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David and his team focus on trading strategy and research, market structure, liquidity, market regulatory affairs, transaction cost analysis, counterparty risk and related areas across asset classes.

## Faster, cheaper, better: the future of markets and trading

**TECHNOLOGY, REGULATION, COMPETITION** and a host of other factors have transformed the trading landscape over the past decade. Director of Trading and Market Strategies David Cushing says it's only the beginning.

### If you look at the big picture, how will the world of trading be different five years from now?

**CUSHING:** The headline is that markets are going to be faster and more connected to each other, with artificial intelligence that draws on large data sets having a growing influence on trading decisions. Together, these changes will improve market function and trading efficiency. While technology and automation will help drive this evolution, it's important to stress that people will remain integral to the process. Of course, jobs will evolve as these changes take root and people adapt to take advantage of new technologies.

I'd compare what's happening in trading to the advancements we're seeing in robotics today, which were unthinkable a few years ago. As technological limitations fall, we're seeing the leap from robots that vacuum floors to the Google robot that can walk through the woods on two legs, avoid objects and right itself if it trips. You hit a point with technology where change begins to accelerate and become a disruptive force, and that's where we are now with trading. Thirty years ago, the earliest electronic trading systems had response times of 30 seconds, and market participants thought that was fast. Eventually, response times went from seconds to milliseconds, a thousand-fold jump. Today, the world's moving in microseconds and there is appetite to go faster still.

In recent years, we've seen these changes taking place in pockets — for example, in the wholesale area of the Treasury market, which is now overwhelmingly electronic — but I expect this evolution to broaden.

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### KEY POINTS

- The use of artificial intelligence, automation and other technologies will improve the speed and efficiency of trading across most markets.
- "Blockchain" technology, which underlies Bitcoin, may fundamentally alter trading practices, including shortening the settlement process, and help solve a range of regulatory and business-model problems.
- New tools will help improve liquidity in markets such as the secondary corporate bond market. Customer-to-customer technology will enable the creation of networks that connect a wider range of counterparties.
- While automation and artificial intelligence will reduce trading costs and increase efficiency, they will also introduce risks and unintended consequences. Asset managers need to plan and build their resources accordingly.

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We can think about it in terms of the time required to price a spectrum of transactions. On one end of the spectrum, you have transactions with a longer time scale, like pricing an IPO. Next you might have a block trade, followed by an electronic “all-to-all” corporate bond trade, and then a high-frequency equity trade. Currently, the time scales that those transactions span are orders of magnitude different, but in coming years they will all funnel to the shorter end of the spectrum.

#### **Why do you expect the trading transformation to accelerate?**

**CUSHING:** A number of key limiting factors will be addressed. Computers will be faster of course, and other technological barriers will come down. More importantly, there will be advances in the actual risk decision itself. Today, electronic market making in liquid stocks is effectively allowed to run itself. People are monitoring the overall process, but no one is sitting there and deciding where to set the quotes. Large investment banks have gone from having dozens or even hundreds of people making markets to having two: an individual who is the primary overseer of the market-making engine and his or her backup. The moment they don't understand something that's happening, whether it's because the market is distressed or there's an issue related to a single stock, they hit the “big red button” and shut the whole process down. There may even be an automatic shut-down process, with programmed risk parameters — if the price change or the volume trends to a particular level, for example.

The ability to speed up risk decision-making in markets is going to be a big deal, and it's going to happen in large part because a broad range of market participants, from electronic market makers to firms like ours, are pushing for it.

For the big banks, these changes are also being driven by pressure to increase profits, which have been harder to come by in recent years as revenues have slowed and regulatory changes have driven up costs and capitalisation requirements. It was not long ago that a trader at a bank would talk to someone on the phone about a possible trade, consult with fellow risk-takers to come up with a price, haggle some, execute the trade, then move on to the next one. And all this was happening in a silo. But increasingly, when that trade request comes in, it is thrown into a single risk book for the entire bank, and the marginal impact of that position on risk, liquidity and expected return is recomputed in real time and the price is generated. This applies to maybe eight or nine out of 10 trades, covering about half of the notional volume. The human touch is only required for trades of a certain size, or if there's a concern about the client — for example, if a bank's profitability analysis shows that trades made through a particular counterparty have a history of losing money.

#### **What are some of the big technological changes you foresee?**

**CUSHING:** We've come a long way with electronification, but thus far the changes have been largely efficiency related: taking functions that exist within clearing and settlement and making them faster and cheaper. I think we should expect to see changes in the coming years that would constitute more of a quantum leap and a fundamental redefinition of the marketplace.

One such change will be the introduction of so-called “blockchain” or distributed ledger technology, which is the innovation that underlies Bitcoin. Essentially, it allows you to have a single online ledger that records every transaction in a particular instrument. The ledger can be shared, either among specified parties with stringent rules and governance or, as in

Bitcoin's case, publicly on what is called a "trustless" ledger, meaning you don't have to know the party with whom you are transacting. This is entirely different from the way markets work today. The world of trading, including clearing and settlement, is really built on trust and reconciliation. At some level, you have to believe fundamentally that the system is going to work. You're not going to wire someone US\$100,000 to buy a security if you don't trust that you will end up with that security in your account the next day.

