

THE OLIVER WYMAN

RISK JOURNAL

PERSPECTIVES ON THE RISKS THAT WILL
DETERMINE YOUR COMPANY'S FUTURE

INTRODUCTION

At Oliver Wyman, we take pride in advising our clients on how best to prepare for, and to navigate through, a rapidly growing range of interconnected risks. In this issue, our sixth edition of the *Oliver Wyman Risk Journal*, we present the latest thinking from across our firm on many of management's toughest strategic challenges: blistering technological change, cyberattacks, volatile energy prices, rising healthcare costs, and structural risks emerging from social trends.

I hope you find the *Oliver Wyman Risk Journal* informative and valuable.

Yours sincerely,

A handwritten signature in black ink that reads "Scott McDonald". The signature is written in a cursive, slightly slanted style.

Scott McDonald
President & CEO
Oliver Wyman Group

THE OLIVER WYMAN
RISK JOURNAL

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CONTENTS



EMERGING RISKS

- 6 THE BIGGER RISKS TO BUSINESS**
Inequality, generational conflict, and strains on retirement funding
Scott McDonald
- 10 MANAGING SOCIAL INSTABILITY**
How can businesses survive in a world of unrest?
John Drzik
- 14 BREXIT**
What's at stake for the UK's financial sector
Matt Austen, Lindsey Naylor
- 18 ASIA'S \$20 TRILLION ELDERLY MEDICAL BILL**
Will rising elderly healthcare costs slowly fuel a regional healthcare crisis?
Wolfram Hedrich, Jonathan Tan



RETHINKING TACTICS

- 24 **QUANTIFYING CYBER RISKS**
Can you put a dollar amount on your company's cyber risk?
Leslie Chacko, Claus Herbolzheimer, Evan Sekeris
- 28 **THE VIRTUES OF INCREMENTAL DIGITIZATION**
Why incumbent banks will ultimately be the banks of the future
Barrie Wilkinson
- 32 **ENERGY RECALIBRATED**
Three ways to thrive in the new normal
Alexander Franke, Mark Pellerin, Tim Thompson
- 34 **RETURN ON RISK MANAGEMENT**
The value of information spending rests on the insights it delivers
Douglas Elliott, Ugur Koyluoglu, Dominik Weh

REDEFINING BUSINESS MODELS

- 40 **COMPLIANCE SCIENCE**
Approaching compliance with a startup mentality
Barrie Wilkinson, Hanjo Seibert, Tristan Hands
- 44 **HEALTHCARE'S COMING ECONOMIC CRISIS**
Is healthcare too big to fail? Or is failure exactly what we need?
Sam Glick
- 50 **GOING FULL THROTTLE ON AUTONOMOUS TRUCKING**
Are toll lanes the answer?
Jason Kuehn, Bill Rennie
- 54 **MOBILITY 2040**
Incumbents and investments at risk
Joris D'Incà, Carolin Mentz
- 60 **REIMAGINING COMMODITY TRADING**
A new breed of commodity-trading titans and digital contenders are about to reorder the industry
Alexander Franke, Christian Lins, Roland Rechtsteiner, Graham Sharp

EMERGING RISKS

- The Bigger Risks to Business
- Managing Social Instability
- Brexit
- Asia's \$20 Trillion Elderly Medical Bill







THE BIGGER RISKS TO BUSINESS

INEQUALITY, GENERATIONAL CONFLICT,
AND STRAINS ON RETIREMENT FUNDING

Scott McDonald

Familiar risks top the agendas of most business leaders. Chief Executive Officers are preparing for slow economic growth caused by demographic trends, political instability, and the unwinding of unprecedented monetary stimulus. They must respond to the blistering pace of technological change in a way that makes them the disrupters, rather than the disrupted. Additionally, they face talent challenges as the millennial generation gravitates towards technology companies, startups, or non-profits.

These immediate risks demand attention. Yet important social trends are also creating structural risks that must be understood and considered in strategic planning: widening gaps in wealth, generational inequality, and shortfalls in retirement funding.

Media outlets warn of alienated populations and the potential consequences, but this has not been a focus for executive suites and boardrooms. That is a mistake. These trends may give rise to global crises that could present much graver threats to business returns than the familiar challenges that most companies grapple with every day.

REVOLUTION IN WORK

Recent soundings in the United States and United Kingdom show that about half of all voters are hostile to international trade and globalization. Many feel that foreigners are stealing their jobs, both as immigrants and by way of “offshoring.” Yet the frustrations attributed to globalization – for the most part erroneously, in my opinion – may turn out to be minor compared to those caused by the coming revolution in work.

Advances in artificial intelligence and robotics promise to shunt humans out of many of the jobs they now do, and to profoundly change the kinds of jobs that generate decent incomes. Nearly every company we work with

understands that technological advances will allow them to operate with fewer employees, of whom many will need new skills.

The transition to this new world of work will see enormous gains for those with the skills increasingly demanded. But for many, the transition will be painful. It will prematurely end the working lives of those too old to retrain and impose large adjustment costs on many younger workers. Unemployment is likely to be high until workers made redundant by technology can find new uses for their labor. This revolution in work may create problems of income inequality that dwarf the current challenges.

INTERGENERATIONAL INEQUALITIES

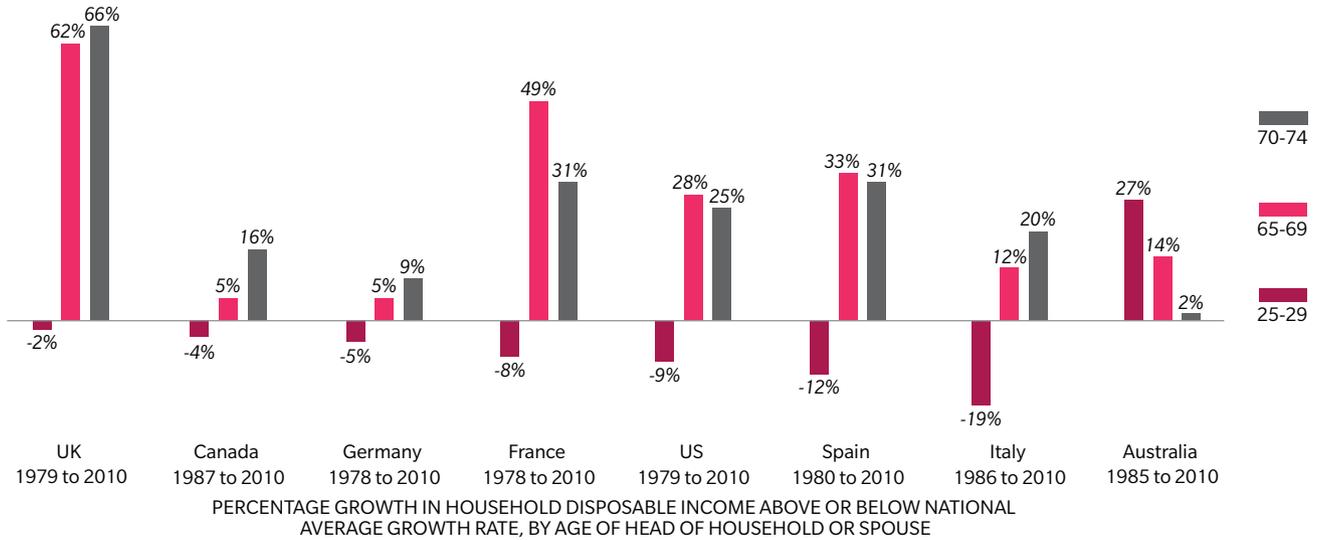
This will come on top of already emerging intergenerational inequalities in wealth. (See Exhibit 1.) Those entering the workforce today carry more student debt and, in most cities, face higher real housing costs than their parents did – which is why so many do not leave home until almost 30. Those with parents wealthy enough to pay their university fees and help them buy a home will prosper. Many of the rest will struggle to get ahead and improve on their parents’ standards of living.

RETIREMENT FUNDING SHORTFALL

Making matters worse, funds from corporations and governments for future retirements are likely to prove inadequate. With birth rates declining and longevity increasing, each retiree will need to be supported by a diminishing number of workers. According to a United Nations study, by 2035 the ratio of retirees (those 65-year-olds and older) to working-age people will have doubled since 1975.

EXHIBIT 1: GENERATIONAL WEALTH GAP

PENSIONERS HAVE SEEN SIGNIFICANTLY HIGHER DISPOSABLE INCOME GROWTH THAN YOUNG PEOPLE IN ALMOST EVERY WEALTHY COUNTRY



Source: Luxembourg Income Study database, *The Guardian*

Such dramatic shifts in the economic fortunes of various groups and the widespread disappointment of expectations are sure to have serious consequences for businesses, not only directly but through social and political action.

For example, the looming unemployment risk could encourage politicians and unions to compel firms to limit redundancies in industries being transformed by laborsaving technology. Since this would make production more expensive in countries with such limitations, it would also lead to calls for restrictions on imports from countries that did not impose such limitations on the use of laborsaving technology.

Historically, technological advances that destroy particular jobs, from the mechanical loom to the desktop computer, have not caused

long-term unemployment. Labor has quickly been redeployed elsewhere, often to produce what were considered luxuries before new technology increased aggregate output or to supply goods and services not previously imagined (consider the growing number of masseurs and yoga instructors).

WIDESPREAD UNEMPLOYMENT

Many commentators familiar with this history nevertheless claim “this time is different,” and that we run the risk of persistent widespread unemployment. These fears will only mount as new technology begins to eliminate jobs in sectors that now employ millions of people – as driverless cars may soon do in the case of taxi, bus, and truck driving.

We can already see glimpses of the way businesses will be affected by skepticism about the capacity of the economy to find new uses for labor. In September, General Motors had

to agree to rebuild an assembly line for cars and trucks at a plant in Ontario after Canadian workers threatened to strike. And as the “price” for closing one of two assembly lines at its largest plant in Canada, GM moved production of one engine to Ontario from Mexico.

RETRAINING

Business leaders need to honestly assess how many of their employees will not be gainfully employed in five to 10 years. If they cannot be laid off, they will need to be retrained to do something valuable – a contingency for which firms should have plans.

Governments must also plan for the coming changes, adapting education to the new demands of high-tech economies. But the more rapidly the changes occur, the greater the need for retraining of the adult workforce and the greater the role of businesses. Some countries and businesses are already responding. For example, both Singapore and JPMorgan Chase have considered and invested in a number of experimental programs to help people acquire the skills required for decent jobs in the future, preparing them to work in professions experiencing shortages and to obtain skills likely to be in high demand in a digital future.

New outlooks on life may be as important as new skills. Many people gauge progress by their children’s monetary incomes, expecting them to surpass their own. With many of the new “digital goods” becoming so cheap, such as access to almost all of human knowledge via the internet, monetary income is an increasingly poor way of measuring well-being. A more sustainable measure could include some combination of wealth, happiness, leisure, and the state of the environment, for example.

My prognosis may seem gloomy, but only because I have so far ignored the extraordinary growth in problem-solving innovation – itself aided by the technological trends at issue. Consider how well prepared companies and governments have become for complex risks that once seemed similarly insurmountable, such as terrorist attacks, viral outbreaks, and volatile energy prices. The Energy Information Administration forecasts that solar and wind power will overtake coal-fired generation in the United States by 2029. Bloomberg Energy estimates that by 2040 electric vehicles may account for one-third of all new vehicle sales globally, having become no more expensive than conventional cars. Only a few years ago, a scenario such as this would have been inconceivable.

What’s needed now is leadership and a sense of urgency about addressing inequality, generational conflict, and obvious retirement funding gaps. It is true the timing and magnitude of these strategic risks for corporations is uncertain. But unless company leaders plan now, rather than waiting for government fixes, they will not be among the winners in the future.

Important social trends are creating structural risks that must be understood and considered in strategic planning

Scott McDonald is the Chief Executive Officer of Oliver Wyman.



MANAGING SOCIAL INSTABILITY

HOW CAN BUSINESSES SURVIVE IN A WORLD OF UNREST?

John Drzik

Surging numbers of refugees fleeing to Europe. High levels of youth unemployment in many advanced countries. Populist movements pressing for regime change. Online activist campaigns endorsed by millions of supporters. Labor disputes, independence movements, backing for extremist political parties, terrorist strikes, cyberattacks. The list goes on. Social and political instability is arguably at its highest level since the end of the Cold War.

What we're seeing now may not be simply a passing phase of higher volatility. Structural issues are also at work. Resentment over deepening income inequality is on the rise in many countries. In the coming years, this may be exacerbated by a rise in the proportion of retirees with insufficient resources for their old age and an increasing loss of jobs to automation. Additionally, the failure to fully integrate refugees into host countries may lead to a time bomb someday.

GROWING UNREST

These issues present a challenging context for business. At a macro level, rising friction can act as a general drag on economic activity, at a time when positive impetus is sorely needed.

The threat of business disruption is also higher, undermining the ability of international businesses to operate in certain countries or substantially changing the terms of business. Activist-driven volatility can influence political decisions by fragile governments, provide a frame of reference for workforce disputes, and intensify disagreements between companies and local communities.

Popular frustration with leaders is widespread, and levels of trust uncomfortably low. In some countries, the prevailing view is that government is weak and too cozy with big business; elsewhere, trust has been eroded by the exposure of scandals and corruption.

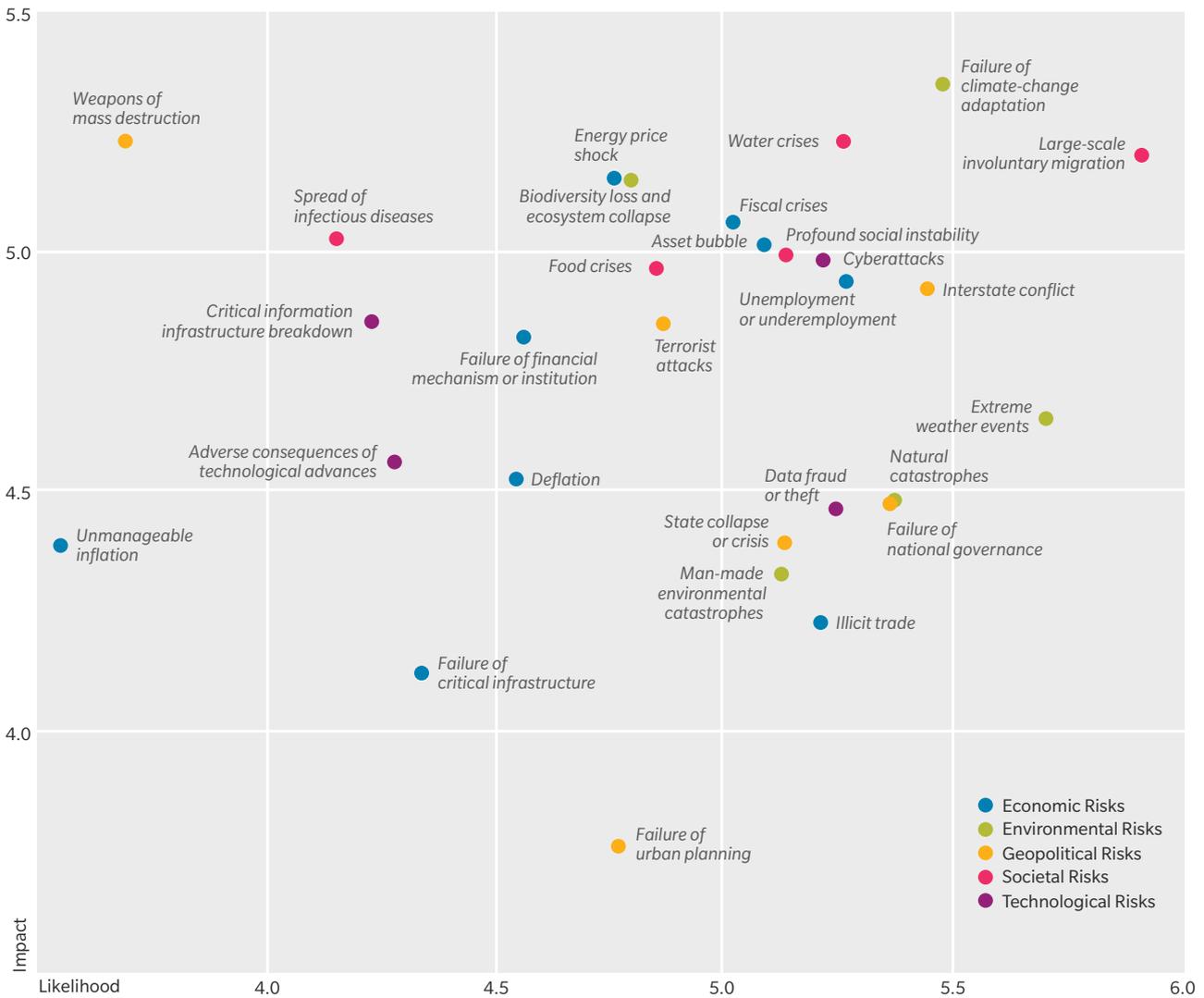
Social and political instability is arguably at its highest level since the Cold War

EXHIBIT 1: GLOBAL RISKS LANDSCAPE 2016

THE POTENTIAL IMPACT AND LIKELIHOOD OF GLOBAL RISKS OVER THE NEXT 10 YEARS

For the *Global Risks 2016* report (published by the World Economic Forum in collaboration with a group of partner organizations, including Marsh & McLennan Companies), 750 risk experts from all sectors and around the world shared their thoughts on the risks that will be of greatest concern over the next 10 years. This page summarizes the results.

Involuntary migration and failure to adapt to and mitigate climate change are two of the top global risks. Social instability and unemployment are also considered to be of great concern.



Source: *Global Risks 2016*: Tenth edition, World Economic Forum and partners, including Marsh & McLennan Companies. Oliver Wyman is a division of Marsh & McLennan Companies

People expect more from governments and businesses, and advances in information and communication technology are providing opportunities for them to express transnational “tribal” sympathies that can stimulate collective action – for better or worse.

In this climate of growing unrest and rapid communication, individual businesses can get caught on the wrong side of a volatile social, political, or environmental issue – and face the risk of product boycotts, cyberattacks, employee departures, and lasting brand damage. (See Exhibit 1.)

