulators around how security can be managed. As with anything that tries to overhaul the way a certain business functions, this will take time and effort.

“This is as much a cultural challenge as anything else,” says Paul McEwen, group head of infrastructure and security engineering at UBS in London.

Nazneen Sherif  
 Associate quant finance editor, *Risk.net*

<sup>1</sup> Sherif N, *When a cloud can light the way*, Risk February 2018, [www.risk.net/5395461](http://www.risk.net/5395461)

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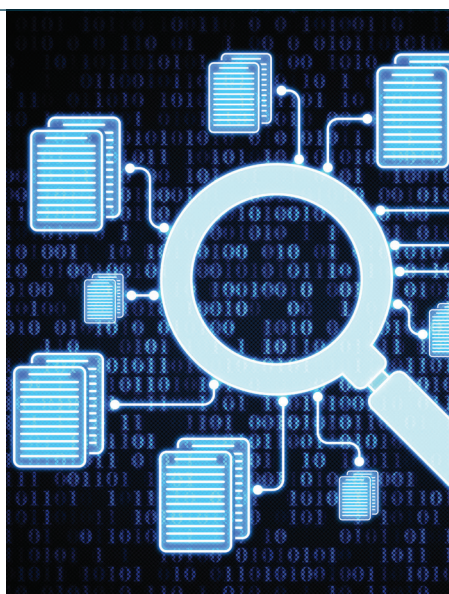
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# Keeping up with cloud adoption

*Risk.net* convened a webinar in collaboration with Murex to explore how, as more financial institutions move to the cloud, they can get the most out of their technology investments

More and more financial institutions are going to the cloud for their technology needs. This burgeoning migration promises to transform hardware-intensive processes vital to effective risk management, such as pricing calculations, regulatory reporting and disaster recovery.

But moving in-house hardware and legacy systems onto cloud-based applications carries challenges as well as gains. Firms are concerned about data security, for example, when pursuing the opportunities for speed, agility and consistency that cloud technology promises.

A poll conducted during the *Risk.net* webinar confirmed that many firms are only just beginning to consider cloud adoption. State Street, however, has been using cloud technology for at least six years. The US bank began by building its own private cloud data centres, providing insight into which applications are best suited to the transition.

"Our initial driver to use the cloud was to create a standardised environment to speed up the time to develop, deploy and retire applications," said David Saul, senior vice-president and chief scientist at State Street. "The primary criterion we've considered is whether data is sufficiently well protected for our clients and ourselves. Our test strategy has been careful to maintain control over production-level data."

## It's never too late

Saul suggested that firms just beginning to experiment with cloud are in prime position to benefit from the trials and tribulations of earlier adopters and improved products from vendors.

"External cloud providers have greatly matured their offerings to include a lot more capable services. Software services that previously you might have had to build yourself are now offered by the cloud provider," he said. "Rather than thinking you're late to the party, consider that by avoiding being a pioneer you're able to benefit from the experiences of those that came before you."

Cloud's coming of age has led to accelerating adoption, observed Arnaud de Chavagnac, head of cloud solutions marketing at Murex, a front-to-back-to-



Arnaud de Chavagnac, Murex

## THE PANEL

Arnaud de Chavagnac, Head of cloud solutions marketing, Murex

David Saul, Senior vice-president and chief scientist, State Street

Moderator: Nazneen Sherif, Staff writer, *Risk.net*

risk software provider: "It's only relatively recently that we've seen many of our customers going to the cloud globally for mission-critical systems on the buy side and on the sell side. It's happening now because of great results already achieved and great improvements performed by the cloud vendors working with other industries on other applications."

He added: "Now all of this can be leveraged in this capital markets segment. When you see the stability, the scalability, the security and the cost savings, many more recent investments have been made possible thanks to some other sectors that have already adopted these techniques."

Saul praised the efforts of the Cloud Working Group, part of the Object Management Group. The independent body has grown in five years to around 600 organisations in different sectors sharing best practices. "It's an invaluable information resource. Our organisation has contributed to it. I suggest exploring that, and if you're not already a member you should join," he said.

Within the broad migration to the cloud, de Chavagnac stressed that financial services clients are pursuing different approaches, for variously weighted reasons and at differing adoption rates.

"On our side, we need to make sure we give enough options so we can cope with the different constraints that clients face, for example in the demands of local regulators, and what they have might have already done in the past with their other systems," he said.

De Chavagnac observed that many firms were proceeding in phases. Companies tend to migrate selectively, he noted, rather than move production data to the cloud in one swoop. "They will first test the results with certain parts of the installation," he said. "For example, a Murex application may mix elements run on-site and those on the cloud. It's important to match the maturity of the firm with the cloud subject, and to understand the constraints they may face from auditors and regulators."

### Beginning in-house

Saul implored would-be cloud migrants to focus on their own prior experiences. “Use your experience,” he said. “You don’t have to create something totally new for the cloud if you already have good practices for managing data centres and deploying servers and applications. Take those policies and procedures and adapt them if they need to be adapted, but it is the experience you already have that will stand you in good stead as you move to the cloud.”

De Chavagnac illustrated the point with an example with a recent customer. “We had a cloud workshop with one of our customers a few weeks ago, with participants from many departments that all needed to be involved for cloud migration,” he said. “Most of the skills needed already existed within the firm and were in the room – for the operating systems, for the database, for the applications and for security – with Murex as the software provider and cloud vendor also present. When they are involved right at the beginning, you have the assets in place to migrate relatively quickly and smoothly, and you are in a good position to start your cloud journey.”

A poll conducted during the webinar revealed respondents’ priority applications for adopting cloud technology. Risk management, research and development, and pricing calculations figured highly. Disaster recovery, perhaps surprisingly, lagged behind.

Saul thought the research and development focus matched his own experience of the testing phase, including selecting cloud providers to match the company’s infrastructure, software and environmental factors.

“It encourages effective development and experimentation,” said Saul. “We’ve tied that in with creating test data that can be used in different environments, eliminating the concern about use of production data.”

Keeping disaster recovery systems up to date is an advantage of cloud, he explained. Duplicated in-house disaster recovery systems might not be updated consistently, for example, with the latest software patches, but cloud offers consistency in this respect, Saul suggested.

“In a cloud environment, where your disaster recovery and your production environment are being used interchangeably, you not only lower the cost because you don’t have hardware sitting idle, but you also eliminate the problem of keeping things up to date because everything is maintained at the same level,” he added.

Flexible access to capacity as required saves on server inactivity or being overworked at peak demand, noted de Chavagnac. A range of factors that are difficult to predict has often meant estimates have been inaccurate, adding risk or wastage.

“If you know when you will need this extra capacity, then you will use it when you need it, and you will only pay for it when you use it. You can monitor and adjust capacity more easily. You no longer need to predict the unpredictable.”

Cloud makes capacity planning easier by pooling it, Saul noted. In the past, organisations had to plan capacity for separate segments of processing, with multiple estimates for what was required to handle peaks for disaster recovery and other scenarios.

He added: “By bringing them together, we now have more assurance that our total number – since it can be reallocated instantaneously – is going to be able to handle peak situations, whether in production or disaster recovery. That makes the job of capacity planning much more straightforward than it was previously.”

Cloud’s pay-as-you-go access to capacity was cited as the greatest benefit of adopting the technology by respondents to a question polled during the webinar. Cloud’s scalability in this respect reaps benefits for developing new applications, Saul highlighted, with major time and cost savings possible once internal hardware capacity is no longer a limiting factor.

“Before cloud, a typical application development would get to the stage of sizing the amount of processing storage needed for development,” said Saul. “In that procurement process, hardware would be turned over to various

infrastructure groups to build an operating system, a database or whatever is needed for the application development to proceed. In the best case, that could take weeks or probably many months.”

Cloud can transform this scenario, he explained. “Today, a standardised environment means deployment is mostly automated and happens in minutes. The time saving also enables greater experimentation to try new techniques or algorithms. If something doesn’t work out, the cost of changing it is negligible.” said Saul.

### Regulatory compliance

De Chavagnac has seen similar benefits from a regulatory compliance perspective, particularly for the Fundamental Review of the Trading Book (FRTB) reporting requirements.

“For FRTB, for example, you need to manipulate a vast amount of data, as well as calculations across many scenarios and points in time,” said de Chavagnac. “This requires a lot of computing power to produce results in limited time. Certain customers are ready to do these calculations but are waiting for the computing capacity they ordered months ago. You need to be ready to run those calculations at all times, and for the figures you use to be consistent throughout the organisation.”

Amid toughening regulatory requirements, security has improved as technology has matured towards protecting data as well as providing robust disaster recovery, Saul suggested. However, a poll question revealed security is still perceived as the top barrier.

“We’re making progress, and it constantly needs to improve,” said Saul. “Security and regulation have so much overlap. Caution and reluctance to move has been understandable because we need to know regulators are comfortable with what we’re doing.”

Data residency requirements from some regulators, for example, mean checking with cloud providers where data physically resides, while other data can be moved more flexibly and kept in lower-cost locations.

“Security starts with the data, and the vital aspect is control over the level of access. Everyone at your organisation should be matched to appropriate access, and whether they are limited to reading data, or can make changes,” Saul said.

“We are all data-centric businesses,” he continued. “Data should be categorised by levels of protection. Think of it as concentric circles, with the crown jewels at the centre and the highest level of controls. That may be the information you never let off the premises. As you make your way through the expanding concentric circles, data in the cloud may require encryption as it moves and sits at rest. It may be public data, requiring fewer controls and associated costs.”

Cloud governance should be the same as internal processes, Saul emphasised. “If you try to create something entirely different from the cloud, you will waste the years of experience you’ve gained developing governance, and you’ll probably miss something,” he warned.

“External cloud providers will provide you with the certifications they comply with. Match those with what you already have, and you’ve got a good idea of what you can expect as you move data to cloud,” he added.

De Chavagnac focused on the team dynamic between cloud vendor, customer and application vendor. “You can’t achieve security alone. The important thing is that they are working hand in hand and know their responsibilities. The security experts should be part of the team from the beginning and throughout the journey,” he added. ■

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Capital markets: Keeping up with cloud adoption [www.risk.net/6025461](http://www.risk.net/6025461)



# Keeping the lights on

Cash-constrained risk management fintechs are facing an extended gauntlet most won't survive, writes Luke Clancy

**S**tart-ups are widely reckoned to have a one in 10 chance of survival. For start-ups in the field of risk management, the odds are probably a little worse: the field has all the withering mortality of the ordinary start-up, plus the special hell of being small, agile and captive to the sluggish metabolism of a big bank.

For now, it's not stopping them. Hoping for a big payout, this group of disrupters is looking to upend risk management with their products, addressing things from transaction monitoring and trade reporting, to International Financial Reporting Standard (IFRS) 9 and model validation.

For banks, the upsides of doing business with a start-up can be striking, says Chris Corson, co-founder

of The Disruption House (TDH), a benchmarking and data analytics business for early-stage fintechs. Banks can pocket dramatic savings, achieved via cheap cloud delivery and an energetic staff paid in stock options. Established software providers, in contrast, might offer prices only slightly below the cost of an internal build.

For many banks, however, taking on the services of these start-ups represents an operational risk: the third-party risk of young B2B software vendors, with their massive washout rate. According to Corson, 90% of B2B software businesses fail in their first five years.

*Risk.net* spoke to 15 risktech companies, all under three years old on average, to delve into their plans and see how they are bringing them to reality, as they vie for the budgets of chief risk officers (CROs) at the world's largest banks. Many of those pitching the new platforms are bank refugees themselves, or may have set up financial services companies. The risktechs are small firms with big aspirations.

And big obstacles. The hurdles are many, but largest among them appears to be the drawn-out process at banks in getting to a contract, a stretch that can be lethal to a start-up panting for cash.

There are many reasons for longer sales cycles at banks – on average, it takes two years before a contract is offered, says Huy Nguyen Trieu, co-founder of the Centre for Finance, Technology and Entrepreneurship (CFTE), a fintech education platform.

Banks often lack processes for dealing with small vendors, and start-ups find they need approval from risk or compliance departments to start work with a bank. Besides that, small start-ups don't meet a lot of procurement criteria, like producing three years of accounts, or being of a certain size.

"It's difficult for a large organisation to shorten their sales cycle," Nguyen Trieu says of the banks.

"Banks love processes."

Rupert Bull, the other co-founder of TDH, agrees.

At present, banks approach fintechs in a variety of ways.

"The most advanced have created bespoke fintech onboarding processes that take fintechs outside the traditional vendor procurement processes," he says. "But some still put fintechs through traditional procurement, which slows down onboarding significantly." He says banks should quickly link fintechs to business sponsors and investment arms to expedite decisions. "A quick 'no' is better than a long and slow 'no'," he says, freeing fintechs to focus on companies "that have an appetite to work with them".

Brian Lynch, chief executive of compliance software provider RegTek.Solutions, says the targets set by banks can be ambitious. "We have to offer a cost reduction of up to 10–1," he says. "It's not enough to say we can reduce costs from \$10 million to \$5 million."

Clients often have an "overinflated sense" of their ability to reduce costs if they instead build in-house, he adds, and the expense of integrating a new vendor makes them want even bigger savings.

Faced with the torpor of the big banks, one risktech took a different tack. Scaled Risk says it initially targeted tier one banks, among them BNP Paribas and Societe Generale, with its trade-reporting and transaction-monitoring tool. But Bertrand Tillay-Doledec, Scaled Risk's head of product management, says the banks' glacial response times forced it to rethink its strategy. Now it goes after tier two institutions, custodian banks and large asset managers.

"It is easier to speak with the higher management in these firms, and they see benefits in supporting smaller companies like ours, rather than going with a big American company and having no influence on their road map," he says.

## Need to know

- *Risk.net* has surveyed 15 risktech start-ups, many run by former bankers, that are vying to disrupt lenders' risk management processes.
- For banks, 'start-up risk' represents a growing operational threat; however, failure rates among young vendors are enormous.
- This metric is not helped by banks putting fintechs through lengthy procurement processes, and starving them of funding.
- Risk management fintechs wishing to sell to large organisations need to understand the buying process at their prospects and seek support to navigate it successfully.
- Some firms claim to have found a better foothold by securing access to bank incubators, gaining access to inside knowledge and valuable mentorship.

## Can a partner help? Sometimes

To get their ideas off the ground, some risktechs have struck alliances with a bigger company. But that can have its downsides too.

One start-up boss says he got “screwed” by a Fortune 500 company he struck a distribution deal with. The larger firm had no interest in taking the time to build relationships with targets for the vendor’s software, and so didn’t open the doors it had promised. That fintech is now looking to exit the agreement.

Another reports a bad experience with an accelerator programme that partnered with the government of Singapore and a Singaporean bank. It sounded like a great deal on paper – but the bank’s tech team had not secured senior management buy-in, and the start-up ran into a culture resistant to change.

“It was great to get the government on board – but a lot of equity was given to the bank, which actually has no interest in innovation,” he says.

But the collaborations can work, too.

Access Fintech attended JP Morgan’s In-Residence incubation programme to test its technology at scale – and was impressed. The residency allows fintechs to work inside the bank for six months to find solutions to the bank’s specific needs.

Access Fintech’s founder is Roy Saadon, who previously helped set up Traiana, known for its automation of middle-office processes for listed and over-the-counter transactions. His new venture offers exception management across risk systems at banks or buy-side institutions.

“We got such credibility from the JP Morgan investment – it had an impact on our entire pipeline,” he says. “It changes the whole ecosystem. We couldn’t have asked for a better partner.”

He explains of the bank’s incubator: “In-Residence is a very interesting structure. I think it offers different things to different stages of companies. It helped us navigate a bank as complicated as JP Morgan.”

That could, in theory, help the company sell its software to the bank in a so-called enterprise deployment – selling its technology to the bank in a centralised way, rather than pitching to many independent functions. “So rather than us as a small company trying to navigate the organisation, we get a sponsor and a mentor who can actually fulfil a bigger vision and take us through the different desks from IT, to risk, to compliance,” he says. “It can be draining for a small company to have to do that.”

## Babel: the CRO and the start-up

Part of the problem in appealing to a big bank is that the two parties may be gazing at each other from across a cultural gorge. Conservative by nature, CROs may not relate well to the roll-the-

dice vibe of start-ups, and have no protocol for assessing the inherent risk of doing business with a start-up.

“When a company has no balance sheet, it’s difficult to credit-check,” Corson of TDH says of start-ups. “Instead, you need to look at the capability of the team, its resources and the technology to be able to scale.”

That may be a big ask of a more orthodox executive looking at a service that doesn’t have much of a track record. Despite their protestations, banks may find it hard to go against that grain.

The banks’ pretence of wanting more innovation – or any innovation – can wear thin.

“With some of these innovation schemes, it’s not even lipstick on a pig, but more a case of waving lipstick in the general direction of the pig,” one exasperated fintech executive says. “Banks, if they want to embrace young innovation, need to change.”

Part of the cultural divide is distrust of the unknown. Start-ups, of any sort, ask people to take a chance on something they may only glancingly understand.

“It has not been worked out yet how human beings deal with machine intelligence,” says Luke Waddington, chief executive of Blue Fire AI. “Machine learning doesn’t fit into the human decision-making process,” he says. “They reject it or want to know every data source before they can accept it.”

“If I say to you that your favourite colour is blue, and you say, ‘No, it’s red’, then you’re not going to believe it,” he illustrates. “But a machine could have analysed every piece of your life and actually found you’ve got a bias towards blue.”

He continues: “This is like the driverless car. Everyone loves the idea and would go for a 20 miles per hour spin around a track, but nobody is going to buy one yet to go 70mph down a motorway.” He calls this “the challenge of the sell”.

Blue Fire’s product works by gathering market and balance sheet data, flagging stress in companies at risk of collapse and siphoning data from holdings and filings databases, as well as from press sources.

Blue Fire has had to broaden its target market: it was originally pitched to asset managers for alpha generation. “But there were no buyers,” says Waddington.

Instead, the firm has retrained its sights on offering an early-warning system for portfolio managers and banks managing credit risk. It has also entered a partnership with the communication tool Symphony, “humanising market signals” into the workflows of capital markets professionals through a chat bot, he says.

## Sustaining life on the way to solvency

One of the larger fears of risktechs is being able to hold on long enough for a product to pay off. Start-ups “must have sufficient funds to survive the sales process”, says Bull at TDH.

Firms complain that banks take their services for granted early in the process. Percentile – which offers cloud services for complying with regulations such as the Fundamental Review of the Trading Book and the standardised approach for measuring counterparty credit risk – found this out the hard way.

Anthony Pereira, founder and chief of Percentile, says big financial institutions should not view the start-up world as “free work for them, as that’s perpetuating the failure rate. Banks are very willing to spend a lot of money with large vendors, but find it hard to spend a few thousand pounds with start-ups”.

The CFTE’s Nguyen Trieu sees a lot of banks that still consider the proof-of-concept stage “part of normal commercial practice and a cost for the start-up to bear”. But some banks are starting to pay for pilots, he adds. While not a huge amount – maybe \$50,000 or \$100,000 – this at least compensates the start-up for time spent working with the bank.

One of the things that can tide over a start-up struggling to find its feet is investment. While bank investors are familiar with the industry’s needs and best practices, other investors can be less well informed on the nuances of capital markets applications, says Lynch of RegTek.

“There’s a lot of dumb money around,” Lynch says. “I get peppered by calls every second day from venture capitalists who have billion-dollar funds and claim to be in our space.”

“The truth is most of them are not pursuing the kind of solution we offer,” he continues. “Most of them are chasing technology, looking for big, potentially unicorn-type solutions that are massively disruptive to retail-payments processing, be that artificial intelligence or blockchain.”

He thinks few VCs understand “niche” capital markets and are put off by the relatively low growth potential for start-ups, compared with retail banking markets. Some of the start-ups don’t last, and are absorbed into larger companies. “It’s difficult to see individual solutions in capital markets worth more than \$100 million to \$200 million before they are pulled into a consolidation strategy,” he says.

Unlike most of the fintech executives *Risk.net* spoke to, Lynch predicts his company “will end up part of a consolidation”.

## The ‘essential’ feature

Other risk management fintechs report better experiences in dealing with banks – especially if their product has some claim to being essential. Take Simudyne, for instance. The company has pitched

itself as a sine qua non for banks in meeting IFRS 9, the new global accounting standard.

“We don’t ‘sell’ to CROs,” says Justin Lyon, chief of Simudyne – whose toolkit is used by Barclays. “Quants start using the software and typically it’s a bottom-up recommendation.”

Non-compliance with IFRS 9 represents an “existential threat” to banks, he says, and the only alternative to his software is for banks to develop their own in-house simulation frameworks, spending as much as \$100 million. “That is difficult to do and doesn’t deliver competitive advantage,” he adds.

Z-Risk Engine also says it has a mousetrap the industry cannot do without, this one for meeting the requirements of IFRS 9. Its credit-cycle indexes convert credit ratings to point-in-time (Pit) indicators and credit models to Pit forecasting tools.

The company’s founder Scott Aguais says that, in reviewing 15 major banks, “none is achieving a complete set of Pit probabilities of default, loss given default and exposure at default, and, therefore, none are producing expected credit losses that satisfy IFRS 9”.

Yet another approach is that of fintech founders who knew of problems at a former employer and went on to cook up a solution at their own shop.

Scaled Risk says its product – which collects a bank’s capital markets data for reporting and time-stamps the information for regulatory audit purposes – builds on an idea that failed at Thomson Reuters. Scaled Risk’s founders previously worked there as risk management executives and engineers.

Tillay-Doledec, Scaled Risk’s head of product management, says Thomson Reuters suffered “technology bottlenecks” in its efforts to improve its enterprise-wide risk management product to cope with the increased data and analytics requirements of Mifid II, or the second Markets in Financial Instruments Directive. According to Tillay-Doledec, that was because Thomson tried to use Hadoop – the open-source data framework inspired by Google research and the basis of most big-data projects – in on-premise deployments, instead of through the cloud.

Thomson Reuters responded that it has met all of its Mifid II service-delivery targets for clients on time.

Likewise, Governor Software, a governance, risk management and compliance system, said its platform emanated from a project that initially bombed at a bigger firm.