Customer expectations of the companies they interact with can quickly change. Similar shifts in sentiment can take place with employees, shareholders, and other stakeholders.

MAINTAINING RESILIENCE

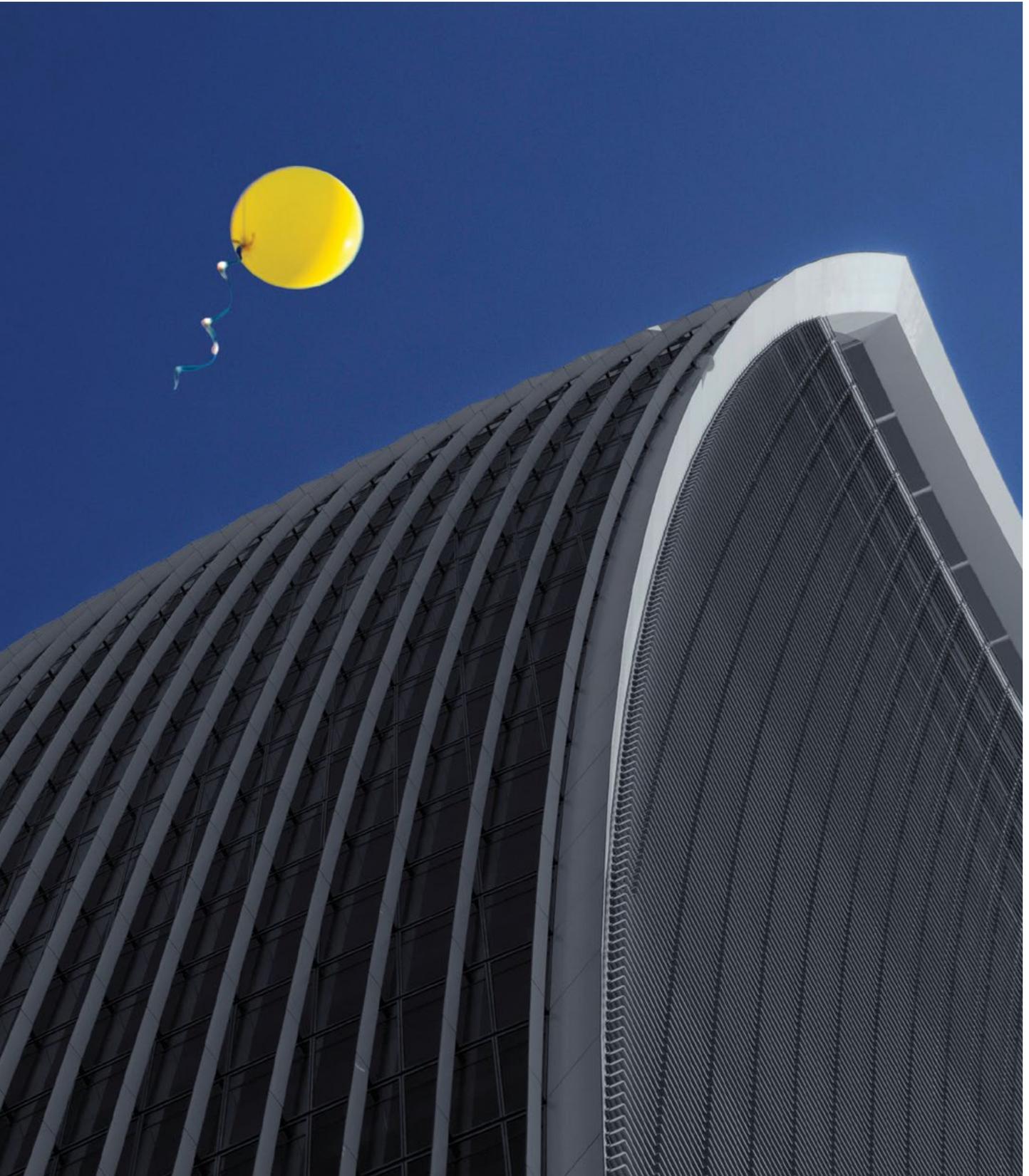
What can businesses do to remain resilient in this challenging environment? The construction of plausible developments and worst-case scenarios, in which various types of unrest are either the source of a crisis or an amplifier, provides a platform for gauging which assets are at risk and the scale of the potential damage. The best scenario planning involves thinking creatively about second- and third-order consequences – likely government responses and cross-border impacts, for example. Companies can then stress-test their supply chains and investment decisions, and evaluate changes to their strategy that would help diversify their exposure to disruptive events within and across countries.

Firms should also ask themselves whether they are doing enough to protect and manage their reputation, which is even more vital in this type of environment. Leaders need to keep their finger on the pulse of both internal and external sources of instability so that emerging issues can be addressed rapidly and constructively before they cause lasting damage. Becoming more attuned to social and political conversations will also help firms assess where they might deepen engagement – with customers, employees, and policymakers – to help mitigate potential threats in advance.

Of course, a more volatile environment will also create opportunities in the form of new patterns of demand and new customer allegiances. Staying power is critical, and companies that are adept at building the skills to manage through a global context of continuous stress and unrest will be better placed to grab market share from competitors that address the same challenges less successfully.

John Drzik is president of Global Risks and Specialties at Marsh. Marsh, like Oliver Wyman, is a division of Marsh & McLennan Companies.

This article first appeared as part of a World Economic Forum Agenda series.



BREXIT

WHAT'S AT STAKE FOR THE UK'S FINANCIAL SECTOR

Matt Austen • Lindsey Naylor

London is the world's leading international financial center, rivaled only by New York. This explains the large contribution that financial services make to the United Kingdom's economy. Banks, insurers, asset managers, and associated firms collectively contribute about \$147 billion in gross value added (GVA) to the economy, employ over a million people, pay about \$80 billion in corporate and income taxes, and contribute a \$98 billion surplus to the nation's balance of payments. (Our estimates are based on an exchange rate of 1 British pound for every 1.2 United States dollars.)

Brexit raises concerns about the future of the UK's financial sector.

The impact on the sector will depend on the details of the Brexit deal that is ultimately struck with the European Union (EU). If "passporting" is preserved, so that UK financial firms are entitled to serve customers anywhere in the EU and UK and EU regulation are deemed "equivalent" across a broad spectrum of EU directives, then Brexit will have a limited impact on the access of UK-based financial firms to the EU.

In this "high access" scenario, Oliver Wyman estimates only modest downside from Brexit: the loss of about \$2.4 billion in revenue from EU business, 3,000 to 4,000 jobs at risk, and tax revenues reduced by less than \$600 million. London will likely remain the financial hub of Europe, with the concentration of skilled workers, interconnected firms, and supporting infrastructure that explain its current preeminence.

But significant uncertainty remains. At the other end of the spectrum, Brexit negotiations may not preserve passporting and equivalence. A "low access" scenario, in which access to the single European market is far more restrictive than it is today, would result in a much greater impact on the UK's financial services industry.

Limited access to the single European market would put 75,000 jobs and \$12 billion in tax revenues at stake

We assessed the likely effects of Brexit across the financial sector if firms are only entitled to limited access to European Union customers. The effects will be greatest in international and wholesale banking, which account for just under half of total financial services revenue in the UK. By our estimates, the first-order effects – those arising directly from lost EU-related business – would include a \$11 billion to \$15 billion reduction in GVA, about 30,000 lost jobs, and a \$4 billion to \$6 billion reduction in tax receipts. (See Exhibit 1.)

These losses would be compounded by knock-on effects throughout the wider financial services ecosystem. For example, an operational function may need to be located in the same place as the business it supports. When a global bank shifts its EU-customer-facing activities from London to Frankfurt or Paris, some of the support functions will go with them. By diminishing London's leading position in European financial services, a hard Brexit will lessen London's role overall.

We expect the losses from such second-order effects to be as large as first-order losses: roughly doubling the loss in GVA, to \$22 billion-\$27 billion; job losses in the range of 65,000 to 75,000; and a reduction of between \$10 billion to \$12 billion in tax receipts.

Of course, some compensating gains may result from new arrangements outside the EU. The UK is best placed to make the most of these opportunities, however, if it remains a leading financial center in Europe.

Our analysis suggests that a high access scenario, with a clear and sensible transition period, would minimize disruption to the industry, benefiting customers who have come to rely on London as a uniquely skilled and connected center for financial services. These customers come not just from the UK, but also from the EU and around the world. A high access scenario would also enable the UK to maximize the potential growth opportunities that could arise from the UK's exit from the EU.

THE BEST OUTCOME

As such, the best outcome for the consumers of UK-based financial services, be they from the UK or the EU, would include a number of key features: Continued adherence to global norms concerning matters such as the delegation of portfolio management, clearing of reserve currencies, and exemptions on margins for intragroup exposures will be important. Current levels of access to international markets (which the UK currently enjoys due to its EU membership) should be retained through equivalence agreements with non-EU countries.

Equally critical will be the grandfathering of mutual rights of access and equivalence that are already recognized by the EU today, for example, in capital and payments regulation. (Indeed, the UK should consider seeking inclusion in ongoing regulatory projects to improve European financial services, such as the Capital Markets Union and the Single Euro Payments Area.) In addition, the UK should continue its engagement with the formulation of global financial regulations, through international forums such as the Basel Committee. And finally, issues such as data sharing, tax, judicial/insolvency processes, and access to talent will need consideration. Securing sensible agreements in these areas will be important for all industries, not just financial services.



ASIA'S \$20 TRILLION ELDERLY MEDICAL BILL

WILL RISING ELDERLY HEALTHCARE COSTS SLOWLY FUEL A REGIONAL HEALTHCARE CRISIS?

Wolfram Hedrich • Jonathan Tan

Filial responsibility has always been an honored tradition in Asia, where children take pride in caring for their aging parents, sharing the financial burden between siblings. However, the region's rapidly aging population and declining birth rates mean that the financial cost of this tradition will soon be too much to bear as a result of rising elderly healthcare costs. (See Exhibit 1.)

While many developed countries in Europe have experienced a rise in the proportion of elderly people in their populations, what stands out in Asia-Pacific is the speed of aging. This compromises the ability of countries to prepare for the increased healthcare demands of an aging population. For example, in the 15 years from today to 2030, China's elderly population is expected to rise to 18 percent, from 11 percent; a similar increase in the aged population in Germany took 25 years, according to World Bank data. In Singapore, the elderly population will rise to 20 percent of the total population, from 11 percent over this period; it took France 49 years to do the same.

Based on demographic changes and medical cost trends, we estimate that \$20 trillion will be required to fund elderly healthcare in Asia-Pacific between 2015 and 2030. In Singapore, annual public and private expenditure for

elderly healthcare is estimated to rise tenfold, to \$49 billion by 2030, straining government budgets, infrastructure capacity, and personal savings of the elderly and their families. Across the wider Asia-Pacific, annual elderly healthcare expenditure in 2030 will be five times the 2015 total. (See Exhibit 2.)

THE MATH BEHIND THE MEDICAL CRISIS

This rise can be explained by two factors. First, the number of elderly individuals in this region will increase by 70 percent by the end of the next decade, with an additional 200 million people aged 65 and older. Worryingly, elderly healthcare infrastructure in the region, both in terms of facilities and workforce, is lacking. Our projections conservatively show that based on

By 2030, Asia-Pacific annual elderly healthcare expenditures will be five times the cost in 2015

current capacity, Asia-Pacific faces a deficit of 18 million long-term care workers by 2030.

Second, medical cost inflation annually across the region stands at about 10 percent, according to Marsh Mercer Benefits' Medical Trend report. Inefficiency in healthcare models has contributed to healthcare cost inflation, with practices such as fee-for-service care (where payment depends on volume of care instead of patient outcomes) requiring immediate review and reform. In addition, inadequacy in elderly healthcare infrastructure pushes demand beyond supply – and prices rise accordingly.

Countries in Asia-Pacific face a variety of challenges associated with a greying society, depending on their economic development and the extent of aging. The common theme for everyone is the urgency to address the steep increases of the elderly population, which will place greater social and political pressure on governments to increase public expenditure on healthcare. Therefore, governments need to intervene now to ensure the healthcare system, from funding to delivery of services, is on a sustainable course amidst continuously tightening budgets.

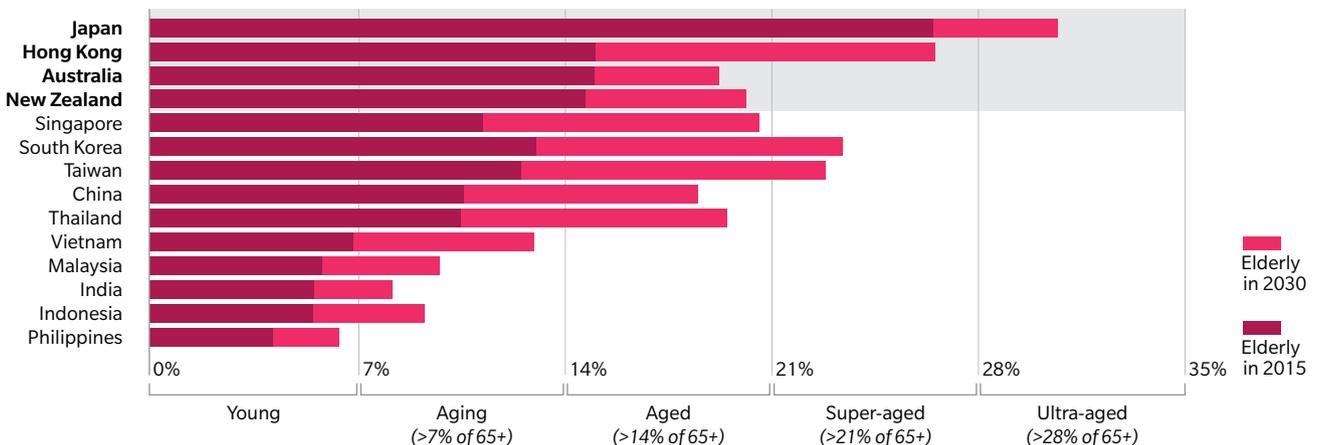
EMBRACING DISRUPTION

Due to the complex nature of the healthcare ecosystem, there is no silver bullet to ensuring the inevitable cost rises will be sustainable. Despite the many challenges, however, there is still much room for optimism and innovation to create fundamentally sound, new business models. The market needs to embrace disrupters while simultaneously removing structural barriers, such as the launch of the ASEAN Economic Community (AEC) with various implemented and proposed arrangements to facilitate the freer movement of skilled labor and foreign investment among Southeast Asian countries. Asia-Pacific's healthcare models today are typically fragmented, with poor coordination between different medical specialists and healthcare facilities. This is especially relevant to elderly patients, who often have several disorders that are managed by multiple, independently operated care providers. For example, by focusing on prevention and treating elderly patients in a coordinated manner, CareMore, an integrated multi-specialty physician association in the United States, has generated better patient outcomes and financial savings.

EXHIBIT 1: ASIA'S RAPIDLY AGING PROFILE

FOUR ASIAN COUNTRIES HAVE "AGED" AND "SUPER-AGED" POPULATIONS. BY 2030, JAPAN IS PROJECTED TO BE THE WORLD'S FIRST "ULTRA-AGED" POPULATION

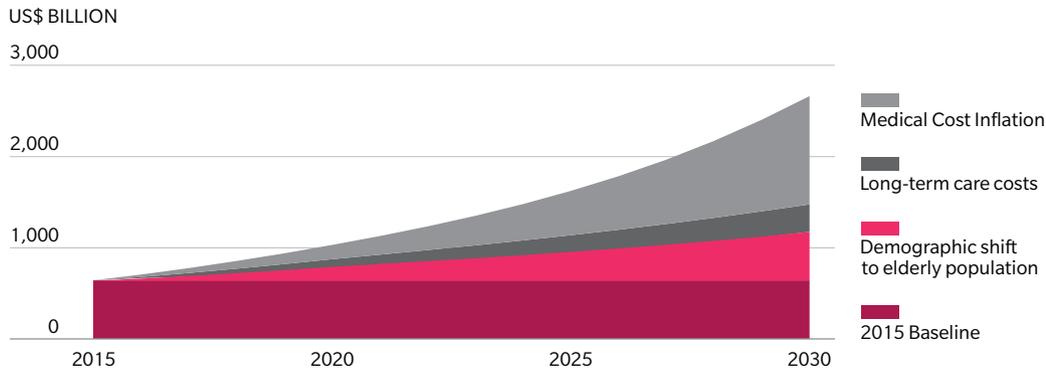
PERCENT OF ELDERLY (≥65 YEARS) IN THE TOTAL POPULATION



Source: Marsh & McLennan Companies Asia Pacific Risk Center analysis of data from Oxford Economics, World Bank, United Nations Population Division

EXHIBIT 2: RISING ELDERLY HEALTHCARE EXPENDITURES

ASIAN ELDERLY HEALTHCARE EXPENDITURES ARE RISING AS A RESULT OF MEDICAL INFLATION, INCREASED LONG-TERM CARE COSTS, AND EXPANDING ELDERLY POPULATIONS



Advances in technology are contributing to an explosion in healthcare data, which is predicted to double every two months until 2020. Wearable health trackers and smart contact lenses could easily redefine mobile, personalized diagnostics. For example, Peek Vision is developing technology to enable mobile phones to obtain high-quality retina images that would allow comprehensive eye examinations.

In Singapore, online platforms such as Jaga-Me.com offer patients and their families access to on-demand professional home nursing and caregiving services. Such services have the potential to cut costs through avoiding nursing homes and hospitalization and reducing family caregivers' opportunity costs. An innovative alternative to current nursing-home care is the use of nursing-care robots. In Japan, robotic technology that improves the mobility of the elderly and monitors elderly patients is fast becoming a viable solution to fill gaps in elderly healthcare. For example, the Robear robot

reduces the burden on caregivers by lifting patients onto their beds.

A NEW HEALTHCARE ECOSYSTEM

Speeding up innovations in public policies, healthcare practices, and health-related technologies to meet the accelerating pace of societal aging can head off the coming regional elderly healthcare crisis. If current trends continue without intervention, traditional Asian values will be challenged and lead to an untenable situation where elderly individuals are unable to afford healthcare and governments are forced to increase healthcare spend at the expense of other areas that fuel economic growth, such as infrastructure and education. Unless all stakeholders in Asia's elderly healthcare ecosystem – governments, insurers, healthcare providers, and individuals – take immediate and coordinated action, there will be a real risk that elderly healthcare costs could develop into a full-blown regional healthcare crisis.