Governor’s founder Richard Pike was working at service provider Wolters Kluwer Financial Services, devising a global strategy to pull data from various risk systems for ingestion by senior executives. But it became apparent that each of its bank clients wanted the data in a distinct format. “We gave up on the idea of rolling up market risk, credit risk, liquidity risk and operational risk into one dashboard,” he says.

But, with information packs running to around 750 pages, Pike also saw why a system that could make data compatible with other datasets using the risk appetite of an institution, and flash the risk level as red, amber or green (Rag), was needed. The solution Governor has devised works from the top down to define a bank’s obligations and can provide evidence of decision-making to a regulator. Pike adds that the platform has attracted investments from former leaders of Deutsche Bank USA and Citi Europe.

In response, Wolters Kluwer says its OneSumX suite has evolved since it was launched in 2015 and now provides an integrated regulatory compliance solution, spanning the full risk spectrum.

## “It’s difficult for a large organisation to shorten their sales cycle. Banks love processes”

Huy Nguyen Trieu, Centre for Finance, Technology and Entrepreneurship

### Timing’s everything

While the need for banks to comply with regulation presents opportunities for risktechs, there are inherent dangers for small firms deploying resources to build offerings and to time their delivery to market.

Lynch at RegTek complains of delays in the implementation of Securities Financing Transactions Regulation, which is now expected to go live towards the end of 2019.

“The timetable was a big deal for us. It hurts, as we built a solution for it and that slippage is expensive,” he says. “We made an early investment to capture market share, but if clients don’t feel there is a set timeline, they just delay the [buying] decision.”

Lynch also regrets not positioning RegTek more aggressively to offer compliance checks for Mifid II, an area now seeing plenty of demand.

There is also a small market in supplying risk services directly to supervisors.

“The reason Financial Network Analytics exists is to help regulators look at what is going on in the markets and operationalise that into a daily routine,” says its founder Kimmo Soramaki, who worked at the Bank of Finland on a payment system simulator, and advised several central banks during the financial crisis.

Scaled Risk is another firm that has sold its product to regulators, one of its clients being a financial markets authority that runs market-surveillance and time-series analytics.

But RegTek’s Lynch is unmoved by the prospect of selling risk software to market supervisors. “The regulators don’t have fantastic tools, but ‘suptech’ feels like a bit of a mug’s game,” he says. Supervisors’ budgets are puny – “insane” in his words – “and it’s so very hard to see how that can be viable”.

Bull at TDH concurs. “Talking to venture capitalists, it isn’t a big enough market on its own to attract funding,” he says. “It isn’t an attractive enough proposition to only serve supervisors, although serving supervisors first is a good sales strategy. Having the blessing of the supervisor would then make it easier to sell to market participants.”

### ‘Fintech fatigue’ and fintech faith

The environment for fintechs is becoming tougher, with banks becoming more critical of start-ups as their numbers grow. Simultaneously, the benefits of fintechs are gaining adherents daily.

Access Fintech’s Saadon believes banks are feeling “fintech fatigue”: too many vendors seem to be doing the same things, and banks are leery of investing time in a vendor that may not last 12 months.

Equally, though, Saadon is seeing much more willingness from banks to share resources and processes. What they may have previously built in-house in order to get a six-month or one-year edge, “is not worth their investment these days if it’s not differentiating”, Saadon says.

He draws a comparison with the first wave of fintechs – for instance, start-ups in blockchain – that set out to boldly cut out the middleman, a problem for financial institutions.

“They were fintech 1.0,” he says. “We are fintech 2.0. We are less disruptive and more collaborative.”

Technology provider RegTek agrees banks are increasingly open to collaborative approaches. Lynch sees banks eyeing the benefits of pooling resources to set up and develop systems. “The cost of such systems to maintain compliance is huge, and they provide no value other than preventing a firm getting fined or overly interrogated by the regulators,” he says.

For fintechs, the name of the game is still staying viable till the cash rolls in, and risktechs have it rough – not necessarily for lack of a good product.

“The graveyard of software companies is full of beautiful tech that was not turned into a successful business,” says Corson. ■

*Previously published on Risk.net*

## The new pack

See the following pages for Risk.net’s 15 surveyed start-ups



## Access Fintech

### Risk Fintech File

**CEO:** Roy Saadon  
**Staff:** 20  
**Clients:** Banks and buy-side firms, the total number is not disclosed  
**Offices:** Israel, UK, US  
**Founded:** 2016  
**Rivals:** None claimed, although there are other tools for managing trade exceptions  
**Funding:** Private seed funding; JP Morgan participated in Series A funding



What it does: Provides a unified portal for trade exceptions by aggregating the client firm's data from bespoke internal systems, vendors and other sources, enabling end-users to identify transactions that require intervention in order to settle successfully and sort them by priority. Saadon says: "Initially we were trying to solve the problem of too many systems and how to consolidate them. But our biggest value-add is helping institutions understand which systems are touching which financial transactions, whether there is a problem with a transaction and the relative urgency of that compared to other issues in the organisation. Finally, we can help with resolution of the problem."

## Blue Fire AI

### Risk Fintech File

**CEO:** Luke Waddington  
**Staff:** 26  
**Clients:** Eight buy-side firms and two sell-side firms  
**Offices:** Australia, Hong Kong, India, Singapore, UK  
**Founded:** 2016  
**Rivals:** Kensho  
**Funding:** Own capital and retained earnings, initiating first institutional round



What it does: Produces insights into companies by analysing market and balance sheet data, as well as alternative data such as investor press releases, holdings and filings databases, news and social media, using quantitative methods and natural language processing. The information can be used by asset managers to make investment decisions, by banks to target customers and by other capital markets firms. Waddington says: "BlueFire AI delivers revenue-generating signals for the capital markets industry. We overlay artificial intelligence signals to your current decision-making process to ensure important information is not missed. Through enhanced detection of key and periphery stress events, we consistently look into a company, decisions made on a company's assets and market reactions."

## Cardabel

### Risk Fintech File

**CEO:** Lionel Simon  
**Staff:** 10  
**Clients:** Four asset managers and banks  
**Offices:** France, US  
**Founded:** 2015  
**Rivals:** Detica, Nice Actimize, Nasdaq Smarts  
**Funding:** Self-financed



What it does: Provides a machine learning-based system for detecting trading anomalies, such as fraud, market abuse and fat-finger errors. Says that, by identifying both known and unknown types of inappropriate trades, it can spot anomalies that elude conventional, rules-based trade surveillance, as well as reduce the number of false alerts created by existing systems. Simon says: "A transaction could have 100 attributes to monitor, combinations of which could be deemed suspicious, such as a change in price together with change in volume. But 52% of fraud is found by chance and too late, when a significant part of the money is already lost. Systems can only control what people have anticipated. Using unsupervised machine learning it is possible to monitor what is unusual. You would be surprised what we can find."

## Everysk Technologies

### Risk Fintech File

**CEO:** Allan Brik  
**Staff:** 25  
**Clients:** Over 50, including hedge funds, commodity trading advisers, family offices, brokerages, online portfolio platforms and wealth managers  
**Offices:** US  
**Founded:** 2016  
**Rivals:** Axioma, Bloomberg, HiddenLevers, MSCI, Riskalyze, RiskMetrics, Statpro  
**Funding:** Mainly self-financed



What it does: Provides stress-testing and analytics tools for multi-asset, multi-currency, long-short portfolios. Says it infers how risks propagate within a portfolio by analysing large quantities of data, using artificial intelligence. Brik, a former Goldman Sachs trader, says: "I designed the platform to address a pain point experienced generating and storing risk and portfolio numbers. It was resource-intensive for us to generate internal reports, store information about portfolios, tag them, normalise them, clean everything and map to symbology. Now we have developed this application programming interface to do that. You don't have to spend millions of dollars hiring folks to do these things for you."

## Firamis

### Risk Fintech File

**CEO:** Jochen Papenbrock

**Staff:** Four

**Clients:** Eight financial services companies

**Offices:** Germany

**Founded:** 2012

**Rivals:** Artificial intelligence and advanced analytics companies in the financial services sector offering software-as-a-service

**Funding:** Own capital, some EU funding

What it does: Provides a software platform for managing risk and detecting fraud at banks, as well as for analysing portfolios at wealth and asset managers. The platform is based on machine learning and advanced analytics, and can create visualisations and animations to increase process transparency. Papenbrock says: "We use machine learning to find communities who are clusters of clients within a web of trust. If there is a payment from one cluster to another, that could be a suspicious one. We then use artificial intelligence and graph theory to better understand the payment ecosystem. In the asset management space, the technology is also used to uncover the interconnectedness of markets, so that information can be used for diversification purposes and screening investment portfolios for risk concentrations."



## Firmo

### Risk Fintech File

**CEO:** Omri Ross

**Staff:** 17

**Clients:** Not disclosed

**Offices:** Denmark, Germany, Israel, Switzerland

**Founded:** 2017

**Rivals:** Stabl, dYdX

**Funding:** Venture capital, private and accredited investors



What it does: Has developed a new programming language for writing smart contracts in financial instruments for trading on any blockchain. It says the code is secure, intuitive and formally verified. Ultimately, Firmo hopes the language will provide interoperability between multiple distributed ledgers hosting financial contracts such as derivatives. Ross says: "At Firmo, we are enabling anyone to write secure financial contracts, moving assets on public and permissioned blockchains simultaneously."

## FNA

### Risk Fintech File

**CEO:** Kimmo Soramaki

**Staff:** 20

**Clients:** 10, including large central banks, financial market infrastructures and financial institutions

**Offices:** UK

**Founded:** 2013

**Rivals:** IBM, in-house builds

**Funding:** Seed round (\$800,000) and angel round, but mostly financed through revenue

What it does: The firm's flagship product, the FNA Platform, enables users to map and monitor complex financial networks – ranging from counterparty exposures and interconnected financial markets – and simulate operational and financial risks. Regulators can use FNA's technology to identify systemic and concentration risks.

Soramaki says: "FNA is focused on technology for financial supervisors, or Suptech. Our mission is to make the financial system safer and more efficient and we work with regulators and financial market infrastructures by providing software for their data science, machine learning and simulation needs."



## Governor

### Risk Fintech File

**CEO:** Richard Pike

**Staff:** 13

**Clients:** Four banks

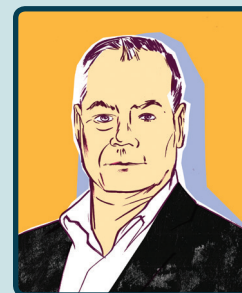
**Offices:** Ireland, UK, US

**Founded:** 2015

**Rivals:** Conventional governance and oversight systems

**Funding:** Private investors, Irish state enterprise funds

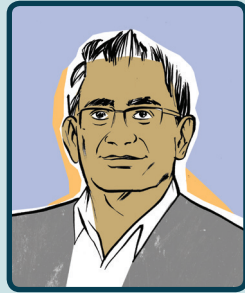
What it does: Its software helps determine a firm's regulatory and other obligations, aggregates relevant data from across the organisation and visualises it in order to provide a real-time snapshot of the performance of governance, compliance and risk functions. Governor is licensed by the UK's Financial Conduct Authority to publish its handbook along with updates – it does so in the form of maps that can be used by clients to ensure compliance. Pike says: "Rather than daunting senior executives with the contents of huge data warehouses, thought is given first to the regulatory obligations of a firm and visualising data that shows whether those obligations are being fulfilled. The data is normalised using the risk appetite of the institution. So the customers input the appetite they have for each relevant item and the Governor system then compares the incoming data – leverage coverage ratio, value at risk and so on – to that appetite and delivers a red/amber/green status for each item. The system then aggregates data using these scores and associated weights."