Wolfram Hedrich is the Singapore-based executive director and **Jonathan Tan** is the Singapore-based director of Marsh & McLennan Companies' Asia Pacific Risk Center. Oliver Wyman is a division of Marsh & McLennan Companies.

This article is adapted from one that first appeared in Singapore's Business Times.



RETHINKING TACTICS

- Quantifying Cyber Risks
- The Virtues of Incremental Digitization
- Energy Recalibrated
- Return on Risk Management





QUANTIFYING CYBER RISKS

CAN YOU PUT A DOLLAR AMOUNT ON YOUR COMPANY'S CYBER RISK?

Leslie Chacko • Claus Herbolzheimer • Evan Sekeris

Cyber breaches are one of the most likely and most expensive threats to corporations. Yet few companies can quantify just how great their cyber risk exposure truly is, preventing them from effectively protecting themselves.

Most managers rely on qualitative guidance from “heat maps” that describe their vulnerability as “low” or “high” based on vague estimates that lump together frequent small losses and rare large losses. But this approach doesn't help managers understand if they have a \$10 million problem or a \$100 million one, let alone whether they should invest in malware defenses or email protection. As a result, companies continue to misjudge which cybersecurity capabilities they should prioritize and often obtain insufficient cybersecurity insurance protection.

No institution has the resources to completely eliminate cyber risks. That means helping businesses make the right strategic choices regarding which threats to mitigate is all the more important. But right now, these decisions are made based on an incomplete understanding of the cost of the various vulnerabilities. Organizations often fail to take into account all of the possible repercussions, and have a weak grasp of how the investments in controls will decrease the probability of

a threat. It's often unclear whether they are stopping a threat or just decreasing its probability – and if so, by how much?

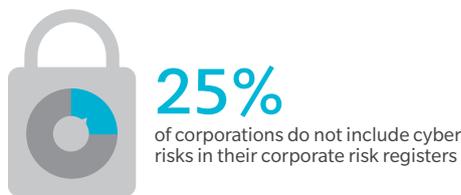
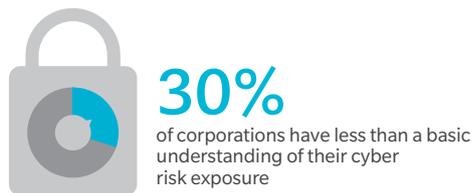
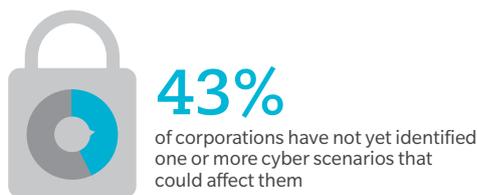
It's essential that companies develop the capability to quantify their cyber risk exposure in order to form strategies to mitigate that risk. The question is, is it really possible to put a dollar sign on fast-changing cyber risks with data that is difficult to find and often even harder to interpret?

CONSIDER A BROADER SET OF LOSSES

Estimating the true cost of a potential cyber breach may never become an exact science. The good news is that our understanding of why cyber risk forecasts keep falling short is improving. The main culprit is that companies quantify cyber risks the same way they do other operational risks – focusing narrowly on potential direct revenue losses. But companies can make much more accurate forecasts if they evaluate cyber risks on a broader set of losses associated with cyberattacks.

EXHIBIT 1: THE STATE OF CYBER RISK MANAGEMENT AT A GLANCE

COMPANIES STILL DO NOT DEVOTE SUFFICIENT RESOURCES TO CYBER RISK MANAGEMENT



Source: European 2015 Cyber Risk Survey Report, Marsh, Global Risks 2015, medium and large-size corporations

Companies come much closer to properly weighing how much they should spend to reduce their cyber risk and curb cybercrime when they consider these risks from three perspectives – foregone revenue and ancillary payments, liability losses, and reputational damage. One reason for this is that they are able to capture one of the biggest differences between cyber threats and other risks to their business: Cyberattacks can hurt a company even if there is no gain for the perpetrator other than accessing sensitive information.

The direct revenue losses for the companies involved in a cyberattack can be nearly negligible compared to the reputational damage incurred, which in turn can lead to future revenue losses. That is why it is essential for managers to quantify cyber risks more broadly. It can be done, and can potentially save companies hundreds of billions of dollars every year.

IDENTIFY THE GREATEST VULNERABILITIES

The first step in putting a dollar figure on cyber risks is to identify your company's most important assets and its greatest vulnerabilities. Cyber risks generally fall into two categories: 1) those involving services shutting down, and 2) those that compromise information, ranging from sensitive data, to corporate secrets, to bank accounts.

But assumptions differ greatly, depending on a business and its customers. For example, a utility company's greatest cyber risk could be a nuclear plant outage, while a health insurer's top cyber risk may be losing medical data or having a hacker unexpectedly cripple critical surgical equipment. For another business, the greatest cyber risk could be the abrupt inability to bill customers, or perhaps, in the case of a bank, a shutdown that prevents customers from getting paid.

The challenge then is to build a smart, well-designed, cyber risk model that's able to analyze potential direct revenue, liability, and brand loss scenarios. For when a cyberattack happens, companies are hit not just with losses resulting from customers who stop buying products and services; they also face ancillary costs related to fixing their problem, such as regulatory fines, forensics, and consulting costs.

Liability losses, too, come into play in cases where critical data is accessed. A company may need to provide customers years of remediation, such as offering credit monitoring services, along with legal fees and penalties to settle multiple class-action lawsuits. Finally, companies must quantify how much their future revenues will fall if a cyberattack has damaged their brand.

DEFINE THE UPPER AND LOWER RISK BOUNDARIES

To understand the upper and lower boundaries of their risk, companies must gather general business, operational, and technical data that can be modeled against expected and worst case scenarios. Using both internal and external data related to the health of their business and operations, managers should be able to predict their expected and maximum cyber losses over a one- to three-year period, just as they can forecast their future revenues. They can also estimate what percentage of their future customers will leave if an outage results from a cyber breach – or how much their stock valuation and margins could suffer if a cyberattack taints their reputation. Companies should also judge, in part from past incidents, which applications are at the highest risk.

Quantifying cyber risks is challenging – but feasible

Armed with this information, it's much easier for managers to judge if their companies have the right level of cyber risk protection and to budget for potential additional spending. Answers to questions like how much the company should invest in evaluating the state of their vendors' cybersecurity become much clearer. Or at what cost more authentication software is appropriate, given the likelihood that critical data will be accessed.

Managers can also weigh if they should invest in more training of employees and vendors or in more technical controls to monitor potential cyber breaches. In some cases, managers may even discover that investing in a new product line may, or may not, be worthwhile given the cyber risks involved.

Quantifying cyber risks is challenging, but feasible – and you can't afford not to do it. Most firms have the technical knowhow and a strong enough grasp of the risks involved to help managers evaluate the trade-offs involved in mitigating cyber risks with a much smaller margin for error than in the past. What's needed now is leadership from managers to prioritize the need to gain a better understanding of how much to spend to curb cyber risks and put a halt to cybercrime.

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This article first appeared in Harvard Business Review.



THE VIRTUES OF INCREMENTAL DIGITIZATION

WHY INCUMBENT BANKS WILL ULTIMATELY BE
THE BANKS OF THE FUTURE

Barrie Wilkinson

Banks have a cost problem. The costs of a typical bank represent anywhere from between 60 percent and 80 percent of its income. Add credit losses and fines to the mix, and little remains from income to return to shareholders.

That's one reason why the conventional wisdom among digital gurus is that it is only a matter of time before technology players with low-cost models disrupt the banking industry. Cursed by their incrementalist approach to innovation and cost cutting, incumbent banks are bound to fall behind.

We are skeptical of this pessimistic viewpoint. Incrementalism, we believe, can be a virtue, provided it is relentless. This is the lesson from many enterprises, including tech businesses. And incumbent banks enjoy important advantages over tech challengers. The bank of the future is likely to evolve from the bank of today.

THE LOW-COST BANK OF THE FUTURE

Banks already provide a good digital experience. Most people in developed economies have access to online and mobile banking. And, once you are set up, it's easy to transfer money, make payments, and gain access to new banking products.

The problem is not banks' digital offerings. It's that their operations continue to be labor-intensive. More than half the cost-base of a typical European bank is employee compensation.

Suspend reality for a moment and imagine that a new "Tech Bank" came onto the scene with technology that allowed it to operate with no employees. If all other costs and revenues were unchanged, the economics of banking would be transformed. The cost-to-income ratio would fall to about 30 percent, and return on equity would climb from the 3 percent to 5 percent range, to between 15 and 25 percent. The golden years

Relentless incrementalism is the right strategy for incumbent banks

of high banking returns would be back. But this time, the returns would be driven by efficiency rather than leverage. (See Exhibit 1.)

INCREMENTAL AUTOMATION

Further automation is unavoidable. If a process can be automated without a loss of performance, it is only a matter of time before a competitor or third party will make it happen. Cost pressures will force banks to follow suit or outsource the processes concerned.

But two misconceptions must be avoided. The first is that the end point will be full automation. Recent case studies suggest that the optimal approach to most processes brings humans and machines together to maximize performance and efficiency. Trying to automate beyond the current capabilities of "machine intelligence" can increase the need for human corrections and overrides to the point where costs actually rise.

Nevertheless, the optimal division of labor between humans and machines will keep shifting in the direction of machines, and bankers need to be on the lookout for new opportunities. Indeed, one is in the area of detecting and correcting errors in automated processes. This is now done

by humans, accounting for considerable employee time and cost. But it is amenable to a high degree of automation. Systems will always generate problems and, hence, extra work. But this extra work need not be done entirely by humans.

The second misconception is that extending automation requires a major project to overhaul the bank’s systems. Ambitious technology efforts at banks have a track record of failure. But the problem lies not so much with banks as with the revolutionary ambition. Incrementalism is a better strategy.

Dr. Dave Brailsford, the sports scientist who revolutionized British cycling, applied the concept of accumulating marginal gains.

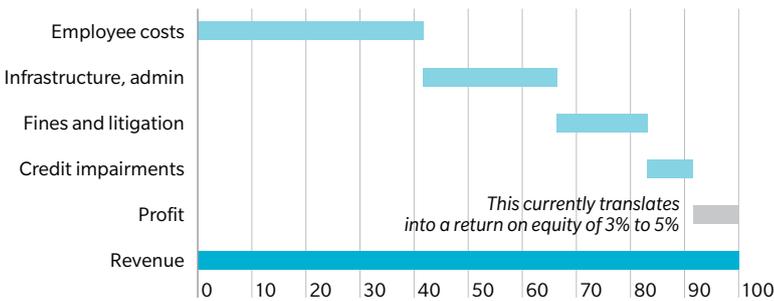
According to Dr. Brailsford, every mundane detail of a system needs to be analyzed for potential improvement. Each improvement might lead to only a tiny improvement in performance but, if there are enough of them, they add up to a substantial gain. And there are thousands of processes involved in banking, all of them improvable.

Even the best technology players, such as Uber and Amazon, have suffered from major systems and data problems on their path to greatness. They have succeeded by relentlessly optimizing every component of their workflow to the point where the whole platform delivers superior efficiency. From day one, these firms have displayed a commitment to the process of cumulative marginal gains.

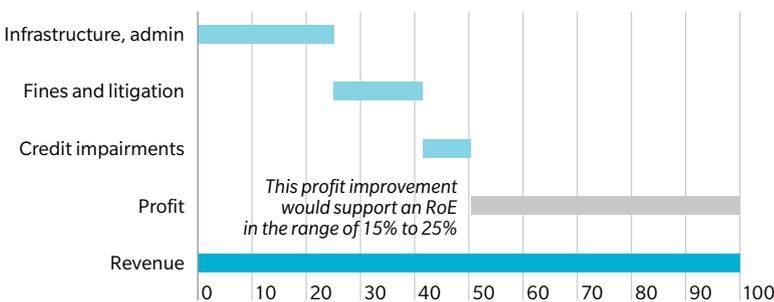
CHALLENGER VERSUS INCUMBENT

EXHIBIT 1: THE ANATOMY OF A BANK BEFORE AND AFTER DIGITIZATION

REVENUES, COSTS, AND PROFITS OF A TYPICAL EUROPEAN BANK



REVENUES, COSTS, AND PROFITS OF “TECH BANK” WITHOUT EMPLOYEES



Source: Oliver Wyman Analysis

Some providers will eventually find a way of delivering a level of performance and efficiency that meets the needs of both customers and shareholders. The question is whether they will be mainly the familiar banking names or technology-driven challengers.

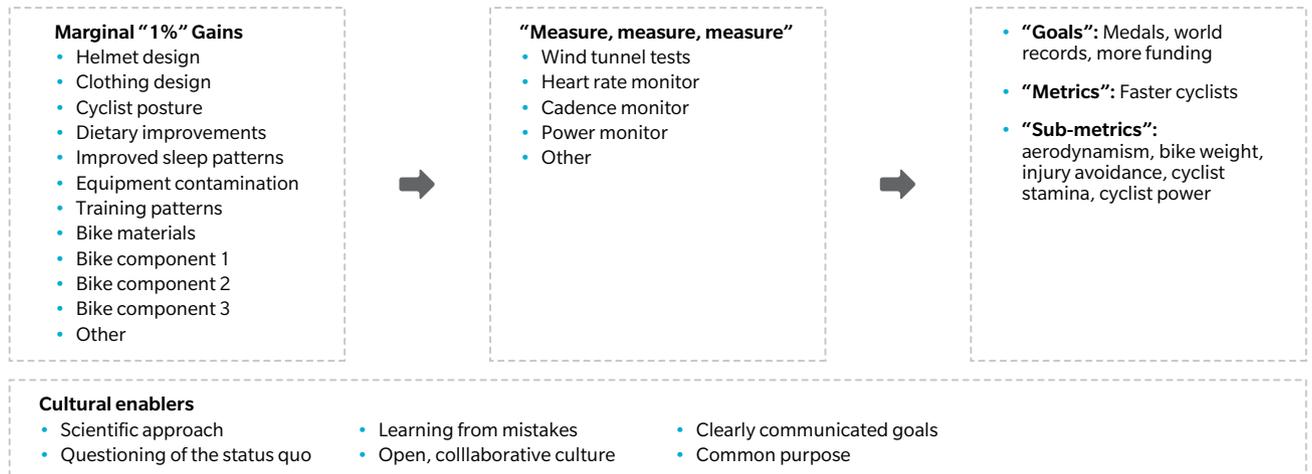
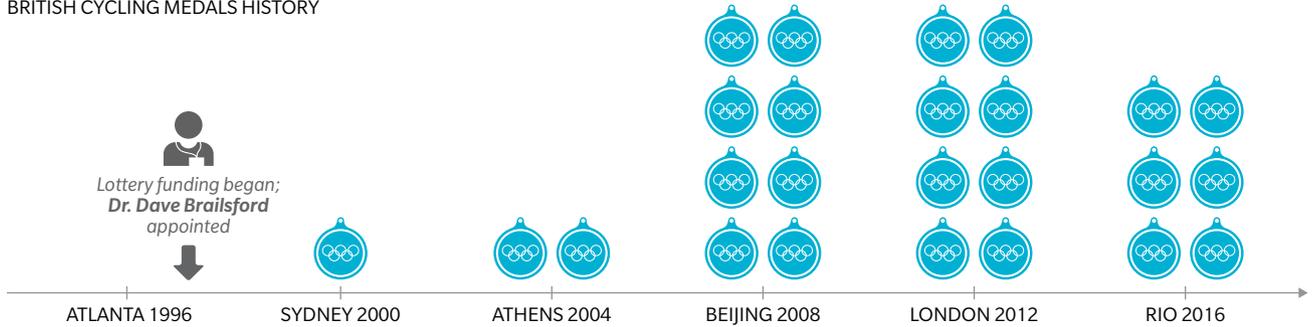
Technology players have some advantages. They lack the cumbersome legacy systems that cost incumbent banks so much to maintain and modify. They have a culture more conducive to technological innovation. And they lack the swathes of non-tech staff who, at banks, have a strong incentive to resist changes aimed at reducing headcount.

But these challenger advantages should not be overestimated. A few fintech players have succeeded in parts of the value chain, such as payments and currency transfers. But it is becoming clear that the core activities of deposit gathering and lending will continue to be dominated by licensed banks with access to central banking facilities and deposit insurance.

EXHIBIT 2: LESSONS FROM BRITISH CYCLING

TRANSFORMATION IS BEST ACHIEVED BY AN ACCUMULATION OF MARGINAL GAINS

BRITISH CYCLING MEDALS HISTORY



Newly licensed “challenger” banks are also struggling to achieve scale, partly because they lack brand recognition but also because they are discovering that banking is a difficult business. Challengers will find that regulations and customer demands pull them toward the cost structure of incumbent banks.

Technology will cut the cost of banking operations. But the transformation won’t come all at once and won’t cause a mass extinction of the incumbent banks. On the contrary, a relentless drive towards automation provides banks with their best prospect of achieving healthy and sustainable returns.

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This article first appeared in Financial News.

ENERGY RECALIBRATED

THREE WAYS TO THRIVE IN THE NEW NORMAL

Alexander Franke • Mark Pellerin • Tim Thompson

Energy company economics are under attack. Companies are spending beyond their means, piling up excessive debt, and destroying shareholder value. Many have swung from operating with surplus cash, to making due with shortfalls. Balance sheets that once served as shock absorbers have been wiped out, risking the ability of many companies to perform for years to come.

Energy companies have emerged on top of volatile boom and bust commodity cycles before by raising new capital, tearing up and renegotiating supplier contracts, reducing permanent headcounts, and temporarily cutting capital budgets and dividend programs. But this rout is different. It's been more than 24 months since West Texas Intermediate oil prices tumbled from a high of \$106 to a low of \$27 in the first quarter of 2016. And it's unlikely that prices will bounce back any time soon, even if OPEC pulls back on production.