## Percentile

### Risk Fintech File

**CEO:** Anthony Pereira  
**Staff:** 10  
**Clients:** Three  
**Offices:** UK  
**Founded:** 2014  
**Rivals:** In-house builds, Murex, RiskMetrics, SAS  
**Funding:** Self-financed



What it does: The firm's RiskMine software aims to automate as much as possible in the daily activity of risk managers. It consists of modules that can be deployed on their own. RiskMine Chronos is a tool for managing large amounts of market data from many different sources, both internal and external. RiskMine Cube is designed for risk data aggregation and reporting, with the data available via interactive dashboards, web apps, in Excel and other reporting applications. RiskMine Scenarios & Wildfire helps with stress-testing and distributed pricing. Finally, RiskMine offers a number of tools for complying with the Fundamental Review of the Trading Book. Pereira says: "Percentile helps firms renovate their world of risk to adhere to the rigour and requirements of regulations driving risk-based capital. We hope to delight users with risk rather than them having to fight it."

## Regtek.Solutions

### Risk Fintech File

**CEO:** Brian Lynch  
**Staff:** 30  
**Clients:** 21, including nine of the world's largest derivatives dealers  
**Offices:** Latvia, UK, US  
**Founded:** 2017  
**Rivals:** Message Automation, Sapien  
**Funding:** \$5 million VC Series A funding, including from Deutsche Börse



What it does: Provides software for regulatory trade reporting in jurisdictions around the world. The software includes connections to trade repositories and approved reporting mechanisms. Lynch says: "We can reduce the cost and the amount of time needed for maintaining and evolving reporting systems."

## Scaled Risk

### Risk Fintech File

**CEO:** Thierry Duchamp  
**Staff:** 15  
**Clients:** Five  
**Offices:** Belgium, France  
**Founded:** 2012  
**Rivals:** In-house builds, Moody's Analytics, Thomson Reuters  
**Funding:** Raising funds now

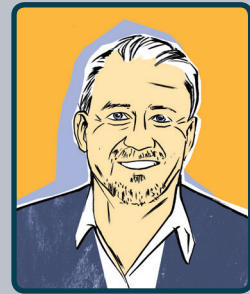


What it does: The firm's platform allows sales, risk and audit teams at financial institutions to centralise, manage and analyse all their data in real time. It can be used for risk management, fraud detection, anti-money laundering and know-your-customer processes, market monitoring and trading analytics, and regulatory reporting. Bertrand Tillay-Doledec, head of product management, says: "The auditability of data management processes is the number one pain point for financial institutions at the moment for reporting and analytics. A lot of solutions target analytics with brilliant rules and algorithms. But if you don't have a robust [data] management framework and auditability, you will have poor data on the output."

## Simudyne

### Risk Fintech File

**CEO:** Justin Lyon  
**Staff:** 22  
**Clients:** Not disclosed  
**Offices:** UK  
**Founded:** 2017  
**Rivals:** AnyLogic  
**Funding:** Venture capital



What it does: Provides software for building extremely large simulations. Use cases for its agent-based models include complex Monte Carlo simulations and stress testing for counterparty contagion risk. Lyon says: "A global bank simulating the housing market, for example, might have 30 million or even 100 million different households in a mortgage book. That's where our platform kicks in, distributing the computations across thousands of machines. All data is preloaded into data and model 'lakes'. If a market event happens, a bank can crunch the numbers quickly and deliver the results to a web browser so the chief risk officer can, in the boardroom, simulate the impact of real scenarios on profit and loss immediately. The bank can then start to take immediate corrective action."

## TickSmith

### Risk Fintech File

**CEO:** Francis Wenzel  
**Staff:** 30  
**Clients:** 11, including banks  
**Offices:** Canada  
**Founded:** 2012  
**Rivals:** In-house builds, KDB, Crux, Xignite  
**Funding:** Venture capital



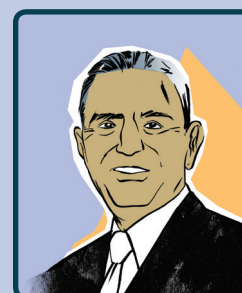
**What it does:** Its flagship product TickVault is a platform for recording, storing and analysing large amounts of structured and unstructured financial data, including trade and quote history, news and events, and research. The platform can help with modelling data for FRTB, regulatory reporting, conducting transaction cost analysis, backtesting of trading algorithms, market surveillance and other tasks.

**Wenzel says:** "Financial institutions without a scalable and future-proof data management infrastructure struggle with increased data-intensive risk and compliance obligations. They are also ignoring the data mining opportunities made possible with artificial intelligence and machine learning. With its TickVault platform, TickSmith centralises, transforms and effectively manages financial data at scale, so that data becomes the cornerstone of their business strategy."

## Transcend

### Risk Fintech File

**CEO:** Bimal Kadikar  
**Staff:** 40  
**Clients:** Three  
**Offices:** US  
**Founded:** 2013  
**Rivals:** Broadridge, FIS, in-house builds  
**Funding:** Self-financed, in discussions on external funding



**What it does:** Delivers modular technology for managing collateral from across the firm. Modules cover liquidity analytics, transfer pricing and other tasks.

**Kadikar says:** "Some top-tier sell-side firms have highly granular models with visibility into secured and unsecured funding, valuation adjustments, balance sheet and capital costs. But challenges remain, such as evaluating and charging these costs directly to the trader or desk doing the trade and how to assess costs pre-trade. Handling this in a bespoke way is not sustainable ... We help firms connect their securities finance platforms to their derivatives platforms to their operations platforms and give them visibility for collateral across the entire segment."

## Z-Risk Engine

### Risk Fintech File

**CEO:** Scott Aguais  
**Staff:** Four  
**Clients:** One  
**Offices:** UK  
**Founded:** 2014  
**Rivals:** Moody's, SAS  
**Funding:** Venture capital investment



**What it does:** Provides software and consulting for projecting expected credit losses in wholesale portfolios to comply with the International Financial Reporting Standard (IFRS) 9 and the Current Expected Credit Loss accounting standard, and for stress testing. Says it is "uniquely" able to use industry and regional credit cycles to convert existing credit models, such as through-the-cycle probabilities of default, into point-in-time measures.

**Aguais says:** "The firm has reviewed 15 major banks and "none are achieving a complete set of Pit probabilities of default, loss given default and exposure at default and therefore none are producing expected credit losses that satisfy IFRS 9". He adds: "What I have is the next paradigm. We're ahead of the curve enough that people haven't woken up. If most banks aren't ready, all we can do is keep publishing our thought leadership and improving our solution."





# Capitalising on regtech

Regulatory technology could be effective in improving data reporting and monitoring, but central banks have a long way to go to make it a reality

## Need to know

- UK, Singaporean and Dutch regulators are leading the way in developing regtech.
- The key to progress is pushing the industry to machine-friendly reporting.
- Lack of familiarity with regtech could be a problem, increasing the risk of operational error or abuse.
- Many institutions are still reluctant in the face of potentially huge modernisation costs.
- The key to regtech deployment remains reliable data quality.

If one were to imagine the ideal financial supervision system of the future, it would probably look very different from what we have today. Financial institutions would report details of transactions to a central utility, from which regulators would be able to extract information in real time. They might monitor markets through multiple screens in futuristic control rooms, picking up systemic risks with the help of flashing lights and heat maps.

Data reporting requirements have increased dramatically since the 2007–08 financial crisis, but central banks and regulators admit they cannot yet use this data to build an accurate picture of risk in the financial system. The evolution of regulatory technology, or regtech, might help deal with this problem – and some central banks are actively exploring opportunities – but there is a long way to go.

“We recognise there are issues in data reporting that need to be addressed,” says Tom Henderson, senior manager in the change and data management division at the Bank of England. “Duplicate data is often collected in multiple reports, and it can

take several years to implement a new reporting requirement, by which time the original policy reason for the report may well have passed. Definitions also need to be improved so that the data that is reported always matches what has been requested.”

The proliferation of reporting requirements presents an opportunity to leverage advanced technologies such as artificial intelligence (AI) and machine learning. Just as the fintech wave has capitalised on the increased automation of financial markets over the past decade, regtech offers the promise of bringing new efficiencies to reporting, allowing regulators to make better sense of reported data.

“Public authorities generally recognise that new reporting requirements have created additional statistical work for commercial banks, not least to enhance the quality of the granular information to be provided,” says Bruno Tissot, head of statistics and research support at the Bank for International Settlements. “A number of these authorities are working with regtech firms to support banks in enhancing their reporting models, including through the use of innovative approaches such as AI and advanced big data techniques.”

Tissot, who also heads the secretariat of the Irving Fisher Committee on Central Bank Statistics, sees the need for a much more intuitive reporting framework than currently exists.

“The objective for banks is not simply to address new individual reporting requirements on an *ad hoc* basis. A key goal is to develop a flexible, granular information system with all necessary identifiers to be able to aggregate granular data and respond to new information requests over time, as well as to evolving business needs,” he says.

### Meeting the data challenge

If deployed effectively, regtech has the potential to bring major advances and efficiencies in reporting. Big data and AI techniques could reduce the potential for inaccuracies in reported data, while also allowing central banks to significantly improve the way they organise and analyse data.

Luca Enriques, professor of law at the University of Oxford, identifies four distinct types of regtech. In a short paper published earlier this year,<sup>1</sup> he noted that market participants might use regtech for their operations or compliance, whereas supervisors and central banks might use it for oversight or policymaking purposes.

“Macroprudential supervisors are closely following the evolution of regtech because they all now receive a wealth of data about what is going on in the financial system, but they recognise the human eye is insufficient to process this data and they need more advanced technology,” says Enriques.

Data monitoring has always been part of the mandate of central banks, but the focus on transparency at the core of post-crisis regulations has led to a proliferation of reporting requirements. Just as financial institutions have had to overhaul their internal systems to generate the right data and report it in a timely manner, central banks are beginning to recognise they also need better systems if they are to make sense of the reports.

“New regulations over the past decade have created a massive new pool of data that didn’t previously exist, so there is a major opportunity for central banks to use this data to obtain better insights and achieve better regulatory outcomes,” says Douglas Arner, professor of law at the University of Hong Kong.

Enthusiasm for exploring regtech varies across the central bank community, with some institutions already surveying and testing new approaches while others wait to see how the technology evolves. But the data challenge shows little sign of diminishing, with the likelihood of further reporting requirements being layered on top of existing ones.



Bruno Tissot, Bank for International Settlements

### Early explorers

UK regulators have been among the earliest explorers of the ways in which technology could be used to improve regulatory reporting. The Financial Conduct Authority and the Bank of England held a two-week TechSprint<sup>2</sup> in November 2017, during which participants developed a proof of concept to make reporting requirements machine-readable and executable so firms could map requirements directly to their data and generate automated reports. The work has continued this year with a call for input to further develop the concept.

“We are thinking about how we could express our regulation and data requirements in a form that is more amenable to machine interpretation because we recognise that, as we ask for more granular information to be reported, technology could be used to reduce the burden on individual firms,” says Henderson.

“This is still at an early stage, but one could imagine a granular data model that is agreed by regulators and standardised across the industry,” he adds. “If all firms adopted this model, we could ask the relevant questions to extract the dataset we need without the firms having to submit an entire copy of everything every quarter – this could save time and resources for all parties.”

The UK is not the only country to think in these terms. The Monetary Authority of Singapore has been actively encouraging greater testing and experimentation with new technologies through its regulatory sandbox initiative, while other central banks are already looking to regtech for solutions to their reporting challenges.

The Netherlands Bank (DNB) has long sought to foster greater innovation in fintech, and in 2016 established a regulatory sandbox with the Netherlands Authority for the Financial Markets to support the

testing of new ideas and technologies. DNB is developing a proof of concept for a system to manage data across multiple divisions.

“All central banks are now struggling with the large volume of data that is coming in and the fact that reports are submitted to meet the requirements of individual mandates. We supervise multiple sectors, and we need to eliminate duplications and omissions in our data while also controlling access rights to different datasets,” says Iman van Lelyveld, senior policy adviser at DNB.

### Beyond the proof of concept

The early progress in these countries highlights the potential for regtech to realise substantial improvements in financial data and reporting. But challenges will inevitably arise when central banks move beyond the proof-of-concept stage and begin to implement systems.

Enriques highlights four possible challenges in the transition to the new regtech environment: human resources, governance, cyber security and operations. On human resources, central banks and regulators have historically been largely staffed by lawyers and economists, but if they are to take full advantage of the boom in regtech, they must now recruit more IT and data specialists.

The governance challenge is related to human resources because institutions might struggle to manage major technological changes if senior management and boards don’t fully understand regtech products and their implications. If just one or two individuals have a sophisticated understanding, Enriques says, it may lead to unconstrained power within their organisations in the adoption and implementation of new systems.

“Increasingly, central banks and regulators are making senior appointments and creating new functions, such as chief data officers, so they can work on visualising data and using analytics and heat maps to monitor the financial system and identify risks and concerns as they arise,” says Arner.

Cyber security is a growing concern across all sectors, but if supervision and reporting becomes more systems-based, regulators will need to redouble their efforts to defend themselves against attackers.

Enriques also sees the potential for operational challenges if the same regtech systems are pitched to both regulators and regulated firms. To some extent, this could be positive as it will ensure interoperability, but as authorities advance their surveillance and monitoring, financial institutions might find new ways to evade detection.

“If the same products are sold to both the regulators and the regulated, there wouldn’t necessarily be a conflict of interest, but there would be a higher risk that the product will not always be

<sup>1</sup> L. Enriques, *Social Science Research Network*, Financial Supervisors and Regtech: Four Roles and Four Challenges, January 2018, <https://bit.ly/2NuOcCA>  
<sup>2</sup> Financial Conduct Authority, TechSprints, September 2017, <https://bit.ly/2C2mTgN>

the ideal one for both parties. There is also a risk the market would get ahead of regulators and find ways to get around their detection systems, so this is a delicate process," says Enriques.

### Taking the lead

While large commercial banks are generally likely to employ more talented technologists and develop more intuitive systems than central banks, it doesn't necessarily follow that they will lead the way in every aspect of technology. On the adoption of cloud computing, for example, some regtech practitioners see greater progress among central banks and regulators than among commercial banks.

"Some regulators are already taking advantage of cloud services, but we're still having discussions with commercial banks about whether their infrastructure can be put on the cloud. For many institutions, it is still much easier to maintain the status quo and legacy infrastructure rather than trying to do something differently," says Brian Lynch, chief executive of RegTek.Solutions, which was founded in 2017 and focuses on regulatory reporting.

The opportunities provided by regtech's need not be constrained to cloud computing and more efficient data analysis, however. There has also been some exploration of how machine learning techniques might be deployed to allow automated analysis of regulatory texts to generate reports without the need for human intervention.

This would require buy-in from regulators and market participants as there would, in all likelihood, need to be a standardised methodology approved by regulators. However, given the volume of resources currently deployed to interpret and act on complex regulatory texts, this advanced use of technology could reap major efficiencies and reduce the resource burden that currently falls on both regulators and the regulated.

"Realising the true promise of regtech will depend on the regulations being made as machine readable as possible," says Enriques. "The rules have to lend themselves to being processed and digitised by algorithms without human intervention. Some regulators are more attuned to this opportunity than others and are already investing and testing technologies."

### Quality control

As early analysis of such techniques continues, there will be more short-term steps to improving the quality of data in the financial system. Accurate reporting depends on every institution, product and transaction having the correct, uniformly recognised identifiers, but while there was a major effort to ensure full adoption of identifiers ahead of regulatory deadlines, this remains a work in progress.



Douglas Arner, University of Hong Kong

Identifiers could be considered the first step towards a successful reporting framework. If not done properly, it will affect the quality of reporting and subsequent decision-making. "For any reporting system to work properly, we need to make sure all of the metadata is accurate and the reported data is of the right quality. The consequences of not getting this right can be severe because it can lead to inaccurate analysis and poor supervisory decisions," says DNB's van Lelyveld.

Lynch echoes this point, adding that market participants need to take ownership of data quality at the outset. "Poor data quality is a major issue in the industry, and there is a lot of technology out there for cleansing and validating data," he says. "Most regulators don't see it as their job to analyse or remediate data quality, but rather to use reported data to measure and manage risk. The problem is, if regulators are relying on poor quality data, reporting does not achieve its objectives."

### Active role

In the long term, regtech offers the opportunity to bring significant improvements to the reporting landscape, and it will be up to both the public and private sectors to capitalise on that opportunity.

Enriques suggests four distinct, but not mutually exclusive, roles for supervisors to play in the evolution of regtech: actively develop regtech products, buy products developed by others, facilitate or co-ordinate market developments and supervise regtech firms. Different agencies will naturally be inclined towards their own approaches, but it is becoming increasingly clear that central banks are more attuned than ever to the need to take an active role in the evolution of regtech.

"Central banks have a lot of datasets in different areas such as payments, research and supervision, and they are increasingly willing to bring these together in a more standardised and user-friendly format," says



Luca Enriques, University of Oxford

Tissot. "Data quality has become a big issue, with the increasing reliance on entity- and transaction-based rather than aggregated datasets. Machine learning and AI can be used to improve the quality of these datasets in a more automated way: to reduce duplication and correct inaccuracies, for instance."

As scrutiny of this evolving sector continues, independent academic analysis should help guide practitioners on the path forward. While there are clearly some operational hurdles to overcome – including human resources, cyber security and governance – observers believe the success of regtech in the official sector depends also on a cultural transition towards a mindset that embraces technological change.

"The biggest shift that is needed to realise the promise of regtech is increased cultural awareness at senior levels of official institutions of the need to understand what is going on in financial markets and the risks that are emerging from digitisation. Advanced technology really should create opportunities for regulators to do their jobs better, which is to be welcomed and nurtured," says Arner.

The financial services sector might still be a long way from the futuristic control tower in which risks are quickly identified, but for central banks already actively exploring regtech, the future looks bright. Technology offers a promising way to navigate the complex reporting landscape, which has proved challenging.

Clair Mills, head of the change and data management division at the Bank of England, says: "There is a lot that would need to happen to do this on an industrial scale, and so far we have only taken baby steps with a small group of large firms to identify what might be possible. Ultimately, if we could move towards a more accurate, flexible and granular dataset, it would reduce the burden on firms and create a more thematic, detailed view of financial markets for regulators." ■

*Previously published on Risk.net*

# Demand response

## Time to look smart

Decentralisation of electricity grids is proving a challenge to firms. Pauline McCallion reports

**T**he rise of prosumers – entities that both produce and consume power – has led to a rapid increase in the number of generation sources available on electricity grids throughout many of the world's power markets. Utilities and system operators must manage the proliferation of these distributed energy resources (DERs), which generally comprise producing resources and controllable loads that are directly connected to a local distribution system. This can include solar and wind resources, combined heat and power plants, electric vehicles and other typically small-scale resources.

There is a growing need for new tools to help aggregate and analyse the explosion of data that has accompanied the proliferation of these new resources.

Big data analytics can help generate forecasts and real-time pricing for demand response (DR) capabilities, but accessing the necessary data remains difficult in some regions. This has restricted the wider development of more localised balancing that would support greater reliability, as electricity grids struggle to keep pace with changing market dynamics, such as load and renewable energy resource growth.

### Need to know

- Demand response is attracting interest thanks to the move to renewable energy, but it brings other benefits as well, such as greater resilience.
- Software start-ups as well as established energy-sector players are developing DR products, drawing on cloud computing and 'internet of things' technology, as well as smart metering and conventional demand management.
- Regulations and data availability are the bottlenecks, especially the fine-grained weather data necessary for supply and demand forecasts.
- Sparse and uneven smart metering roll-out is another problem.

However, pilot projects are under way in many countries that aim to address these issues and create a more balanced approach to energy management that better accounts for activity on both sides of the meter.

### Data explosion

"It's almost like each end-user becomes a potential contributor to stabilising the grid through whatever DERs they have," explains John Flory, Oregon-based executive managing director of energy risk management consultancy The Alliance Risk Group and senior vice-president at the US subsidiary of Norwegian energy software developer Esmart Systems. "And all of a sudden there is a lot more data, and the capabilities and, indeed, the whole strategy around optimising the dispatch needs to change."

These DERs can also provide a more efficient way to address reliability concerns in the face of ageing grid infrastructure in markets around the world.

"In general, DR and DERs provide a much cheaper and cleaner way to do grid balancing that hasn't been available previously, because we didn't have all the [necessary] automation, communication and intelligence," says Yoav Zingher, chief executive of Kiwi Power, a UK DR aggregator.

The ageing infrastructure is struggling to support growing energy needs and new load patterns due to population changes and grid decentralisation. Of course, it can be upgraded, but that can be costly and time-consuming. "You can continue to fix old infrastructures, but there is a limit to how many times you can do that," Zingher adds. "And when the system is under stress and is relying on old infrastructure, it's just a risky way to do things. We know renewable energy, demand response and batteries are cheaper [than traditional peaking power], and we know all these technologies work. We just need to make a decision to implement them and not continue to rely on the old system, which is cheaper in the short term, but not in the long term or potentially even in the medium term."

In addition to the sheer growth in the volume of data that must be managed as a result of DER proliferation, an increasingly decentralised grid

also means accounting for greater variability on both sides of the meter. "With a traditional coal or gas-fired plant, availability is known – except for during forced outages – so the only worry is understanding load variation to balance supply and demand in near real-time," Flory says. "Now we have to not only understand variability in load on the customer side of the meter, but also variability in generation or output on the utility side of the generator or the grid, particularly from a wind perspective."

He continues: "The greater the granularity, the more data points and the more forecasting accuracy is necessary to be able to understand what's going on [at grid level]. Since electricity supply and demand has to be balanced on a millisecond-to-millisecond basis, the challenge increases that much more."

Joakim Sveli, business manager at Norwegian smart energy software developer Esmart Systems, agrees that as more devices connect to the grid, the industry faces both challenges and opportunities.

"We can now get more granularity on the energy and activity data we use because of the increase in different 'internet of things' (IoT) devices that can be incorporated into [our] models," he says of the company's DR initiatives, which often use data from new DERs such as electric vehicles.