So energy company executives need to go beyond their comfort zones to build up resilience in the extraordinary times they now operate in. The industry has been recalibrated. Now companies need to revamp in order to continue to thrive in it. Here are three ideas for steps to start with:

Stop throwing good money after bad projects. Find creative ways to free up capital. Reexamine strategic and financial plans. Tighten working capital and shed non-core assets that can be operated without needing to be owned.

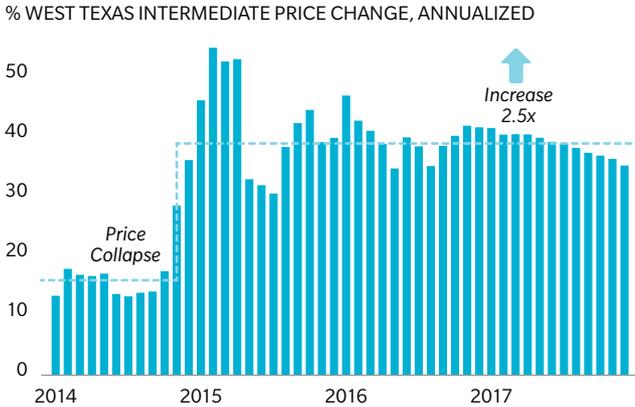
Swap financial for operational risks. Focus on becoming efficient, reliable, and profitable operations. Don't grow your oil reserves to provide shareholders exposure to their underlying commodity when it is no longer valued by banks and rating agencies. Explore physical and financial ways to optimize your supply chain, and take advantage of the fact that the forward price of oil is now higher than the spot price to boost returns.

Reconsider hedging. Stable performance is especially valuable now that most energy companies are operating with razor-thin margins for error. When capital buffers are depleted, use hedges to survive, recover, sustain, and grow long term. Use proprietary information to both dampen the downside (similar to buying insurance) and tap into the asymmetric upside that could result with an unexpected oil price rally.

Volatility doesn't always need to imply vulnerability. But it will for those companies that remain high-cost producers stuck in the past. Instead, energy companies owe it to themselves to manage risk more proactively, take action, and embrace tough decisions – as well as to the industries and consumers that count on them.

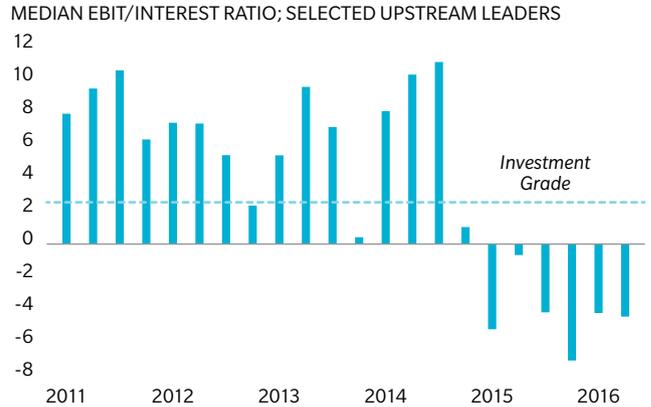
ENERGY'S NEW NORMAL

Volatility is here to stay...

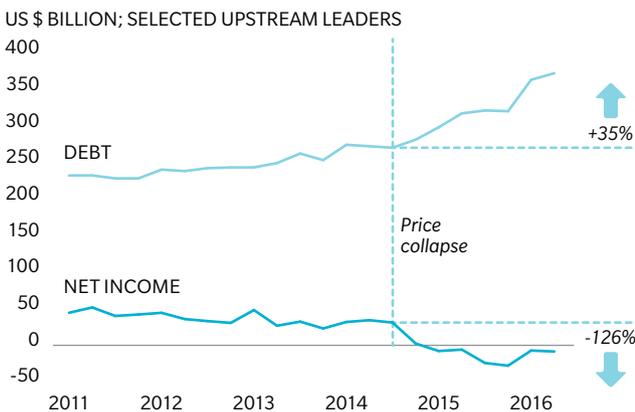


Source: Top 20 upstream operators' quarterly reports, Chicago Mercantile Exchange, Oliver Wyman analysis

...but even the energy industry's leaders can't afford it.

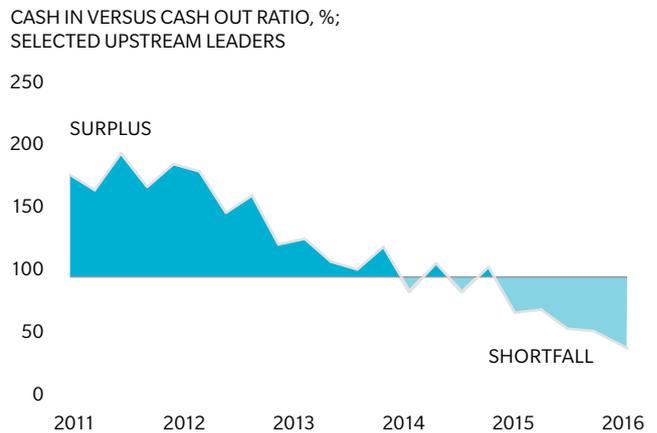


Companies are piling up debt even as their earnings decline...



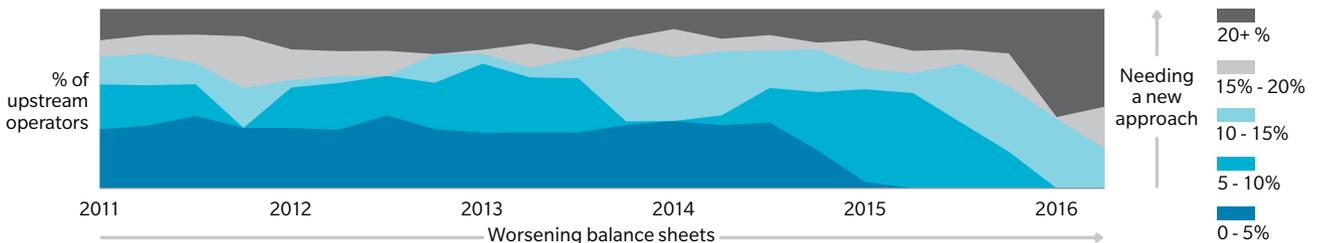
Source: Top 20 upstream operators' quarterly reports, Oliver Wyman analysis

...and they continue to spend beyond their means...



...harming the balance sheets of every energy industry player.

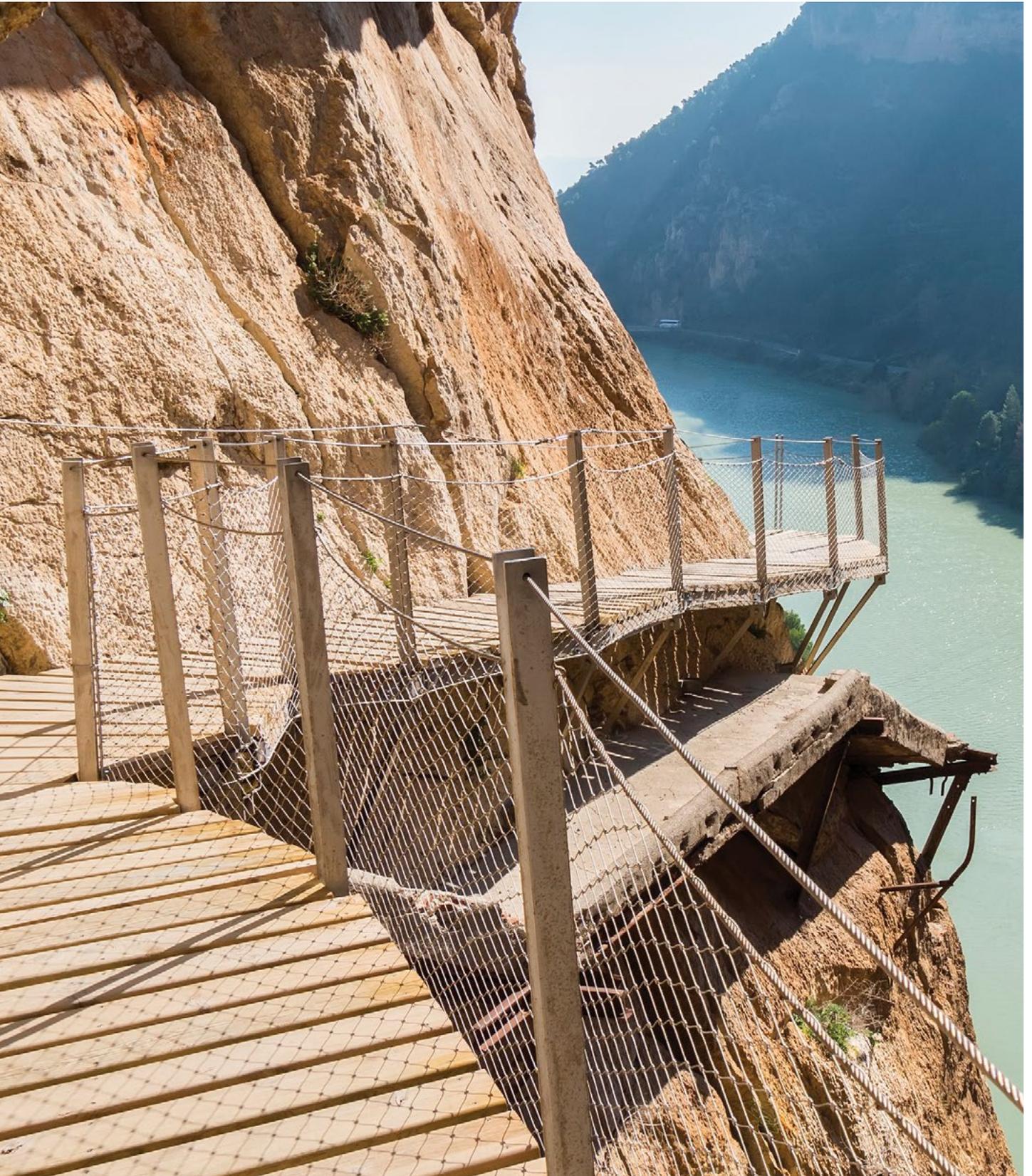
NET DEBT/CAPITAL – PROXY OF RISK BEARING CAPACITY



Source: Top 20 upstream operators' quarterly reports, Oliver Wyman analysis

Alexander Franke is a Zurich-based partner, **Mark Pellerin** is New York-based partner, and **Tim Thompson** is a Calgary-based principal in Oliver Wyman's Energy practice.

This article first appeared in BRINK.



RETURN ON RISK MANAGEMENT

THE VALUE OF INFORMATION SPENDING RESTS ON THE INSIGHTS IT DELIVERS

Douglas Elliott • Ugur Koyluoglu • Dominik Weh

Maximizing the return on risk-management spending at financial institutions is crucial in a way it never was before. Risk management ballooned in size, importance, complexity, and expense after the global financial crisis, responding to regulatory pressures and the internal recognition of problems revealed by the crisis. We estimate over \$50 billion will be spent on one-off regulatory initiatives this year, and ongoing expenses associated with enlarged risk functions will account for about 4 percent of the operating costs of an average bank.

As investment in risk management increases, the value of this spending becomes an issue of ever greater importance. A bank is legally required to comply with new risk regulations, but the way it achieves this operationally and the use it makes of “compliance processes” is left to the bank’s discretion. The bank may decide it should spend the bare minimum to comply with some regulations, yet go well beyond what regulators demand in other areas to gain a competitive advantage. As is the case with any important activity, senior executives must think about risk management investments strategically.

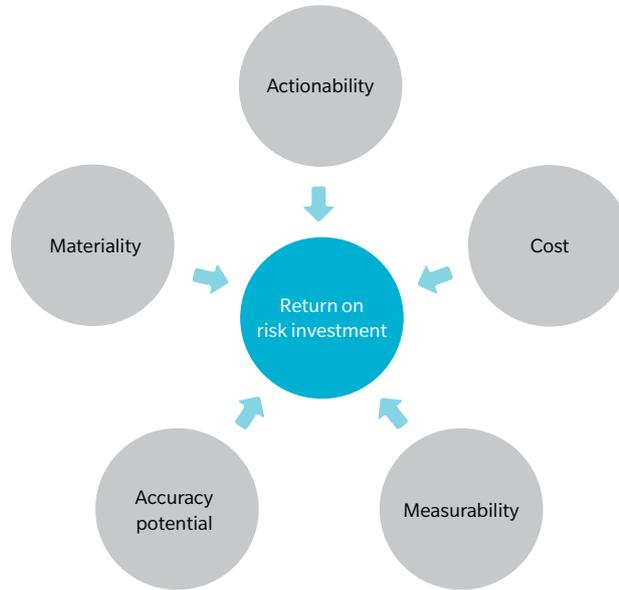
A FRAMEWORK FOR INVESTMENT DECISIONS IN RISK MANAGEMENT

Analyzing the return on investment in the risk function depends crucially on the value of the risk assessments and the insights it delivers. Economics tells us that the value of information is equal to the probability-weighted increase in net worth as a result of making better decisions using the additional information. This depends on five primary variables: the size of the exposure, its measurability, the potential for improved accuracy, the extent to which the assessment can be used to improve actual decisions, and the cost of obtaining and using the information. (See Exhibit 1.)

Maximizing the return on risk management spending at financial institutions is crucial in a way it never was before

EXHIBIT 1: GETTING THE MOST OUT OF YOUR RISK INVESTMENTS

THE VALUE OF RISK-RELATED INFORMATION IS EQUAL TO THE INCREASE IN NET WORTH THAT COMES FROM MAKING BETTER DECISIONS BASED ON FIVE ELEMENTS



Source: Oliver Wyman analysis

The most obvious driver of return-on-risk investment is the *materiality* of the risk exposure – the cost of getting risk assessment wrong. For risk assessment to matter, it must significantly improve the *understanding* of the potential for losses. Spending money on information that does not help in enhancing the assessment of risks cannot be justified, unless required for compliance. A large homogeneous portfolio of loans might merit a simple actuarial analysis to assess the risk of the portfolio under different conditions. A more heterogeneous portfolio might warrant more detailed models that are able to discriminate along the risk spectrum. Some portfolios might benefit from a combination of models and expert overlay. But the key point is to ensure that each layer of the process is adding to accuracy, not just to cost.

Finally, the cost of gathering the additional information must be lower than the benefits. This balancing act affects *where* the money is spent, in addition to *how much* is worth spending. For instance, when considering strengthening one line versus another in the context of “three lines of defense,” a comparative return-on-investment analysis is needed.

Deciding a bank’s overall strategy and making the right risk-return decisions within the risk appetite of the bank can be thought of as solving simultaneous equations. Luckily, a good risk department is endowed with the analytical resources to tackle such problems in a disciplined fashion. In addition, strategy and risk functions have been working much more closely since the global financial crisis.

Regardless of the overall strategy, however, the return on risk management can only be optimized through a sound and detailed analysis of the major types of risks, their probability distributions, the potential for improving a bank's understanding of the probabilities, and an overall approach that maximizes the flexibility of better execution based on better information. These steps require the structuring of a vigorous framework, robust databases, and information technology; additionally, there must be an analysis and comparison of multiple scenarios, the incorporation of expert judgment from both inside and outside the bank, efficient organization of the bank, a focus on results, flexible responses to a changing world, and a sound and well-understood strategy for the bank.

Optimizing the strategy and allocation of risk-management resources also requires excellent coordination between the risk and strategy functions – and indeed between them and other key areas, such as the finance function.

WHAT THIS MEANS IN PRACTICE

The role of the Chief Risk Officer: Many banks are now working on a 2020 Vision. The CRO should be part of the core team, as he or she is able to explain what a particular strategy will mean in terms of regulatory and economic capital costs, liquidity requirements, earnings volatility, and reputational danger. No one is better positioned to make sure that the strategy is consistent with the desired risk profile of the bank and that the risk function has the capabilities to monitor and control any new risks.

The cost of poor risk strategizing far exceeds the modest increase in staff costs that is required

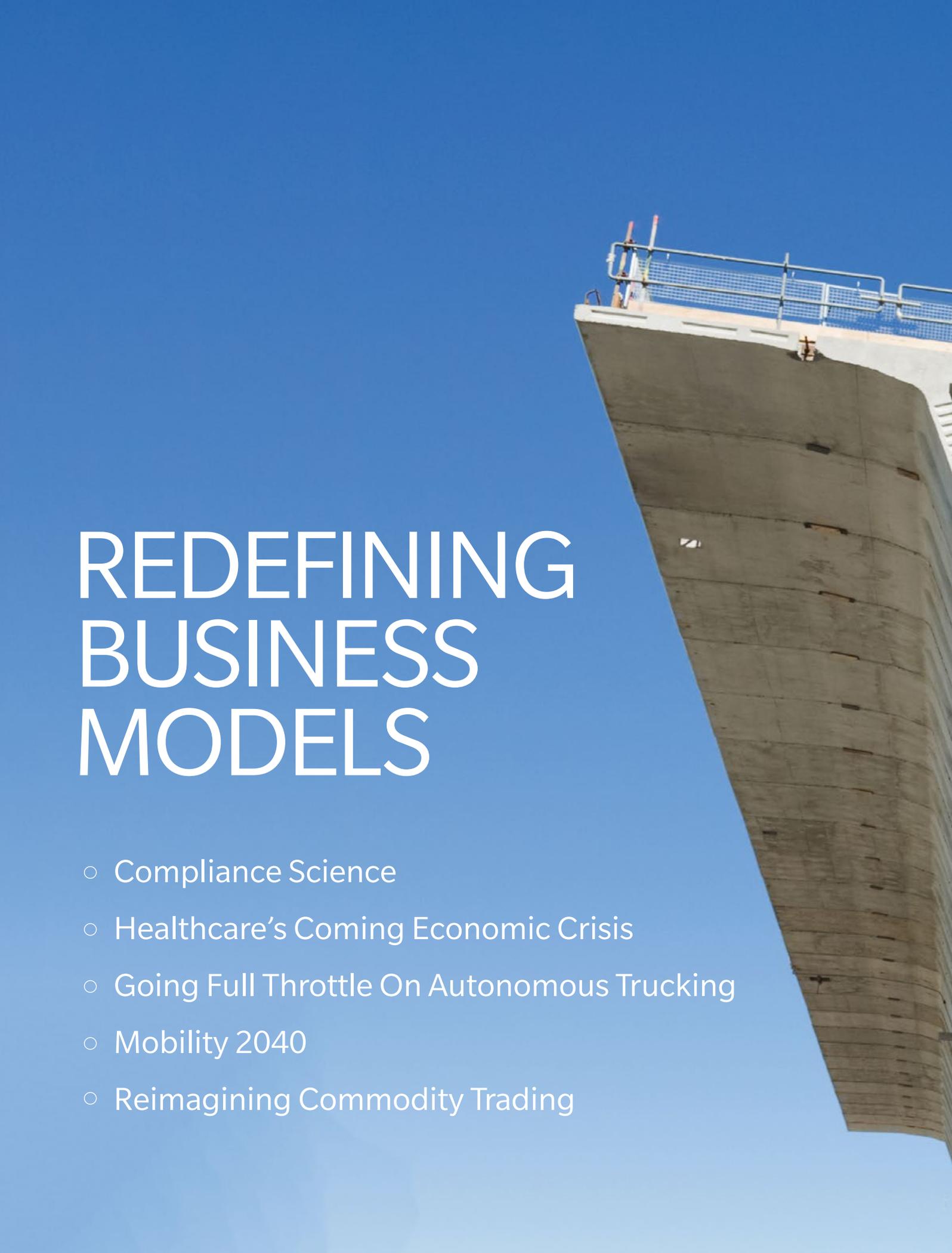
Getting off the hamster wheel: Many risk staff, including the CRO, are still overloaded, and spending has sometimes been guided by the imperative to comply with new regulations, rather than by a strategic vision and best use of new technologies.

Understandable as this is, it will prove wasteful over the long run as short-term fixes usually prove to be under- or over-investments.

CROs and their senior team need to get off the compliance hamster wheel and devote a material portion of their time to strategic matters. The cost of poor risk strategizing far exceeds the modest increase in staff costs that is required.

A leadership mindset: CROs must not think of themselves as the most senior “analytical type” in the bank, but as a leader with as much influence on the bottom line as C-suite peers. The CRO must step up to provide the strategic thinking as it relates to the bank's risk profile and broader business activities, if he or she is not already doing so.

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REDEFINING BUSINESS MODELS

- Compliance Science
- Healthcare's Coming Economic Crisis
- Going Full Throttle On Autonomous Trucking
- Mobility 2040
- Reimagining Commodity Trading





COMPLIANCE SCIENCE

APPROACHING COMPLIANCE WITH
A STARTUP MENTALITY

Barrie Wilkinson • Hanjo Seibert • Tristan Hands

Banks' compliance functions are striving for "Goal Zero." Their aim is to achieve zero regulatory breaches, thus avoiding subsequent reputational and financial damage. Realizing this goal, however, won't be easy. Compliance functions must contend with waves of new regulation and with increasingly sophisticated techniques being deployed by those actors intent on breaking the rules. And they must do so under tight budgetary constraints.

But help is on the way. New data science techniques are able to improve the ability of banks to identify breaches, while reducing the "manual" work required. Banks that have already invested in such technology can achieve further gains in efficiency and effectiveness by optimizing these tools based on their ongoing experience of breaches and by analyzing the outcomes of recent file reviews.

OLD SCHOOL

A stylized summary of a typical compliance process is displayed in Exhibit 1. Banks usually start by defining a "scenario" in which a particular type of breach might occur. They then define a set of "triggers" which, if detected, generate an "alert" indicating an increased threat of a compliance breach. These alerts might be triggered by the contents of certain emails, patterns of behavior on instant messaging, or perhaps a large payment to a suspicious location. Once the alert has been activated, a compliance officer will open a new case file, and this is the point when a large amount of manual effort takes place. The compliance officer will then manually gather supplementary information to get a more complete picture of the situation. After analyzing this information, the compliance officer will conclude whether it is a real breach or just a "false positive."

30%

How much a bank reduced its false positives using compliance science

The problem with this process is that it is a static and inefficient approach. Given that most of the alerts turn out to be false positives, there is a feeling that much of the manual effort involved was not really necessary, and this has proven to be demotivating for compliance staff.

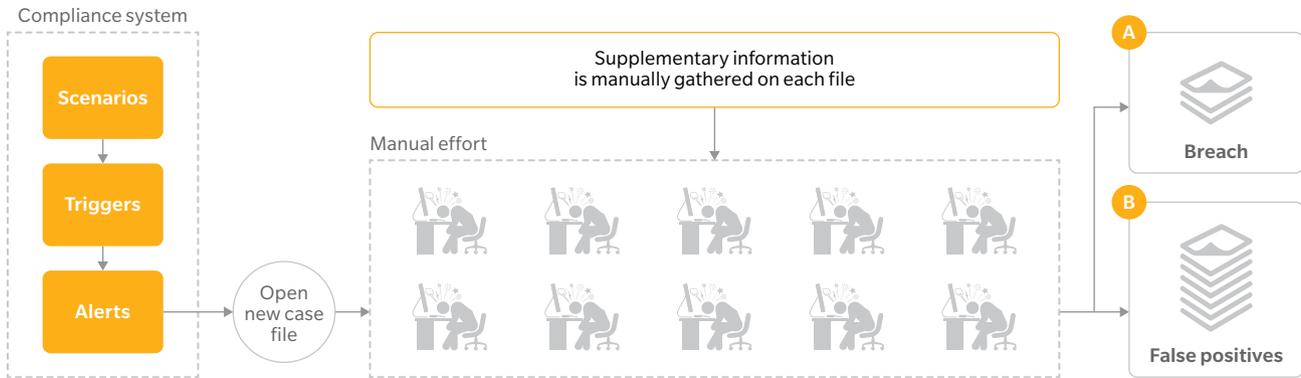
NEW SCHOOL

More sophisticated banks have embarked on a new approach that incorporates the latest data science techniques into their compliance processes. A new type of expert resource, the "data scientist," is able to use the experience from previous file reviews to offer live feedback to the compliance system. The typical enhancements that the data scientist is able to introduce into the process include introducing new triggers and recalibrating old ones to reduce the number of false positives; expanding the amount of information that is auto-fed into the system to enhance the accuracy and granularity of a trigger definition; and refining scenario definitions to reflect the true nature of actual historical breaches.

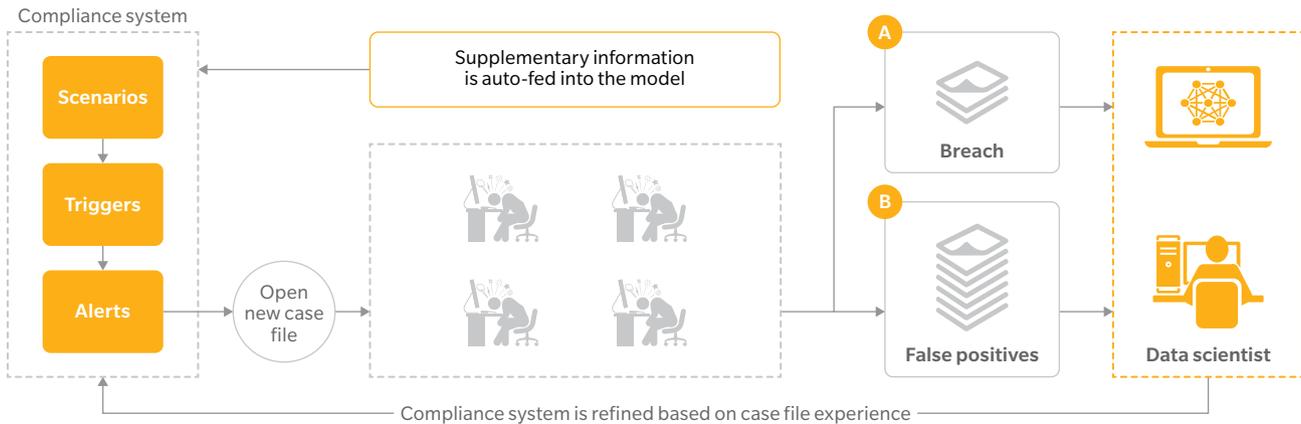
Improvements come gradually as the "machine" continues to learn from more and more experience. But this approach has enabled some banks to reduce the number

EXHIBIT 1: BANK COMPLIANCE PROCESS WITH AND WITHOUT DATA SCIENCE

LABOR-INTENSIVE COMPLIANCE PROCESS TYPICAL OF MOST BANKS



COMPLIANCE PROCESS USING NEW DATA SCIENCE TECHNIQUES



Source: Oliver Wyman analysis

of compliance officers they need over time, leading to major cost savings, while simultaneously improving performance.

Banks that have invested to optimize their compliance processes with improvements in data, analytics, and technology have seen significant progress in effectiveness and efficiency. One large bank observed a considerable increase in the quality of their transaction monitoring alerts, improving the alert-to-suspicious-activity report ratio from 7 percent to 25 percent, while also reducing false positives generated by more than 30 percent.

By breaking the process down into discreet pieces, banks gain the confidence that certain lower-valued elements of the process can be outsourced to lower-cost locations. Pure outsourcing of an entire compliance process, on the other hand, has turned out to be too blunt an instrument that either leads to a reduction in effectiveness or increased cost elsewhere in the department.

The latest data visualization techniques can also help to reveal insights and relationships in the data that might not otherwise be apparent. For example, when investigating the Panama Papers, banks that could readily visualize the web of connections between offshore companies, intermediaries, and shareholders were quickly

able to identify compliance threats. New automation techniques can also be applied to streamline other work-intensive areas, such as management reporting and regulatory reporting.

EMULATING DIGITAL STARTUPS

Achieving such advances in “compliance science” requires the development of capabilities in data mining, analysis, and visualization that are at present uncommon in compliance functions. To develop them, a radical departure from current approaches will be necessary. Compliance functions will need to create an environment and culture that encourages innovation and that can adapt quickly to new developments.

This is most likely to be achieved by emulating the environment of a tech or digital startup. This new team need only consist of a small team of data scientists and creative thinkers, but it is important that they are free to innovate and aren’t held back by corporate bureaucracy and systems limitation.

In our view, building an effective compliance science capability requires four important steps. First, banks must hire a new profile of employee with programming, data analytics, and machine-learning experience. They should be placed in a separate team within the compliance function and given access to the experienced compliance officers who can provide expert guidance.

Next, banks must allow the team to experiment with tactical technology, which can be set up in an agile way independent of the typically slower time frames of large IT programs.

Then, they should ensure that data scientists have access to the data and tools required to develop prototypes. Given the scope of compliance issues and the techniques involved, this means almost unrestricted access to counterparty, transaction, and communications data and also experimentation with new data science libraries, such as those found in the Python toolkit.

Finally, banks must give the new team a mandate to focus on self-defined compliance enhancement projects and not burden it with business-as-usual work. They must create an environment of autonomy and freethinking where anything is possible, and not try to direct progress, but check in regularly.

DIGITAL SHIFT

A digital shift is occurring across financial services, and compliance functions cannot afford to be left behind. They need to make their move now by hiring two or three data scientists and creating the sandbox environment described above. This “startup” can use historical data, expert knowledge, and new data science techniques to develop tools that will make compliance processes more effective and cost-efficient. Compliance is now a material operating cost for financial firms, and failures can result in significant reputational damage and financial cost. Institutions that fail to bring the new culture of digital innovation to bear on compliance will find themselves at a serious disadvantage to their more advanced competitors.

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HEALTHCARE'S COMING ECONOMIC CRISIS

IS HEALTHCARE TOO BIG TO FAIL? OR IS FAILURE EXACTLY WHAT WE NEED?

Sam Glick

There is a looming challenge facing hospitals in the United States, which find themselves being forced either to reduce costs, thus potentially harming the local communities they serve, or else taking less aggressive cost-cutting measures and risk going broke.

The backdrop to this veritable “Sophie’s Choice” has developed through a series of public policy and market moves to shift financial risk onto local health systems that have little experience in such areas. When the hospital is the largest employer in town (as is so often the case), with financing coming from insurance companies and mutual funds, we have the makings of systemic risk in the style of the 2008 financial crisis.

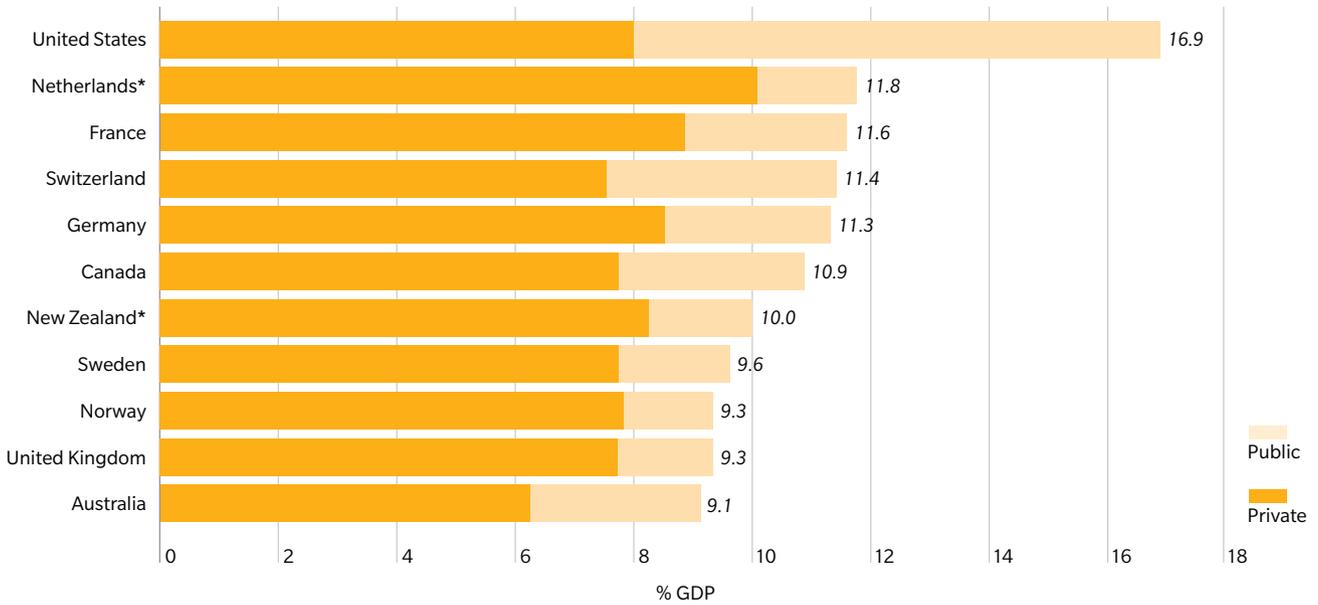
This year, nearly one out of every five dollars of the US gross domestic product will be spent on healthcare. As a percentage of gross domestic product, this is nearly twice the global average, yet we receive no clear benefit from a significant portion of this spending. The US ranks first in per capita healthcare spending, but last in the Commonwealth Fund’s assessment of health system performance in 11 major developed countries. As a society, we have a healthcare return-on-investment problem. (See Exhibit 1.)

This challenge isn’t new. Politicians, academics, physicians, insurance executives, and countless others have been trying to solve the problem for decades. Fifty-one years ago, President Lyndon Johnson signed the legislation that created Medicare and Medicaid, bringing millions of people into the healthcare system and firmly establishing the government’s role in the provision of healthcare. In 1974, President Gerald Ford enacted the Employee Retirement Income Security Act (ERISA), setting clear rules for employer-provided health insurance. In 2010, “Obamacare” (the Patient Protection and Affordable Care Act, or PPACA) – which is intended to provide affordable healthcare to all US citizens, allowing them to choose health insurance coverage in an open, competitive

Healthcare spending should be reallocated to physicians’ offices, new virtual care modalities, and more effective drugs

EXHIBIT 1: HEALTHCARE EXPENDITURES

THE UNITED STATES SPENDS MORE ON HEALTHCARE THAN MOST DEVELOPED COUNTRIES...



* Total expenditure excluding capital expenditure

Source: OECD

...BUT ITS HEALTHCARE SYSTEM'S PERFORMANCE IS THE WORST OF 11 DEVELOPED COUNTRIES.

COUNTRY RANKING



Notes: *Includes ties. **Expenditures shown in \$US PPP (purchasing power parity); Australian \$ data are from 2010.

Source: Calculated by The Commonwealth Fund based on 2011 International Health Policy Survey of Sicker Adults; 2012 International Health Policy Survey of Primary Care Physicians; 2013 International Health Policy Survey; Commonwealth Fund *National Scorecard 2011*; World Health Organization for Economic Cooperation and Development, *OECD Health Data, 2013* (Paris: OECD, Nov. 2013)

insurance market – further expanded access to healthcare and provided incentives for improving outcomes and reducing costs.

OUTSIZED HOSPITAL SPENDING

Despite these efforts and many others, how Americans spend their healthcare dollars hasn't changed in more than half a century. According to the California Healthcare Foundation, in 1960, 39 percent of US healthcare spending went to hospitals, 24 percent went to physician and clinical services, 12 percent went to drugs, and the rest went to everything else. The most recent spending analysis indicates that 38 percent now goes to hospitals, 24 percent to physicians, and 12 percent to drugs. All we've done is make the pie bigger; we still carve it up the same way we did in 1960.

Why is this distribution of spending a problem? Study after study tells us that the best way to keep people healthy while simultaneously reducing cost is to shift sites of care – that is, invest in preventative measures, catch issues early, and provide care for people in the least intensive way possible. If we can turn hospital stays into same-day discharges, emergency room ordeals into urgent care visits, and doctor's appointments into telemedicine calls, we can make a big dent in the unsustainable healthcare cost trend while producing better outcomes.

For most of the history of US healthcare, it has been the role of public and private health insurers to keep healthcare costs under control. They did so through creating treatment guidelines, requiring prior authorizations, and shaping co-pays and deductibles to steer people to lower-cost options. Importantly, they also built up capabilities to pool, price, and control risk through sophisticated actuarial, underwriting, and balance sheet management techniques. Because of this, their cost-control efforts only had to work in the aggregate: Even

Give physicians financial incentives to control healthcare costs

if a particular group of members or providers led to extraordinary costs, the insurer was unlikely to face bankruptcy.