"You can't really use this material in a normal statistical way to improve your models; there is so much data you have to use artificial intelligence and algorithms to expand your functionality."

### New technology

The development of cloud technology has provided power market participants with a way to aggregate and analyse the growing wealth of information generated by DERs. This is also a cheaper and faster way to increase reliability versus physically upgrading grid infrastructure. More than half of the 137 US utilities surveyed for the Smart Electric Power Alliance's (Sepa's) 2018 Demand Response Market Snapshot, published in September, said they are interested in using DR locationally to manage fluctuations or grid impacts (figure 1), with a further 22% already planning to take this approach to grid maintenance.



The growing interest in this approach has attracted new entrants to the market offering solutions that are typically cloud-based and using artificial intelligence (AI) tools, such as machine learning. “There are third parties that are offering to house the data, as well as companies that offer control systems – the distributed energy resource management systems, which can be cloud-based or on-premise,” says Brett Feldman, a principal research analyst with Navigant Research’s utility transformations programme. But he adds that some utilities remain wary of the cloud due to security concerns and cost-recovery issues.

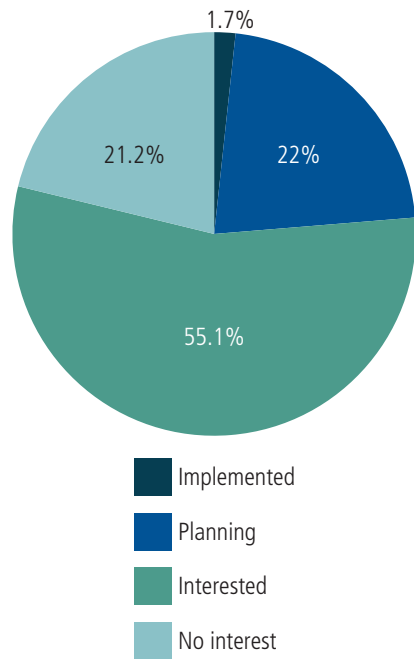
Utilities are typically incentivised for capacity implementation and capital asset investment, explains Larry Cochrane, director of industry technology strategy at Microsoft, meaning solutions for forecasting and co-ordination of resources may not enable cost recovery. In this sense, the glacial pace of changing power market regulations can create a bottleneck for the development of DR data and analytics capabilities. “There are regulatory challenges in terms of the types of things that can be done at this point, which tends to limit, for example, how far utilities are going to go in terms of investing in this area,” Cochrane adds.

However, new players continue to be interested in developing innovative cloud-based products to boost analytical power in the market, particularly those with skin in the game. As a major energy consumer (chiefly through its data centres) that has committed to reducing its carbon emissions, Microsoft is piloting cloud-based data-management solutions in this area using its Azure Machine Learning platform.

Such tools are useless without the correct data, however, and parts of the market are struggling to ensure quality information is captured at the level required to be able to balance an increasingly decentralised grid. “Energy management systems at the transmission level have been doing this for a long time with aggregate load forecasting but, at the distribution level, it is much more challenging because location-specific and finer-grained forecasting capabilities are needed,” Cochrane says.

However, technology companies such as Microsoft can offer large data-collection platforms and intelligent algorithms for forecasting and statistical analysis. “Without locational-specific wind information, for example, it’s hard to do a credible wind capacity forecast,” Cochrane says. This lack of location-specific solar and wind forecasting, because local weather data is not accurate enough, means this kind of analysis remains “a bit of a holy grail” for now, according to Cochrane. “The only way to really fix this is with sensors, anemometers, [use] of actual generation from inverter-type solar panels and so on, to enable location-specific forecasting,” he continues. “But we have not solved that yet.”

**1 Utilities targeting DR specifically to manage fluctuations/grid impacts in a location with a high penetration of renewable energy**



Source: Sepa, 2018

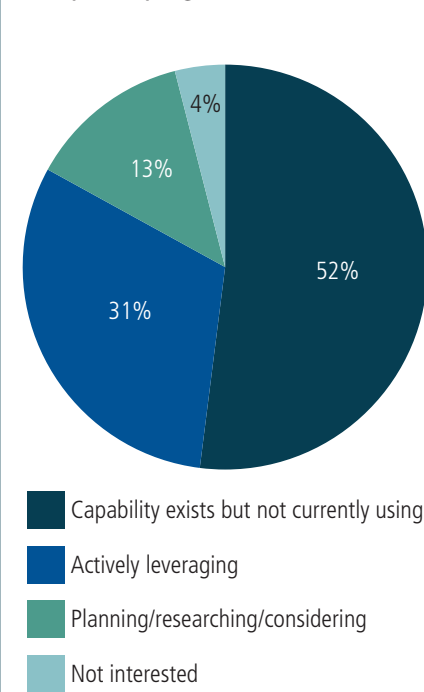
The differing pace of advanced metering infrastructure (Ami) implementation across markets has also affected the ability to capture the necessary data to fully integrate DERs in some regions. Sepa’s 2017 Utility Demand Response Snapshot showed nearly a third of utilities already use Ami data for demand response and a further 13% were looking into the possibility (figure 2 – this question was not included in the 2018 survey). However, more than half said that while the “capability exists”, they were not currently using it, showing room for growth in terms of data-centric approaches to DR.

“There is not much Ami use throughout New York, for example, so getting the data is a little bit more of a challenge right now,” says Michael DeSocio, senior manager, market design, at the New York Independent System Operator (NYISO). “The utilities are focused on working through that and putting in the measuring and capturing equipment we need to get to the data, but it just doesn’t exist today.”

### Norway: leading lights

Given the role of renewable energy in causing grid decentralisation and increased variability, many of the countries and regions with more ambitious renewable energy use and carbon reduction targets are also pioneering the development of the new tools needed to aggregate and analyse the flood of data from DERs. Microsoft’s Cochrane highlights Norway,

**2 Utilities using advanced metering infrastructure data for demand response programmes**



Source: Sepa, 2017

among others, as a leader in this area. According to government figures, 98% of Norway’s electricity production comes from renewable energy sources.

Esmart Systems has been conducting pilot projects in its home country of Norway since 2015 in a bid to use DR to enhance the ageing grid infrastructure. “The first test was in 2015 and from then on, we have developed our offering. Today, our [cloud-based] prediction framework is industrialised and contains a wide variety of algorithms [and delivers forecasts with a high degree of accuracy],” says Tina Skagen, business area manager, energy markets and city at Esmart Systems in Norway.

Esmart Systems’ Connected Prosumer offering aggregates and monitors data from DERs, analysing it to predict consumption and production. Users can then optimise their resources, lower their bills and bid into markets. In addition to energy data, the company collects activity and weather data, price curves and bottleneck information from the grid to create predictions to feed into an optimisation and control model.

It uses Microsoft’s Azure cloud platform to apply machine learning techniques to develop these consumption and production predictions. “The technology, along with the storage and data processing capabilities that are now available makes this much more doable compared to just a couple of years ago. So AI and the way we build and utilise predictions is a core part of our offering,” Skagen says.

### Revving up NY DER integration

New York State's Reforming the Energy Vision (Rev) initiative is also pushing innovation in relation to localised data capture and grid balancing. Under the scheme, governor Andrew Cuomo aims to increase renewable energy use by 50% and cut energy sector carbon emissions by 80% by 2050. One of the most recent Rev pilots, announced on June 28, offers DERs a transactive energy marketplace at the distribution-level, called a distributed system platform (DSP).

Toronto-headquartered software provider Opus One Solutions partnered with National Grid to create the underlying technology, which is currently being piloted at Buffalo Niagara Medical Campus (BNMC) in New York state. The pilot involves two of BNMC's institutions – Kaleida Health (Buffalo General Hospital) and Roswell Park Cancer Institute, with approximately 28 megawatts (MW) of back-up generation, although the pilot will work with 8–10 MW. Participants will be able to offer resources to the local electricity distribution grid in return for compensation based on the value the specific DER provides to the grid.

The project “brings additional layers” to traditional price-responsive demand-market mechanisms by enabling responses that serve the grid's location- and time-specific needs, says Opus One Solutions' chief strategic growth and policy officer, Hari Suthan.

“Institutions on the campus at BNMC can be dispatched as if they are a generator,” he says.

“The market provides a more granular incentive for DER operation through the [development of] locational pricing, which takes into account fixed costs and variable costs and is generated hourly, same day and day ahead. The big difference between this project and prior DR programmes is that the actual locational marginal price varies by DER.”

Suthan adds that participants can reduce differences between bulk pricing and distribution pricing and the platform has the potential to generate new revenues for the utility beyond buying bulk power and transmitting it downstream over rate-based infrastructure. The model aims to support asset preservation, as well as grid safety, security and reliability, since power is only directed to where it is needed and the grid is not overloaded by additional voltage from DERs. “This means the utility actually augments the grid to be far more resilient and flexible, and that is done in a localised manner through the market's price signals,” Suthan adds.

Daniel Payares Luzio, project manager, New Energy Solutions at National Grid, calls the platform “DR 2.0”. “Just like independent system operators have different prices that take into account system constraints and so on, we have developed a model that covers the local distribution system and its constraints,” he



**“In general, DR and DERs provide a much cheaper and cleaner way to do grid balancing that hasn't been available previously because we didn't have all the [necessary] automation, communication and intelligence”**

Yoav Zingher, Kiwi Power

explains. “DR customers can connect to this platform, access [localised] prices 24/7 ... and decide whether to participate.”

From a utility perspective, the project allows National Grid to monitor the point at which its customers have an incentive to participate in DR, as well as the impact of greater DER use on its systems. For prosumers, the pilot, once fully proven, will provide more income certainty for future DER investment. And with respect to the system operator, DeSocio says initiatives such as the DSP, as well as participation of third-party aggregators of DR in the market, will be key to the success of its efforts to fully integrate DERs into the grid system. “From a system operator perspective [...] it's all about the federation of roles and responsibilities to entities with better visibility into the DERs,” he says.

After working on the underlying financial model for around a year before the DSP demonstration went live in Buffalo, National Grid is now discussing plans to expand the pilot by two to five additional participants, and to add a wider range of DER technologies, such as combined heat and power, and energy storage. But Payares says it's “too early to tell” if the platform could eventually be rolled out across National Grid's entire market. Similarly, the potential savings for users remains an unknown.

“We still need to test how accurately we can predict peak-time demands and how much we can rely on the participants to act on price signals,” Payares says. “Also, this would depend on the location constraints that we can target and any potential [issues] that the DERs can help solve.”

Opus One Solutions, however, believes the underlying technology has global applications – even in areas that do not necessarily need to incentivise DER growth. “In New York, the primary motivation was to incentivise the development of more DERs to help with grid resiliency,” chief commercial officer Keyvan Cohanim says. “In [other] areas that already have that momentum, or where the cost of DERs is at grid parity or close to it, utilities will be incentivised by the operational benefits because they will be able to manage a higher penetration of DERs.”

### A more nuanced approach

According to OP Ravi, principal program manager (Azure IoT) at Microsoft, companies at all levels of the global power markets are starting to take DER integration more seriously. “It's an early stage, but it's moved beyond scepticism now,” he says. “Organisations are aware that the change is real and many of them have already started their digital transformations. So it's a journey, and the serious organisations are investing in this area, and others are evaluating the options.”