But because of healthcare's unique consumption dynamics, these traditional insurance techniques can go only so far in controlling costs. Decision making about the consumption of healthcare is deeply personal, and most decisions are made by patients and their doctors. The most expensive piece of healthcare equipment, as the saying goes, is a ballpoint pen. Through orders and prescriptions that they do (or don't) write, physicians have broad control over the amount and effectiveness of healthcare dollars.

SKIN IN THE GAME FOR PHYSICIANS

If physicians have control over healthcare spending and they're the ones most qualified to make healthcare decisions, a solution to the problem would seem to be to give physicians financial incentives to control healthcare costs. If physicians can consider real cost-benefit tradeoffs in making medical decisions,

16%

of healthcare payments
estimated to be contingent
on health systems controlling
costs by 2018

everyone should be better off – insurers, employers, patients, the government, and society overall.

In the 1970s, the US moved in exactly this direction with the creation of health maintenance organizations (HMOs). In an HMO, physicians (or the health system of which they are a part) are given a fixed amount of money to provide care for a patient. Keeping costs low is now their responsibility as well, not just the insurer's.

Despite the initial enthusiasm for HMOs (more than 80 million people were enrolled in HMOs in 2000, up from fewer than 10 million in 1980), they created new problems. There were well-publicized cases of newly incentivized hospitals and physicians keeping people from receiving the care they needed (or at least thought they needed). HMOs did work well in many areas (and still do in places such as California), but

membership began to wane after 2000 as consumers turned against the model and macroeconomic factors temporarily reduced the growth in healthcare costs.

Obamacare has placed a new emphasis on shifting incentives for controlling healthcare costs to physicians and hospital systems, moving beyond the basic model of the HMO and requiring specific performance on a number of healthcare quality measures. By 2018, the Department of Health and Human Services (HHS) aims to have 50 percent of payments tied to quality measures; private insurers are quickly following suit. Simultaneously, Oliver Wyman projects that by 2018, a full 16 percent of healthcare payments will be contingent on health systems controlling costs, with that percentage continuing to rise into the 2020s.

This brings us back to thinking about sites of care and the 38 percent of healthcare dollars that currently go to hospitals. If these new incentives work as intended, what we should see is the healthcare cost trend coming down and spending being reallocated to physicians' offices, new virtual care modalities, and more effective drugs.

GOING INTO LABOR

Yet moving spending away from hospitals is harder than it looks. The biggest cost in operating a hospital is labor. According to the Kaiser Family Foundation, more than 12 million people work in healthcare (twice as many as in financial services), and many of these 12 million individuals work in hospital-related jobs. To reduce hospital spending, we need to reduce labor spending, and that means eliminating jobs. When the hospital is one of the largest employers in town (as it is in many cities, from New York to San Diego), such labor reductions can have significant economic and political impact.

The situation gets even more difficult. According to the American Hospital Association, 83 percent of US hospitals are either not-for-profit or government-owned. This means that most hospitals in the US were financed using tax-exempt bonds, with bondholders counting on hospital revenues to be repaid. And who owns these bonds? Retirees and property-and-casualty insurers looking for stable, low-risk income.

Now hospital systems face a conundrum: Reduce cost of care in a material way by moving services out of hospitals and potentially delivering a significant economic blow to their communities, or take incremental measures to control costs and avoid impacting the community – and risk not getting paid enough by insurers and the government to cover expenses. This choice, of course, is set against the backdrop of the health insurance industry, which is highly skilled at managing financial risk, shifting that risk onto these delivery systems, most of which have no sophisticated risk management infrastructure in place.

All of this has the makings of an economic crisis: risk being transferred from organizations that can manage it well, to those that can't; systemically important, undiversified community hospital systems facing significant community and political pressure not to make tough cost-reduction decisions; and those hospital systems being financed largely by the nation's insurance companies and mutual funds.

TAKING A PAGE OUT OF THE NEW HEALTHCARE PLAYBOOK

Not all hope is lost, however. There are examples of healthcare delivery systems – from Kaiser Permanente in California to Intermountain Healthcare in Utah to Inova in Virginia – that have made real investments in both population health and enterprise risk management, and those investments are paying off. Now other health systems need to take lessons from their playbooks.

We must also accept the reality that for material costs to come out of healthcare, we are going to need to close hospitals and lay off employees – and that kind of creative destruction is fundamental to improving health outcomes. We also need to reconsider how we finance capital investments in healthcare, including whether tax-exempt bonds issued for the construction of buildings will continue to serve us well in the new healthcare environment.

If the 2008 financial crisis taught us anything, it's that changing rules and poorly understood interdependencies in the banking sector resulted in a catastrophic outcome for the US economy. Let's make certain not to have to relearn that painful lesson in the healthcare sector.

Sam Glick is a San Francisco-based partner in Oliver Wyman's Health and Life Sciences practice and co-director of the Oliver Wyman Health Innovation Center Leaders Alliance.

This article is adapted from one that first appeared on BRINK.



GOING FULL THROTTLE ON AUTONOMOUS TRUCKING

ARE TOLL LANES THE ANSWER?

Jason Kuehn • Bill Rennie

Prerematurely accelerating the implementation of fully autonomous trucking (no driver in the cab) seems like an idea that could be fraught with risk. While driverless long-haul trucks have the potential to increase economic productivity by enabling more cost-effective transport of goods, the technology is not yet ready for prime time. There is growing pressure, however, to make it a reality sooner rather than later – particularly as long-distance trucking faces a worsening driver shortage.

At the same time, highway infrastructure in many parts of the country is clearly inadequate even for today’s traffic, let alone a mixed bag of driven and driverless cars and trucks. The safety of autonomous vehicle technology – particularly when it comes to 18-wheelers – will be a question mark for some time to come.

What autonomous trucking needs now is a carefully crafted path to implementation. We believe that separated highway toll lanes could not only mitigate perceived risks, but provide a solution to a convergence of public and private needs. (See Exhibit 1.)

WHERE THE RUBBER MEETS THE ROAD

Although partially autonomous trucks (with a driver still behind the wheel) could be rolling quite soon, these won’t solve the core dilemma for the trucking industry – a shortage of long-haul truck drivers in developed markets that is projected to steadily worsen. Fully autonomous trucks could quite soon be able to take over the highway portion of movements, while drivers on either end handle local, last-mile responsibilities, such as getting trucks to and from distribution centers and warehouses, navigating suburban and city streets brimming with hazards, and participating in loading/unloading operations. Such a system would end the quality-of-life issues that cause so

Dedicated autonomous trucking lanes could simplify technology requirements and minimize public safety risks

many to avoid long-haul trucking as a career choice: long stretches of time away from home and on the road.

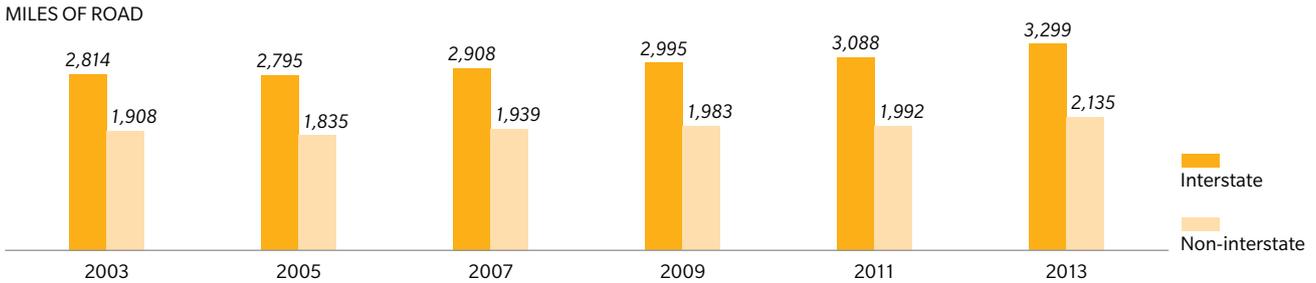
At the same time, many developed markets are facing a crisis of capacity when it comes to highway infrastructure. Public funding (and political appetite) for expensive road projects is at a standstill in many regions. One idea that governments have used to solve highway funding crises is to turn over management and operation of toll roads to private parties. But these deals can be risky: The privatized Indiana Toll Road, for example, filed for bankruptcy in 2014, after the recession drove down truck volumes.

Autonomous trucking might help solve the twin problem of insufficient highway capacity and funding as well – providing benefits that further incentivize its development. Governments could tender construction of a single, separated autonomous trucking lane on major highways to private investors. This new toll lane would serve only autonomous trucks – moving from an on-ramp to an off-ramp in a single lane, at a uniform speed – essentially a conveyor belt on wheels, with built-in telemetry and monitoring of vital safety and mechanical systems.

EXHIBIT 1: THE FUTURE OF AUTONOMOUS TRUCKING

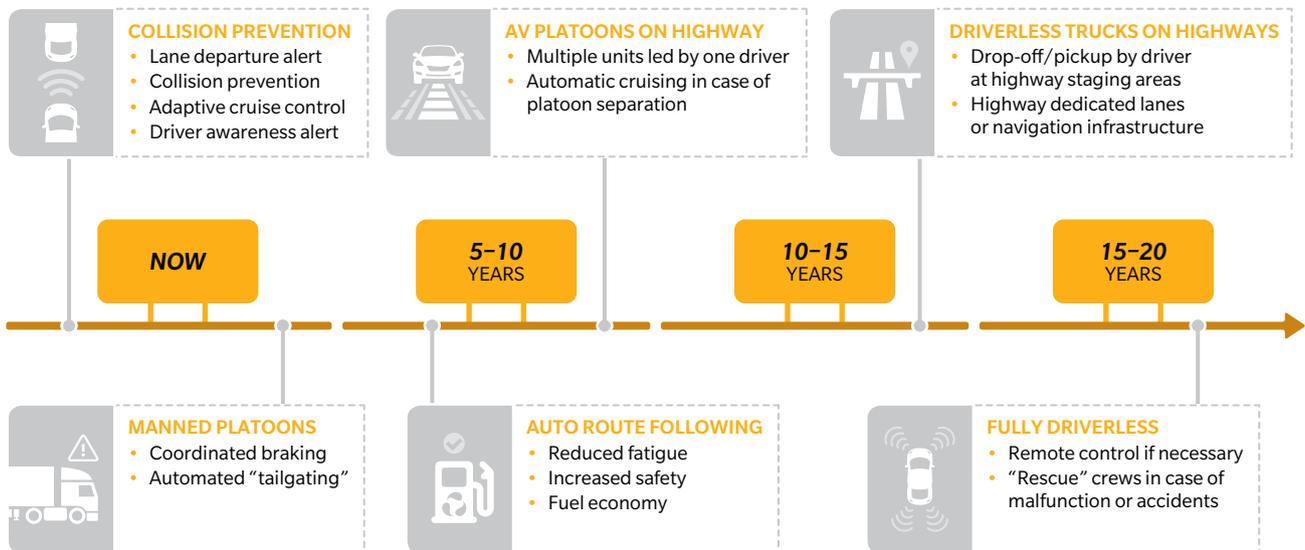
TOLLING IS INCREASINGLY BEING USED AS AN OPTION FOR HIGHWAY CAPACITY EXPANSION...

US TOLL ROAD MILEAGE GROWTH
2003 THROUGH 2013



Source: US Federal Highway Administration

...AND COULD HELP SPEED UP THE IMPLEMENTATION OF DRIVERLESS TRUCKS ON HIGHWAYS



Source: Oliver Wyman analysis

Safety risks would be addressed by keeping these trucks segregated from the driving public, while congestion on the drivers' portion of the highway would be vastly reduced simply by moving most trucks to their own lane. And the greater density of this "AT lane" would result in higher revenues for investors.

The conveyor-belt approach also would provide for the easiest implementation of autonomous driving; that is, lane adherence, vehicle following, and simple merging at ramps. Technologically more difficult behaviors, such as overtaking, lane changes, and complex hazard evaluation would be avoided, meaning that such trucks could get on the road sooner and need not wait on the development of artificial intelligence capable of handling every conceivable situation.

With no drivers (and no hazardous materials) in the AT lane, any potential accident would be a matter of property casualty only. And on the other side of the barrier, the lanes for vehicles with drivers would not only experience less gridlock but become safer as well, thanks to fewer trucks interspersed with cars.

What about disruptions for maintenance and equipment breakdowns? Long-haul trucks today lose 10 to 12 hours every day for driver rest. So roadway maintenance windows and occasional delays should not make a single, dedicated AT lane less operationally feasible – and the offset is that driverless trucks can run 24/7, every day of the year. (Simple solutions such as regularly spaced sidings or hook-and-haul tow vehicle depots would likely further minimize delays.)

HEADING DOWN THE (DRIVERLESS) HIGHWAY

The economics to support private toll AT lanes are sound. We estimate that 40,000 trucks per day could use an AT lane (assuming 80-foot vehicles, 30-foot spacing, 60 miles per hour, and a conservative 75 percent utilization to account for maintenance and disruptions). This would be triple the capacity of a typical interstate highway lane in use today. A toll of just \$0.10 per truck-mile would be sufficient to cover the construction costs of a dedicated AV lane at a volume of 10,000 trucks per day or more.

Historically, it has been difficult for toll roads to attract truck traffic, since there may be few or no benefits to the trucker to offset the cost of the toll. The substantial benefits of autonomous trucking and a dedicated high-

capacity lane could be persuasive, however: Driverless linehaul trucking could save \$0.40 per truck-mile from fuel, driver, and risk costs – even after truck conversion costs and a \$0.10 per truck-mile toll is deducted.

Two issues would need to be resolved to bring this implementation path to fruition. One is that to get private funds such as pension plans to invest in dedicated lanes, these lanes must remain the only on-highway option for driverless trucks for about 15 years. Such a time frame would match the length of a typical infrastructure fund (and bond payback period). If there is a risk that AT lanes would be quickly superseded by autonomous trucks gaining open highway access (an unlikely case given public safety concerns and technology challenges), the up-front investment would not be worthwhile.

The other issue is that governments would need to be willing to develop AT lane projects that cross state/regional lines. A “driver day” in the United States, for example, is about 500 to 600 miles, and it would take autonomous trucking runs of that length to fully realize the benefits of the technology.

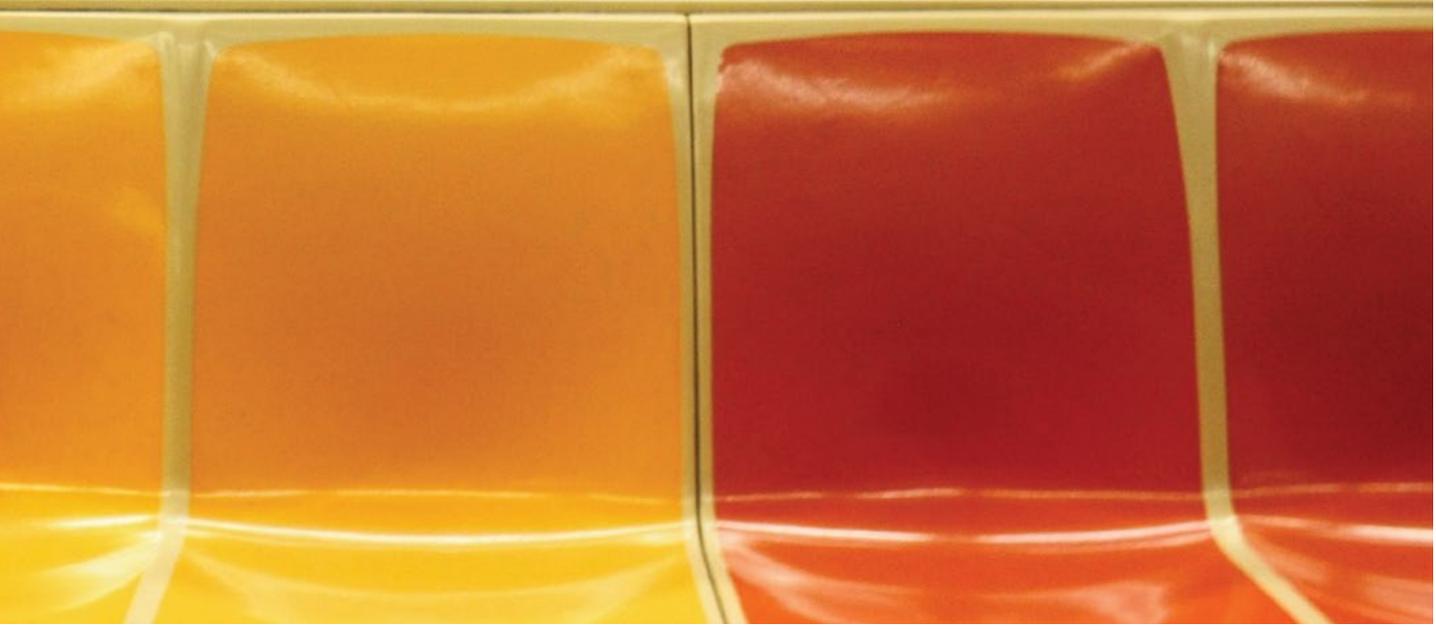
In sum, the conversation around how autonomous trucking gets implemented should start happening now – it doesn’t need to wait until the trucks are ready. Highway infrastructure projects often require five to ten years (or more) for completion – similar to the projected feasibility time frame for fully autonomous trucks. Segregated AT lanes could provide an important solution to funding highway transportation deficits by adding capacity through private investment, while simplifying driverless technology requirements and minimizing public safety risks.

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This article first appeared in Forbes.

148 St-Lenox Terminal
Manhattan

New Lots Avenue
Brooklyn



MOBILITY 2040

INCUMBENTS AND INVESTMENTS AT RISK

Joris D'Inca • Carolin Mentz

It's a beguiling vision: You wake up and tell your house management system that you need to be in Munich, or Chicago, or Beijing, by two in the afternoon. The house tells your mobility provider, which computes the journey and sends an itinerary to your smart device. At the appointed time, a driverless car rolls up and greets you by name, and you say hello to a couple of people already seated inside. The car drops you all at an integrated mobility hub, where you board a 750 miles per hour hyperloop that whisks you to your target city in mere minutes. An autonomous bus waits at the station to take you to your final destination, a shared office space in the city center.