Grid decentralisation has refocused the industry away from the traditional centres of power production and consumption to a more widely distributed map of prosumers. In addition, demand response is no longer viewed in simple terms.

“Utilities or power grid operators are now starting to use storage to help maintain frequency control or maintain second-to-second control for reliability,” Flory says. “So we've moved from thinking of signalling capability as simply an on/off switch to more like a rheostat that can be adjusted – potentially in near real-time – for particular types of loads, situations or DER resources.”

Those that use the right tools to analyse the growing volume of data from DERs will be able to continue to develop this more nuanced approach to balancing supply and demand. And for much of the market, there is no use in denying the growing importance of these resources.

“DR and DERs are starting to move from a passive to a very active role in the market,” says NYISO's DeSocio. “Providing almost a day's notice that ‘tomorrow will be hot, please get ready’ works really well for now, but in the future these resources will develop to be used just like a traditional generator in helping to balance minute-to-minute and hour-to-hour load and grid needs.” ■

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# Obstacles and opportunities in adopting cloud computing

Firms are increasingly exploring the benefits of cloud-based options for a range of tasks and applications. A panel of industry leaders discusses key topics, including how to best deploy cloud computing, its most effective uses, the impact of regulation on its adoption and the long-term advantages cloud adoption offers





Arnaud de Chavagnac  
Head of Cloud Solutions Marketing  
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### What is leading capital market firms to consider cloud computing?

**Arnaud de Chavagnac, Murex:** Capital markets firms have many motivations for moving to cloud. Companies want to achieve digital transformation, which – because cloud infrastructure can be kept up to date with frequent innovation – requires state-of-the-art technology, agility and simplicity.

Cloud computing provides the scalability of unlimited capacity, the flexibility of a pay-as-you-go model and the benefits of outsourcing commonplace activities. Time-to-market is also a factor. With cloud, capacity can be increased in minutes, whereas many financial institutions require months to order and install new hardware. Ultimately, moving to cloud brings reduced total cost of ownership and greater transparency about that cost, because every unit consumed is monitored and metered.

The risk domain is the root of technical changes taking place with regulatory requirements, such as initial margin and the Fundamental Review of the Trading Book, which require portfolios to be re-evaluated across a high number of market data scenarios and time periods. Performing such sophisticated calculations requires extra hardware capacity that can be swiftly mobilised; only cloud can offer this.

### What tasks and applications is cloud computing most suitable for?

**Arnaud de Chavagnac:** Applications across the front office, back office and risk function can now benefit from cloud because of the performance, stability and security already attained by providers after millions of deployments across countries and industries.

Development and test installations on the cloud can enable rapid development and an optimised development operations project mode. This type of installation is used for a proof of concept, typically lasting a few weeks; it is often taken as an intermediary step before moving usage onto cloud, at which point questions about security, performance, availability and reversibility would take longer to address.

A particularly relevant use case is grid computing for pricing complex structured products on demand on a large set of central processing units or graphics processing units. Cloud removes the need to purchase these units in advance, which makes sense when most grids are used for only a few hours each day. The grid is less critical in security terms because sensitive information, such as counterparty names, is not sent to it.

Cloud also offers production benefits. Having the main production of the application on the cloud means the user pays exactly and only for the capacity they require. The alternative to this is traditional on-premises installations, which are comparatively rigid in terms of capacity, and compel users to estimate future usage. The result is that you either oversize and pay for capacity you don't use, or undersize, potentially limiting your business.

Putting disaster recovery on the cloud is another type of deployment that is gaining popularity as users pay only for storage and replication

bandwidth, not for computing power when the disaster recovery site is not used. A hybrid cloud approach of moving certain software components onto the cloud is also proving popular because it allows a selective and progressive journey to cloud.

### What obstacles are firms likely to encounter when introducing cloud computing?

**Arnaud de Chavagnac:** Regulators and auditors have strict data protection and security guidelines that could prevent full cloud adoption. However, there are many situations where cloud security standards are greater than in-house security, given the level of investment by cloud providers. In the latter case, security becomes another driver of cloud adoption.

Other obstacles that should not be underestimated include change management issues – such as new governance to implement new skills. Application modernisation costs may be a factor if the application needs to be redeveloped before it can be ported on the cloud. Also, some older interfaces might not be compliant with security standards or cloud technology.

### What should firms consider when selecting a cloud provider?

**Arnaud de Chavagnac:** The cloud is a modern construct, allowing the freedom to move quickly. However, having plenty of options to fit customers' different situations is crucial. Murex aims to give clients the capacity to innovate while selecting what is right for their needs.

Cloud providers must demonstrate that their offerings are secure and available in the relevant regions. They should demonstrate better price-performance ratio of the applications onto the cloud, and propose new standard offerings that will help customers focus on core competencies.

The application must already have been certified with the target cloud provider – as is the case with Murex's offering. The partnership between application vendor and cloud provider is important: it must enable first-class support for a mission-critical system, and its evolution needs to prove that it will continue to bring benefits for customers. Murex, for example, works with Amazon Web Services (AWS) and Microsoft Azure.

### How can firms best manage the potential risks associated with cloud computing?

**Arnaud de Chavagnac:** First, they should assess the exact limit of their cloud appetite, such as whether the customer is ready to put data on the cloud. Second, they should involve their security team from the outset of the process. Third, they should use experience gained on other cloud migration projects for less critical systems. And, finally, firms should seek assistance from system integrators to execute cloud migration projects with the relevant cloud skills and experience, and establish the right governance around cloud usage and consumption.

### Where does cloud offer the greatest potential for the future?

**Arnaud de Chavagnac:** Cloud is the foundation of application vendors' research and development into making functional innovations. Cloud's cross-sector roll-out provides the opportunity for application vendors to select the most relevant features for their business. In addition, cloud could impact project resources by freeing them up to create new offerings to maximise end-user satisfaction. Application vendor business models may also change with the emergence of new managed services and moving to run on the cloud. ■



# A fool's gold (or data) mine

## Need to know

- Quant investment research faces the “gigantic problem” of poor use of data, with as many as 50% of factor discoveries being called into doubt, and two in five bank risk premia offerings withdrawn.
- Machine learning arguably makes matters worse, offering the chance to dredge far bigger datasets with the added risk of identifying spurious relationships in doing so.
- Academics such as Campbell Harvey and Amit Goyal are leading calls to apply tougher tests of statistical significance in quant research.
- Some investment firms will test hypotheses backed only by human intuition.
- Others think setting too high a bar risks missing out on machine learning's promise to uncover patterns humans cannot see.
- “In other fields like medicine, self-driving cars and language translation, researchers have been able to use machine learning to create complex models that are better than human performance. And we can do the same,” says a hedge fund manager.

Quants are building toolkits to avoid the pitfalls of data mining, including spurious results, writes Faye Kilburn

**E**mpirical science is reeling. In the last five years, in fields from biomedicine to social psychology, top journals have upended canonical studies by showing their results cannot be reproduced.

A review of 100 major psychology studies, for instance, found only 36% had statistical significance. Over half the alien planets identified by Nasa's Kepler telescope turned out to be stars. And in preclinical cancer research, a mere six out of 53 breakthrough studies were found to be reproducible.

Quantitative finance does not fare much better. “It's a gigantic problem – spurious results are the norm,” says Zak David, co-founder of the analytics firm Mile 59, and former engineer of high-frequency trading software. David says he has tried to replicate any number of studies in the past decade, and been “consistently disappointed”.

Data-driven traders and quant researchers rely on the same processes of statistical inference and number-crunching as scientists, to design investment

strategies and suss out the things that drive returns. But the field of quantitative finance is now littered with the stiffened detritus of data mining.

How bad is it? Take factor investing, which sidesteps traditional analysis of companies and stocks and instead looks at a quantitative selection of securities with shared characteristics – factors – that purportedly drive above-market returns. Factors underpin quant investment strategies, risk premia products and smart beta exchange-traded funds.

But a 2014 study found approximately half the discoveries of factors could not be replicated.

A follow-up study found the underlying risk premium associated with 85 of the 99 most recent factor “discoveries” were found to correlate to previously identified factors, and therefore provide little diversification in terms of risk. For example, a “new” factor proposed by Steven Heston and Ronnie Sadka relating to the seasonality of the stock market was found to be highly correlated with a six-month momentum factor proposed in a 1993 study.

In yet another indication, in recent years, two out of five bank risk premia products built on factors were withdrawn, raising questions about poor performance related to “overfitting”, when strategies are engineered to look strong in backtests, but underperform once launched.

The causes given for unreliable quant research land broadly in four camps: there is way too much data; there is no human input; there is not nearly enough data; forget humans – machines are smarter.

**Monkey and machine**

Many criticisms of Wall Street’s unreliable data results parallel the infinite monkeys theorem – the idea that an infinite number of monkeys with infinite time could end up randomly typing a work by Shakespeare.

John Ioannidis, a professor of medicine at Stanford University and one of the leading whistleblowers on spurious research, asserts that as much as nine-tenths of medical research may be based on false information. He attributes that to data dredging, where scientists scour databases for patterns, with no hypothesis in mind.

Because there is no starting idea, “people can go wild about mining these datasets”, he says. “Nothing is shared. It’s just a scientist with his fellows, data dredging day and night, and producing unreproducible results.”

This is not unlike the attempt to glean patterns from large datasets in quantitative finance, which has likewise churned up false positives.

“If you compare enough datasets with other datasets, you’ll find one that appears to predict

another,” says Tom Howat, chief technology officer at GAM Systematic’s Cantab team. “But because you started with so many contenders, one was bound to appear to predict another, when in fact it has little or no predictive power.”

Anthony Morris, Nomura’s global head of quantitative strategies, says the use of artificial intelligence and machine learning to resolve non-linear relationships makes the problem “a hundred times worse because there are so many more degrees of freedom to play around with”.

Meanwhile, George Mussalli, chief investment officer at quant hedge fund PanAgora, believes the rise of alternative datasets has exacerbated the problem. Asset managers spent \$400 million on alternative data last year – an amount projected to exceed \$1 billion by 2019.

“It becomes a bigger danger when using machine learning techniques on bigger datasets. You can find more spurious patterns,” he says. The sheer volume of data – for example, credit card information on 10 million people can amount to terabytes of data – becomes its own trap, he adds.

Regardless, data today is a fact on the ground from which there is no going back. So, many quants are building methodologies to diminish the incidence of false positives.

**Safety first**

Canadian economist Campbell Harvey was one of the authors of the 2014 study that found of the 296 published papers to explain returns in equities, 158 were false positives. Harvey, a professor of finance at Duke’s Fuqua School of Business, has since been leading the call for



George Mussalli, PanAgora

financial researchers to raise the level of statistical significance of their findings.

Currently, quant researchers use a metric called the t-statistic, indicating a 95% level of confidence in their results. Harvey wants to raise it to over  $3\sigma$ , a 99% confidence level.

Amit Goyal is an early adopter of the higher t-stat. “Two has been the golden standard for a very long time,” says Goyal, a finance professor at the University of Lausanne. “Physicists use 5. In finance, we are advocating between 3 and 4.”

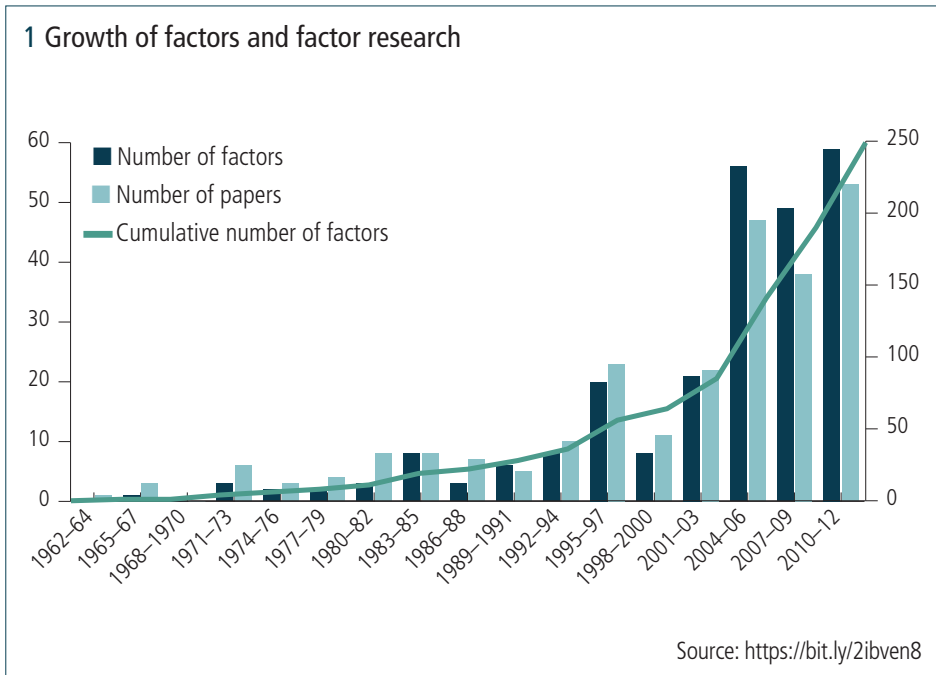
Another metric used to prove the robustness of findings is the p value, that is, the probability that results occur by pure chance. A p value of 0.05 represents a 5% probability of a false positive. Data mining is sometimes referred to as p-hacking, since researchers attempt to get as small a p value as possible.

But there is a problem, says Bryan Cross, head of quantitative evidence and data science at UBS Asset Management: there is debate on what p value actually means.

It is generally thought that the smaller the p value, the better the model. But there is disagreement as to whether p values are a good way to quantify uncertainty at all, since there is uncertainty in the calculation of the value itself.

Instead of using the “frequentist” approach of fixed confidence levels like t-stats and p values, UBS Asset Management has turned to a Bayesian approach, which Cross says is better understood by fundamental analysts.

A frequentist interprets probability as the frequency of an outcome recurring in repeated experiments. A Bayesian approach is more in line with human understanding of probability as the belief in the likelihood of an outcome, and allows for



the inclusion of prior knowledge in the calculation of a probability.

"Instead of saying, 'Sales are going to go up 10% this quarter with a t-statistic of 2', we can show the fundamental analyst a distribution of outcomes based on the data," Cross says. Instead he can say: "There's a 60% chance that sales will increase this quarter."

But not everyone thinks these precautions are necessary. Jeff Holman, chief investment officer of Sentient Investment Management, notes that unlike science, finance is a Darwinian arena, where natural selection will quickly annihilate those who invest on shaky data.

"Financial journals should have higher standards. That makes sense. But who cares?" Holman says. "I think ultimately it's self-policing in the real world: I'm going to lose money on my trade and go out of business."

### But shouldn't there be a human idea?

In traditional scientific methodology, a researcher puts forward a hypothesis before conducting any experiment. Jai Jacob, a managing director leading Lazard's multi-asset investment team, says the practice of mining datasets without an economic rationale leads to a proliferation of false positives. Lazard's fundamental analysts are now required to submit a formal hypothesis if they want the quant team's help.

"A lot of times we have a request that says, 'Let's get all the world's credit card information,' but I don't want people on my team to be just swimming through datasets," Jacob says. The analysts "have to be specific and they have to be comfortable with the null hypothesis", referring to an outcome of no statistical significance.

Besides an economic idea, quants could come up with measurable corollaries that should also be true if the hypothesis is true, suggests John Fawcett, co-founder of the crowdsourced hedge fund Quantopian.

"If you have an economic rationale that there should be a correlation with interest rates, you can then do experiments where you'll simulate what would happen if the rates spike or drop, and then your model should explain that behaviour," he says.

But others say the very point of machine learning is precisely that it goes beyond human cognition. Holman at Sentient Investment notes the role of emotion.

"Unfortunately, we can rationalise almost anything. It's motivated cognition," he says. "You spend all this time on finding this pattern, so of course, you can come up with a rationale that that makes sense."

Humans can be hindered by their own biases and the limits of their knowledge, Holman says. In addition, they might not pick up on highly complex, sometimes non-intuitive drivers of the markets.

"If you restrict yourself to only trading in cases where you have an intuition, I think you're leaving a lot of money on the table," he says.

### Testing the tests

One statistical technique that has emerged to combat overfitting is out-of-sample testing, that is, testing and training quantitative models on one set of data and then validating results on another. Depending on the model, the data can be split into time periods and run on various assets, as well as across different countries and markets.

But the results can be apples and oranges. For instance, many quant strategies are based on US economic or market data due to ease of access. "But try that investment strategy on Japanese data and it often fails," Nomura's Morris says. "The markets can be quite different."

The real problem is that even out-of-sample testing relies to some extent on events of the past. "I can come up with a strategy that happens to work on a testing period and an out-of-sample period," Morris says. "As long as they're both from the past, it doesn't really mean anything. For something to be truly out of sample, it needs to be a dataset you've never seen before."

Nonetheless, Quantopian's Fawcett believes out-of-sample testing can work in some instances. For example, a model based on high-frequency data over a several-month time period produces a strong statistical result on whether the strategy has predictive power, he says.

"It gets more difficult when you have less and less frequent data. So it is not a cure-all for all of this," he says. "I personally think the ultimate thing would be to publish both the data and the source code that codifies the theory, because then peers could evaluate whether you have enough data to either validate or invalidate that paper or that theory," he adds.

### More is more

Yet others think the problem is not curating the data sample or nailing down a hypothesis, but getting enough data points. The head of quantitative strategy at one systematic hedge fund says the trick is choosing the right statistical method for the question at hand, and that often depends on the size of the dataset.

"You don't always need a sound economic thesis, you just need to have enough data," he says. Sparse data may not provide "enough observations".



Bryan Cross, UBS Asset Management

Nonetheless, most quants have faith that more stringent statistical techniques will reduce false positives and uncover data patterns unlikely to be found by human intelligence.

John Alberg, a co-founder of the machine learning hedge fund Euclidean Technologies, says moving to a higher level of statistical significance "doesn't seem sustainable long term" as it will only serve to kick the can down the road as more factors are discovered.

"Instead of giving up on building better models from data," Alberg says, "quants should borrow statistical tools from the world of machine learning to validate their results."

For example, recently developed algorithms used in machine learning allow researchers to test the likelihood that their backtest is overfitted by repeatedly validating the model selection process on sub-samples of the data.

"In other fields like medicine, self-driving cars and language translation, researchers have been able to use machine learning to create complex models that are better than human performance. And we can do the same if we leverage tools that help us avoid overfitting."

In the meantime, the soul searching in financial research continues – as does Wall Street's romance with machines.

The granularity of data "has become finer", notes David of Mile 59, "and the ubiquity of machine learning software packages has placed predictive modelling in the hands of anyone with a pulse". ■

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# Stricter vendor regulation not ‘magic pill’, banks say

Third parties would still require oversight from banks, even if formally regulated, writes Dan DeFrancesco

**O**utsourcing experts at banks say implementation of stricter regulatory standards on vendors would not affect how they manage their third-party relationships.

As largely unregulated start-ups enter the financial industry in growing numbers – in response to increased demand from banks for their services – regulators have begun to question whether vendors should fall under standards similar to the institutional clients they serve.

But greater regulation of third-party providers won't reduce the burden of oversight for banks, experts say. Fiona O'Brien, head of group supplier assurance at Bank of Ireland, said more rigorous regulation of vendors wouldn't change how banks undertake due diligence.

"What is the driver for wanting [vendors] to be regulated? If it is because you are hoping that it's the magic pill and will reduce [banks'] monitoring, I don't think it would hugely," said O'Brien, who was speaking on a panel at OpRisk Europe in London on June 12. "I do agree that it means companies don't have the same standards. But you still have to get the assurances that the standards are as you expect them to be; that the environment is operating effectively."

Vendors have long benefited from having to deal with little to no regulation, which has allowed them to remain agile and innovate more easily. As banks have relied more heavily on outsourced solutions that play critical roles in their day-to-day operations, regulators have put the onus on them to ensure their third-party – and sometimes fourth-party – relationships are resilient and secure.

In the US, the Federal Reserve Board and Office of the Comptroller of the Currency (OCC) both issued guidance notes on third-party risks for banks in 2013. Some firms have complained of overregulation, with one bank saying the guidance from the OCC "has gone too far". Another bank told *Risk.net* it had scaled back its vendor roster by 25% since 2014 as part of its compliance with the OCC recommendations.

In Europe, authorities have issued guidance on the use of cloud computing providers, as banks look to these services to ramp up computational capacity and cut hardware costs.

Abhishek Khare, divisional director of outsourced services operational risk at Societe Generale, said banks would need to undertake the same level of due diligence, whether or not a vendor was subject to regulation.

"Having vendors regulated is a cherry on the cake," said Khare, who also sat on the panel. "The risk from all kinds of areas is something you can't get away from just because [vendors] are regulated. It is important to manage even those vendors who are regulated with an equal amount of due diligence."

That's not to say regulation of vendors can't be beneficial for the industry overall. O'Brien said effects of the European Union's General Data Protection Regulation (GDPR), introduced in May, could already be seen. GDPR lays out new rules for how all firms – not just financial institutions – manage personal data. The new regime is a particular concern for companies due to the size of penalties for non-compliance: up to €20 million (\$23.6 million) or 4% of global annual revenue, whichever is larger.



**"What is the driver for wanting [vendors] to be regulated? If it is because you are hoping that it's the magic pill and will reduce [banks'] monitoring, I don't think it would hugely"**

Fiona O'Brien, Bank of Ireland

"I can see a big difference in the last year, as [vendors] assessed their readiness for GDPR," O'Brien said. "They knew they had to because they are now liable for fines. I can see where there is a balance, but you still need to get your assurances."

Aegon UK subjects some of its larger third-party relationships to the same rules and standards that apply to Aegon itself, explained fellow panellist Kurt Neilson, head of third-party relationship management at the insurer. This means the vendors are, in effect, regulated.

In some previous instances, Aegon had outsourced contracts without that type of oversight, he said.

"What I have seen – certainly at the executive level at Aegon – is a greater understanding today and more accountability in outsourcing," Neilson said. "If we choose to go down that route, we are putting in place the structure, the processes and the risk mitigation to make sure it is a success."

Outsourcing has consistently featured in *Risk.net's* annual Top 10 Op Risks review, ranking in fifth place in the 2018 survey. ■

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