To determine if this is what mobility could look like in the year 2040, Oliver Wyman recently conducted a survey of more than 200 executives and experts in the transportation industry globally. Driven by the fourth industrial revolution, technological convergence, new entrants in the mobility space, and changing travel behaviors, we expect the pace of innovation in passenger transportation to accelerate over the next quarter century. Disruption to existing

business models will be widespread, and 80 percent of passenger transportation incumbents say they don't feel well prepared for what's coming. (See Exhibit 1.)

A FAST-APPROACHING TOMORROW

Our survey identified four key trends that will shape passenger transport over the next 25 years: 1) sustainable, efficient assets; 2) integrated personal mobility; 3) urbanization and smarter cities; and 4) increased competition and innovation.

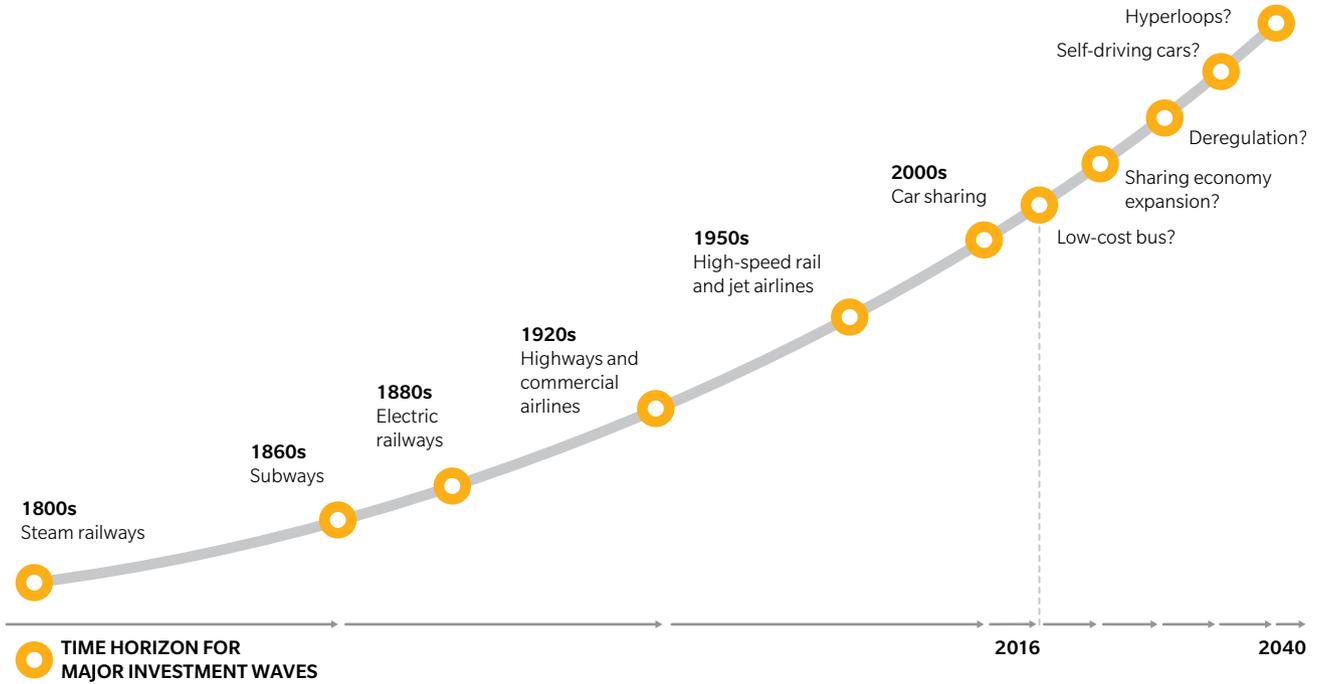
Sustainable, efficient assets: The next 25 years will see greater demand for sustainable solutions and more efficient use of transportation assets. Eighty percent of survey participants believe that there will be fewer private cars in the future, while nearly 70 percent see a significant increase

80%

of incumbents
aren't prepared for
mobility disruptions

EXHIBIT 1: THE NEW RULEBOOK FOR MOBILITY

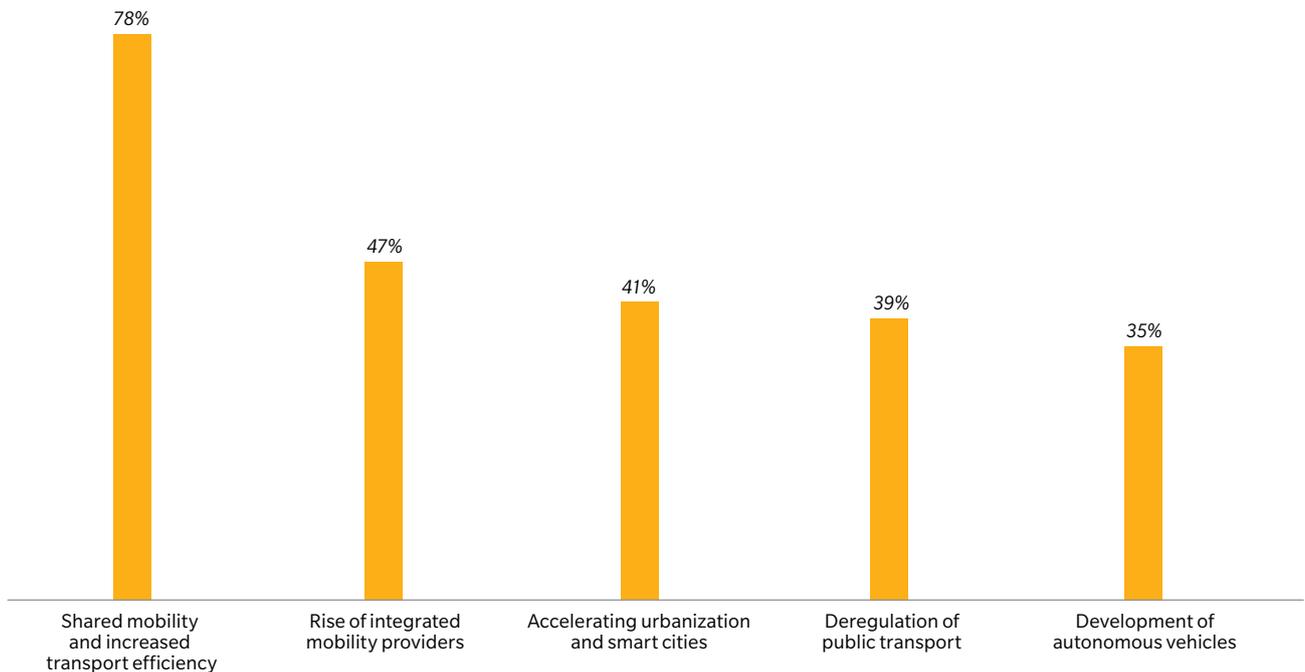
THE PACE OF INNOVATION IN PASSENGER TRANSPORT IS ACCELERATING...



Source: Oliver Wyman analysis

...DRIVEN BY DISRUPTIVE NEW MOBILITY TRENDS...

SHARE OF MOBILITY 2040 SURVEY RESPONDENTS WHO CONSIDER TREND TO BE AMONG THE THREE MOST IMPORTANT

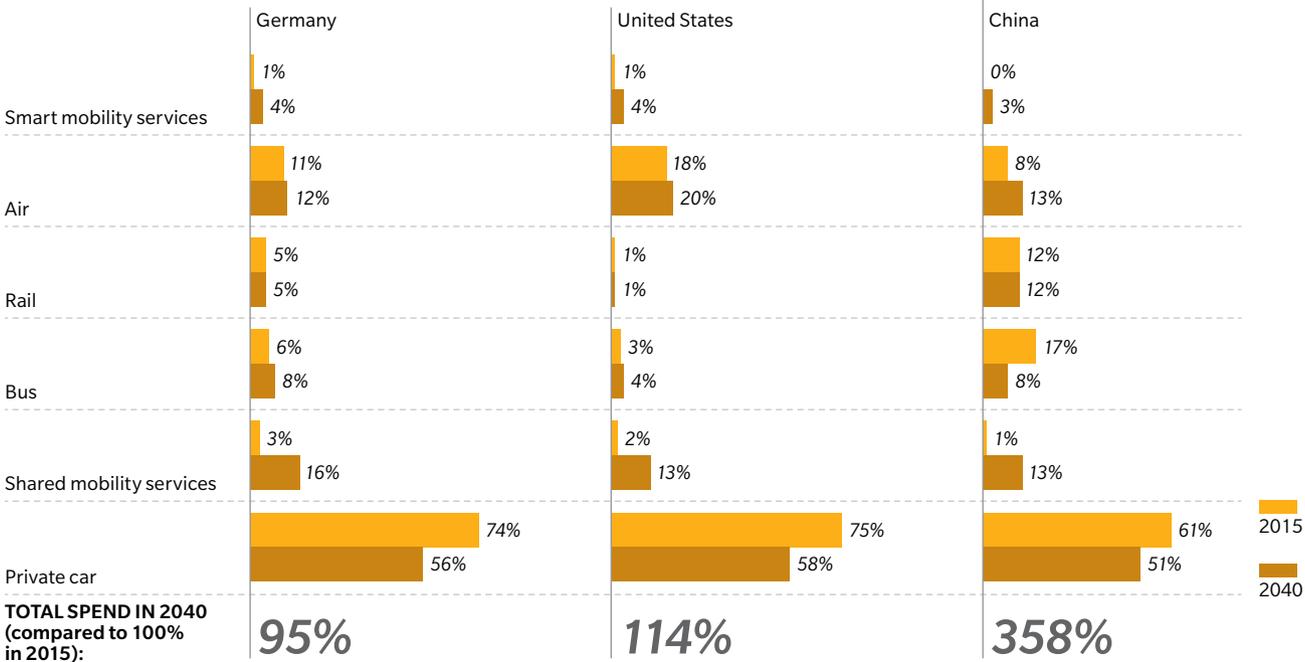


Note: Multiple answers possible.

Source: Oliver Wyman Mobility 2040 survey

...ALTERING THE PASSENGER TRANSPORT SHARE OF SPEND

PERCENTAGE SHARE OF EACH MODE, 2015 VERSUS 2040



Source: Oliver Wyman analysis

in car sharing. These trends will be accelerated by the development of fully autonomous vehicles. It is not too farfetched to imagine autonomous car fleets that are shared across a neighborhood or city on a fee-per-use or subscription basis.

Integrated personal mobility: Current mobility services will coalesce into full-scale mobility providers, who will focus on enabling seamless, on-demand journeys by integrating all modes of transport. For the traveler, transport mode selection and timetables will cease to be an issue – they’ll only need to know what time to be ready so as to reach a destination by a given time. Smart devices will become the organizational center for all trip planning and mobility personalization.

Urbanization and smarter cities: Urban and conurbation populations will continue to grow, increasing passenger volumes. The “smart city” of the future thus will have to invest in technology and transport, with a focus on passenger flow management. Coordination with mobility providers, real-time data monitoring, and responsive smart grid systems will ensure the best use of public transport and minimize congestion.

Private cars will lose their leading role, as shared mobility increases dramatically

Increased competition and innovation: Survey respondents expect that transport deregulation will continue to spread. Liberalization of railways, bus services, taxis, and ride-sharing will enable new companies to enter the market, giving travelers more choice and driving further innovation. One big concern: that liberalization and the rise of low-cost bus and rail services will force revenue per passenger downward, adversely impacting incumbent transport providers.

Taken all together, what do these trends imply for the future of mobility? Private cars will lose their leading role, as shared mobility – using autonomous vehicles – increases dramatically. Public transport usage will increase moderately but function more as one component in seamless multimodal passenger flows. Meanwhile, the number of companies operating in the mobility space will increase and become more diverse, likely leading to more “co-opetition.”

The biggest story however will be the rise of mobility services and information. Out of many different providers now attempting to establish themselves in this space, we expect only a few will rise to the top, gaining enough share and reach to provide personal mobility coordination that stretches from one end of the journey to the other.

THE THREAT – AND POTENTIAL – FOR INCUMBENTS

Incumbents in passenger transportation face the greatest risks from this vision. Customer relationships and data are at risk for capture by new-entrant mobility providers offering increasingly integrated travel planning. And as the transportation landscape becomes more diverse and competitive, the revenue pie will be split more ways. Investment capital may even be harder to come by for traditional transport modes if investors see better opportunities elsewhere.

Our analysis found for example that over the longer term, regional passenger railway services (which are common in Europe) may be especially vulnerable, as shorter, low-volume routes could be more cost-effectively served by autonomous buses. In Germany alone, 20 percent to 30 percent of fixed assets are expected to be at risk. And automotive manufacturers in developed countries may see a substantial reduction in the number of cars they sell as car sharing moves mainstream. Fully autonomous cars – expected to be as much as one-third of all car sales by 2040 – will further expand this trend.

More than half of railway operators, original equipment manufacturers, and infrastructure providers report that they are tracking trends and developing response plans. But few say

they are well prepared, with a plan in place to start responding to these trends. When asked what they are likely to do, incumbents cite changes to business models, development of new products/services, and increased levels of customer service. Unfortunately, these “business as usual” responses to the threat of change don’t get at the heart of how radical the coming wave of personal mobility will be.

In particular, it will be critical for all incumbents in the mobility value chain to consider the impact of disruptive trends (many of which are already underway) on investment planning. Given that many transportation assets have lifespans of 30 to 40 years or more, the investment planning cycle for 2040 starts now. Investment obsolescence is a real risk, while on the other side of the investment coin, peak capacity management will become more of a headache as urban and conurbation populations continue to grow. This will require a series of steps (such as active capacity management, optimized asset utilization, and cooperation with other modes) to keep asset requirements from spiraling out of control.

Incumbents also will need to determine if they are content to participate in only certain steps in the customer journey or if they want to optimize mobility door-to-door. The former may require less investment and keep the organization focused on its core skills, but carries the risk of loss of value and

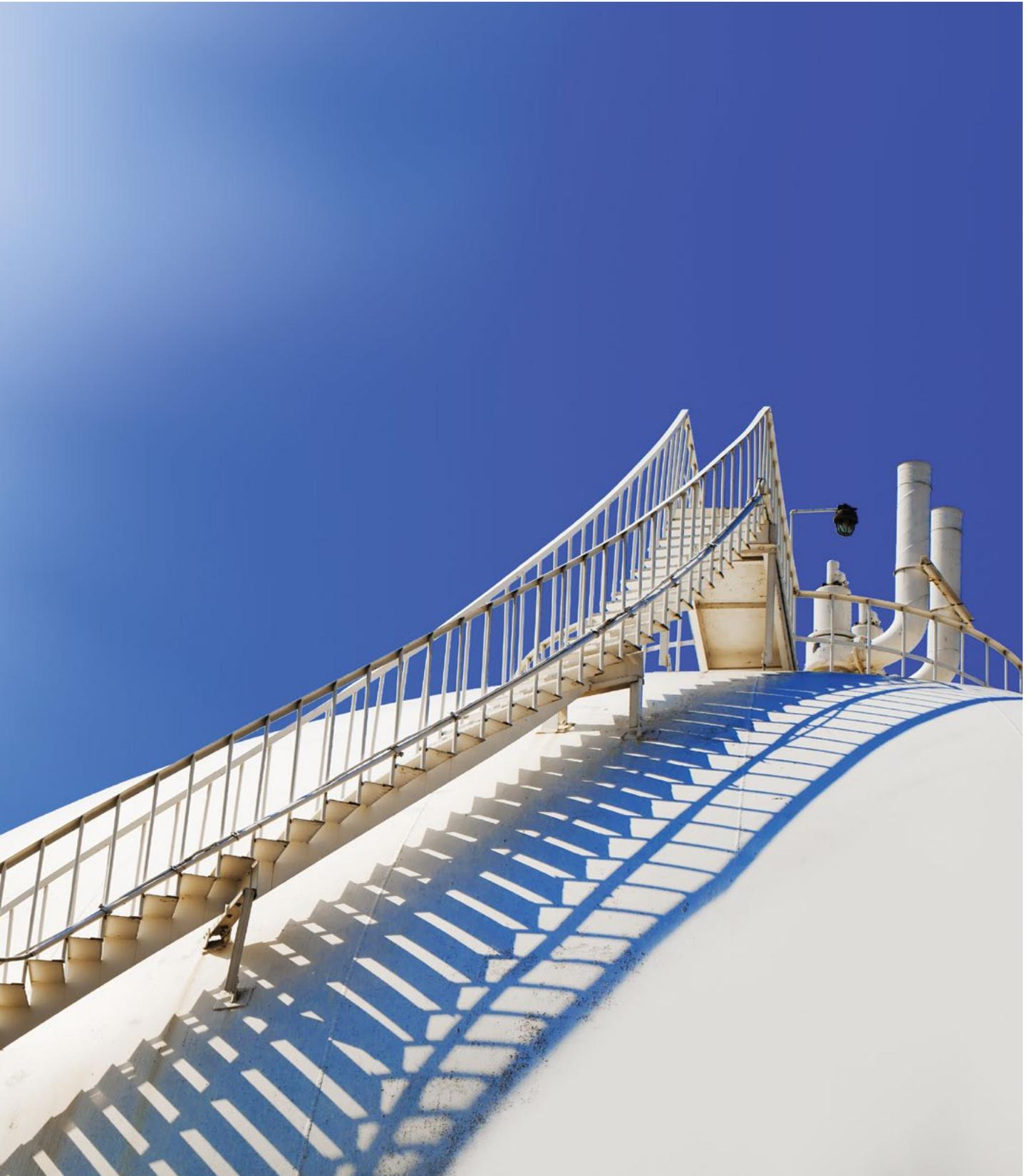
commoditization. The latter is a much bigger ask that may involve acquiring technology providers and greater co-opetition, but that could keep revenues and customer control from shifting to new entrants.

Incumbents do have the advantage of vast stores of customer data, which could be leveraged to build personalized mobility offers and partnerships that offer other services using travel time – if they don’t wait too long. When it comes to how fast they can turn, however, many transport players tend to be ocean liners rather than speedboats. Faster-moving targets will mean that organizations must speed up innovation in-house to quickly recognize and claim opportunities and reach critical mass.

In some ways, the future of mobility looks to be thrilling. But for incumbents in passenger transportation, it is going to be an unprecedented challenge. Collaboration with or integration of mobility providers, technology and data investments, and an open ecosystem for sharing real-time journey data are just a few of the necessary adjustments they will need to make. The game is about to change, and the rules will, too.

Joris D’Inca is a Zurich-based partner and **Carolyn Mentz** is a Munich-based principal in Oliver Wyman’s Transportation practice.

This article first appeared in Forbes.



REIMAGINING COMMODITY TRADING

A NEW BREED OF COMMODITY-TRADING TITANS
AND DIGITAL CONTENDERS ARE ABOUT TO
REORDER THE INDUSTRY

Alexander Franke • Christian Lins • Roland Rechtsteiner • Graham Sharp

Over the past year, the gulf between high-performing commodity traders and weaker players has been widening. Big oil traders such as Trafigura, Glencore, BP, and Shell Trading racked up record trading results. At the same time, smaller oil traders and players in other weaker-performing commodity classes stagnated or declined. Meanwhile, new digital entrants in the power sector signaled sweeping change in the next decade, as legacy commodity traders began to rethink the impact of digitization and a greater degree of electrification on their vaunted trading operations. Apple and Google, for instance, have subsidiaries that are registered energy wholesalers in the United

States. The German tech firm United Internet has also launched a new business, aiming to trade and market energy and energy services.

The commodity trading industry is about to be reordered – again. The market is sending a powerful message that the industry will be divided into three divergent camps – a core of sophisticated, competitive, global traders versus smaller traders and new digital contenders. The number of traders will shrink, and survivors will need to proactively rethink traders’ roles as digitization radically reshapes the industry.

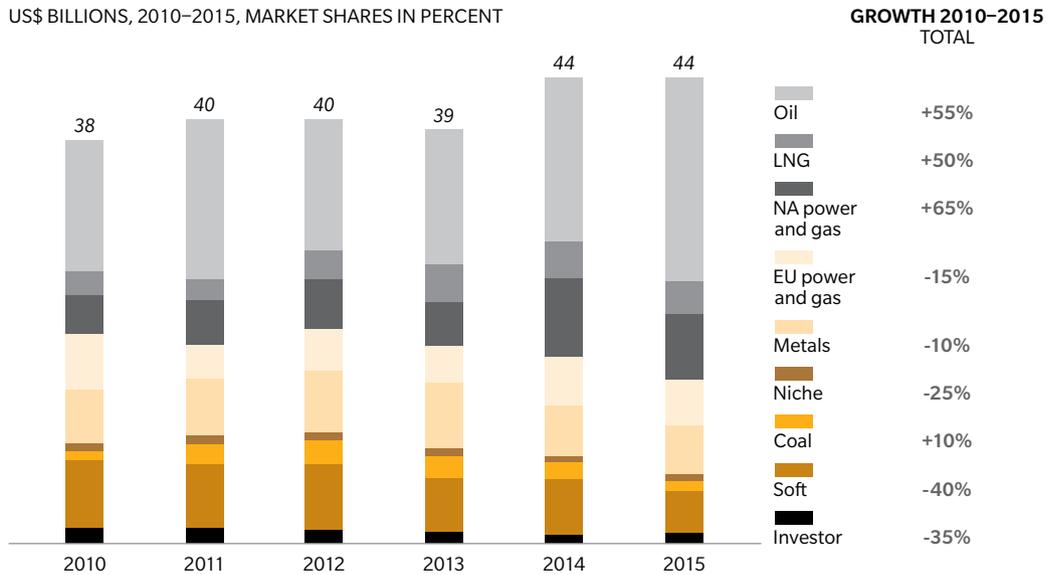
\$44 billion

The commodity trading industry’s
total gross margins

EXHIBIT 1: COMMODITY TRADING MARGINS BY THE NUMBERS

THE GROSS MARGINS OF OIL, NATURAL GAS, AND NORTH AMERICAN POWER AND GAS TRADERS ARE IMPROVING, BUT TRADERS IN OTHER ASSET CLASSES ARE STRUGGLING

US\$ BILLIONS, 2010–2015, MARKET SHARES IN PERCENT



Notes: Sum of products may not equal to total due to rounding; significance of shift overstated in graphic due to rounding; niche consists of emissions, Asia power and gas and exotics (weather).
 Source: Oliver Wyman proprietary data and analysis

What has set the consolidation of commodity trading on fast-forward is the fact that the industry’s gross margin growth is flat-lining around \$44 billion. (See Exhibit 1.) While oil traders stormed ahead, thanks to low, volatile spot prices that created cash-and-carry trading opportunities, traders in other asset classes, such as European power and gas, were hurt as renewable power gained ground and changed the market structure unfavorably.

As a result, as we predicted in last year’s report titled “The Industrialization of Commodity Trading,” it’s the large commodity traders who are thriving in the present lower-margin environment. By streamlining middle- and back-office operations, integrating trading and origination capabilities closely, and taking advantage of analytics provided by artificial intelligence systems, a core set of traders are now world class in speed and flexibility.

With these gains accelerating, the leaders of the commodity trading pack are raising the bar for the industry. They are setting a new world standard for commodity trading efficiency that will force even the largest players to further expand their trading networks in order to harvest volatility better, while squeezing more efficiency from their operations. At the same time, these trading giants are deepening their relationships with existing customers and rounding out their portfolios by winning over new ones, including the growing number of customers starting to produce electricity. Consider:

QUEST FOR SCALE

The stakes for trading hydrocarbons are rapidly rising. The trading volume of oil and refined products handled by leading independent commodity traders is catching

up to the asset-backed majors. Major asset-backed traders trade 5 million to 10 million barrels of oil per day. In 2015, independent commodity traders traded more than 4 million barrels per day on average, about 30 percent more than they traded in 2010. Independent traders are also trading much more liquefied natural gas.

Thanks to their current rate of expansion, large independent traders are racking up gross margins comparable to those of large asset-backed majors. To some degree, these greater margins reflect windfall gains, as oil's forward price has been higher than its spot price. But the bigger reason is that large independent traders have built up massive portfolios, which let them take advantage of volatility across interconnected commodity markets and move into new commodities and geographies. (See Exhibit 2.)

The big players will likely only become bigger. In the past, large independent traders had to increase their reach by leasing more tanks and monetizing market volatility with minimal

material working constraints. But in 2015, they derived most of their profitability from strategic deals struck with commodity producers that expanded their global reach and diversified their customer base. This development along with new forms of financing – backed by external sponsors, such as private equity or sovereign wealth funds, for both independent traders and their counterparties – gives independent commodity trading leaders the financial might to move into even more new businesses.

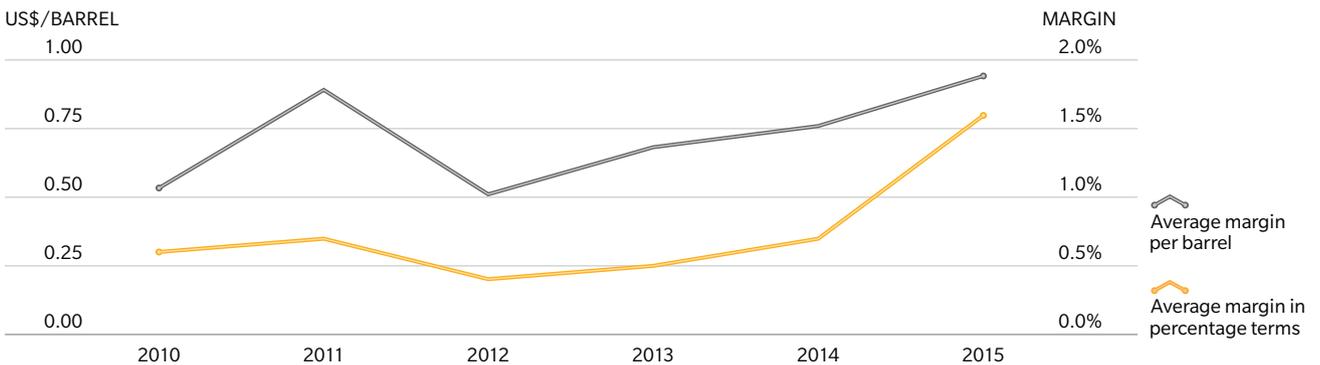
COMMERCIAL EFFECTIVENESS

Leading commodity traders are moving toward metamorphosing into leaner, nimbler organizations. Many traders have gone through multiple rounds of workflow streamlining. Now, the industry's leaders want to respond even faster to opportunities and changing market conditions by automating processes and shortening reporting lines. As in banking,

EXHIBIT 2: DRIVEN BY LOWER OIL PRICES AND FAVORABLE MARKET CONDITIONS OIL PRICES ARE DOWN, BUT TRADING MARGINS ARE UP

GROSS MARGINS PER BARREL OF OIL HAVE TRIPLED OVER THE PAST TWO YEARS, REACHING HIGHER ABSOLUTE LEVELS THAN AT THEIR 2011 PEAK

2010–2015 GROSS MARGIN PER BARREL OF LARGE PHYSICAL OIL AND REFINED PRODUCTS TRADERS



Source: Oliver Wyman analysis based on publicly available data

commodity traders are exploring using automation to reduce repetitive and time-consuming workloads.

At the same time, retiring senior staff and trading veterans are being replaced by junior staff trained in-house, instead of expensive rainmakers recruited externally. At this point, many junior staff members have gone through in-house graduate and mid-entry level programs for traders and support functions. So commodity traders are increasingly only hiring externally when knowledge of a specific asset class or region is required.

DIGITIZATION

Further down the road, traders foresee a world in which artificially intelligent automation within defined systems will become the norm and make more of the routine decisions. Determining delta-hedging positions, managing fleets of vessels, optimizing credit risk, aggregating internal and external intelligence on cash flows, and even making freight decisions accounting for cargo flows in relation to the market, weather, congestion, and other factors will soon all be assisted by machines as often as by man.

They will also likely experiment with distributed ledger and smart contract technologies to redraw their middle- and back-office operations, following in the footsteps of financial institutions. In spite of the physical nature of commodity trading, a new wave of productivity gains will come from applying intelligent algorithms to tasks such as processing letters of credit, determining warehousing, and chartering vessels.

CUSTOMER CENTRICITY

Major trading houses are refining their approach to customer service so as to capture recurring business from a fragmented base of customers. Commodity traders have focused on offering tailored services such as supplying commodities, managing projects, financing, and operating facilities to companies. In electricity markets, they are beginning to need to figure out new ways to service customers that both produce and consume energy.

To succeed, major traders will have to discover new efficient ways to service a bigger and more fragmented customer base. Traders recognize the need to move beyond arm's-length transactions arranged on Instant Messenger in order to obtain structural positions that will yield stable margins and tradable market intelligence on a regular basis. But offering the same level of service to consumers as they do to companies with larger bulk businesses on a 24/7 basis is very costly. So major traders have begun to deploy new technologies in addition to investing in customer servicing arms.

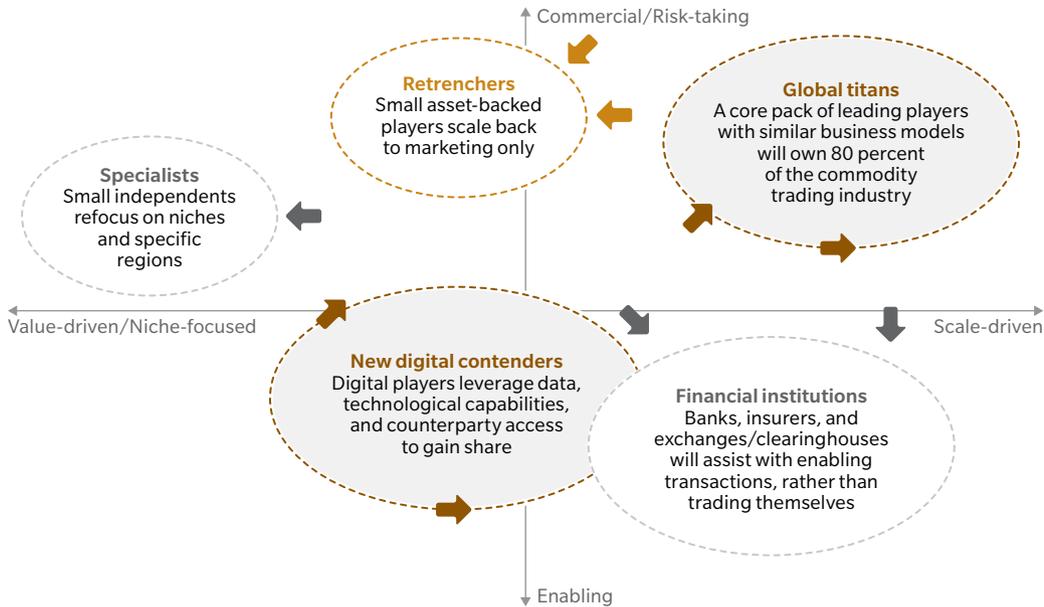
COMMODITY TRADING BEYOND 2025

As major asset-backed and independent trading houses continue to charge ahead, these global titans will forge a new market structure alongside new digital contenders who will seize electrification and data-driven opportunities to act as catalysts for even more change. (See Exhibit 3.)

The revamping of the industry's incumbents combined with the entrance of these new market participants will force other players to rethink their futures in the commodity trading space. Financial institutions, such as banks, insurance companies, and clearinghouses will need to focus first and foremost on servicing commodity traders. Other traders

EXHIBIT 3: THE COMMODITY TRADING MARKET BEYOND 2025

THE COMMODITY TRADING INDUSTRY WILL FALL INTO THREE DIVERGENT CAMPS: GLOBAL TITANS, NEW DIGITAL CONTENDERS, AND A RANGE OF SMALLER PLAYERS



Source: Oliver Wyman analysis

will also have to specialize and focus on niche segments where they can sustain a competitive advantage or adopt entirely different strategies.

GLOBAL TITANS

The new breed of a commodity-trading titan will manage both wholly and partly owned assets around the world. And it will deploy digital solutions as much as possible, leading to a bifurcation of human capital in the front office as artificial intelligence assumes a greater role and middle- and back-office operations become much leaner.

Vastly fewer people will be required, compared to today’s standards, because artificially intelligent systems will manage the bulk of volume. People will oversee, stress test, and maintain automated risk management systems and physical operations. Even

proprietary-trading strategies – both financial and physical – will be semi-automated, with a small team of traders, analysts, and data scientists steering, approving, managing, and programming underlying algorithms. As a result, employees will focus more on structuring non-vanilla deals and managing a multitude of relationships with stakeholders.

Global titans will continue to focus on securing outlets, such as refineries for crude and retail chains for fossil fuels in developing economies such as India and Indonesia. But over time, these giants’ asset-backed trading portfolios will expand to become a global energy ecosystem with a multitude of private and public sector stakeholders. Trading and recycling plastics will

A new wave of productivity gains will come from applying intelligent algorithms to tasks

also play a bigger part of their portfolios as the importance of hydrocarbons in transportation fuels declines in the developed world and more liquid spot and forward markets for olefins and polymers develop.

As they expand into more commodities, these global titans will also begin to look more alike. Services related to renewable generation will contribute materially to revenue. Even players with a non-utility background will sooner or later strike new deals or partnerships to optimize the renewable energy produced by utilities and from rooftops.

They will also begin to manage and originate trades like technology-backed ventures that will involve greater complexity. Bread-and-butter bulk-trading strategies will take a back seat to higher-margin customized businesses. Simpler trading operations and interactions with customers such as fuel-only retail outlets in emerging markets will become a lower priority.

THE NEW NIMBLE DIGITAL CONTENDERS

At the other end of the spectrum, an army of new low-cost digital contenders will own a greater share of the industry's traditional commodity trades. As commodity trading becomes more automated and energy consumption more homogeneous and electric, global online platform providers like Amazon and Alibaba, transportation providers like Uber, information aggregators like Google and Baidu, and even telecom service providers and technology conglomerates will all leverage their own energy consumption.

In an energy-abundant, more electrified world in which market intelligence is at least as important as capital, these players run by a younger generation will outmaneuver many commodity trading veterans unwilling to change. By subsidizing energy with revenue from their many other services and charging subscription fees, these new digital contenders will sell power for much less. They will also monetize valuable proprietary intelligence from customers ranging from households to electric vehicles to companies. By offering reliable power in emerging markets, they

will also quickly roll out a large portfolio of digital services, such as advertisement payment services.

SMALLER TRADERS AND BANKS

Other market participants' roles will need to be redefined. Smaller independent traders will need to specialize – and dominate – niche markets such as petrochemicals and renewables.

Meanwhile, banks and other financial institutions will need to refocus on assisting commodity traders. The combination of highly efficient commodity trading goliaths and rising regulatory pressures have raised the stakes to the point that it is close to impossible for banks to return back to physical trading. Instead, they should help existing players by showing the way for them to digitize the financial aspects of their businesses. By pioneering blockchain technologies for commodity finance purposes and smart contracts to facilitate inspections and warehousing, experienced financial institutions can build a partnering platform with existing market participants.

CONCLUSION

As trading margins in developed markets stagnate, it remains unclear which type of player will determine the energy landscape of the future. Traders that can tailor service offerings to specific markets at vastly different stages of development are the mostly likely to succeed in a new energy ecosystem, especially in new frontier markets. But global titans will have to cope with a greater degree of service complexity than ever before, extending from arranging financing packages from third parties such as private equity, sovereign, and international development funds, to cash-flow-based lending, to waste management services for feedstock for biogas facilities.

It is no longer a question if large commodity traders will have to digitize and transform into players within a greater cross-industry, cross-commodity energy ecosystem, but rather when and who the winners and losers will be. The broad outline for how the commodity trading industry will evolve over the next decade or so is apparent. Now, it's up to commodity trading titans to proactively embrace change and for new digital contenders to discover ways to fit into and profit in an industry with well-established players as it goes through what is likely to be the most profound transition in its history.

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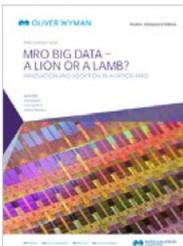
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