Blockchain technology will reduce the need for that trust among financial market participants because all parties to a transaction will be able to see and agree on what happened in real time. It also has the potential to take some of the intermediaries out of the trade process, and it can greatly simplify and shorten the settlement process, which should yield some big efficiency gains. Think about it this way: by at least one estimate, US\$120 billion of capital annually is tied up in the current multi-day clearing and settlement process. If you can collapse that multi-day period, billions of those dollars could flow back to the pool of usable capital, which helps solve a big problem for banks — namely how to generate better returns on capital in a lower leverage and more constrained environment.

In terms of blockchain applications, they may start small, but they will likely start with the areas where the technology could make a meaningful difference. We saw a prime example with the recent announcement by the Depository Trust and Clearing Corporation (DTCC) and Digital Asset Holdings, a start-up focused on distributed ledger technology for financial markets, that they will collaborate on a proof of concept to clear repurchase agreements for US Treasury, agency and agency mortgage-backed securities.

Another area where the advancements will be dramatic is in the use of artificial intelligence, particularly where trading programmes can leverage big data. They take in market-data feeds and other kinds of information in bulk quantities, synthesise it all in something approaching real time and then take action based on what that synthesis reveals. The high-frequency trading (HFT) firms are the clear leaders in this area today, as they search for an edge in their market-making activities and strive to succeed in a very competitive business.

The possibilities for new technology to improve and leverage data are immense. We are seeing new market entrants roll out innovative techniques at a rapid pace, from using satellite imagery to track and forecast a country's industrial activity to scanning market data for signs of an impending sharp sell-off, not unlike the technology that's used to predict earthquakes. Even if these particular tools don't work as hoped, there will be more companies lining up to improve on the concepts.

**Markets have experienced periods of declining liquidity in recent years, particularly in the secondary corporate bond market. Can technology help?**

**CUSHING:** There will be a variety of advances that fall under the heading of liquidity aggregation — finding ways to bring smaller liquidity providers together. We're seeing this already in the growth of customer-to-customer (C2C) interaction, where technology is enabling the creation of networks that connect a wider range of counterparties — not just the large conventional broker-dealers, but smaller regional dealers and other institutional providers of liquidity. "C2C" trading in relatively illiquid markets, including investment-grade corporate bonds, has been growing at an accelerating pace.

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We will also see new tools for improving liquidity that borrow from technological advances in other fields. For example, there are emerging smart-phone applications that can actively help connect you to someone selling a product you want at a price that's attractive. Based on your location and your online shopping history, your phone might alert you that you are near a store that sells a particular product you like and that it's on sale. We'll see analogous tools in trading. Technology will be able to harness data from the buy side and the sell side, recognise patterns and preferences, and then provide real-time alerts of attractive trade opportunities from across a network of dealers.

#### **Will these technological advances touch all markets?**

**CUSHING:** Yes, and it's really a matter of when, not if. In general, the more liquid the market and the more adaptable it is to electronic trading, the faster these advances will occur. The process will also speed up broadly as ideas and lessons from past implementations are applied to new markets. It took decades for the equity markets to get from initial electronification to where they are today. The wholesale Treasury market took a few years. The next market might take half that, and so on.

Even within a particular market, the transition will happen at different speeds and with different protocols. For example, every segment of the fixed income market grew up with its own trading conventions, so the timing will vary based on the challenges of risk decision making, the mechanics of execution, and the unique clearing and settlement cycle.

The big challenges are going to be in asset-backed securities, corporate bonds and emerging markets debt. Take the corporate bond market, for example. Moving to a more automated model is difficult because the market is so broad and diverse. But we are having more and more conversations with firms that are starting to come up with viable solutions for pricing and for reengineering the interactions between participants.

To offer another example, in foreign exchange there has been resistance to taking automation to the next level, from a largely voice-traded market to one where more of the execution is automated and trade processing is straight through. It is really remarkable that such a large and liquid market is still so manual. But market participants and regulators are demanding change, technology is enabling it and start-ups are now forcing the issue.

#### **Is this new world good for market participants? What risks need to be considered?**

**CUSHING:** We've already seen in recent years that the automation of market making can significantly reduce trading costs and increase efficiency. We would expect that to be the case in markets that implement these tools in coming years. To capture the benefits, investors will need access to trading analytics that can keep pace with all this change. As markets become more transparent, it becomes easier to apply those analytics across a broader range of instruments.

However, transparency has a potential downside as well, particularly for institutional-size trades. If you're an asset manager making a trade on behalf of a fund whose ultimate client is the individual saver or pensioner, you don't necessarily want your trade to be immediately transparent to predators in the market. We strongly support market transparency overall — but with large trades, we think the end client is better served if there's an appropriate time lag in the transparency. In the same vein, artificial intelligence can help solve a variety of trading problems and benefit clients, but there are risks, including advances in pattern recognition that might enable traders to detect large orders in the market. For this reason, larger

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market participants are working to hide their tracks as much as possible, using randomisation and other techniques. This will be an escalating arms race of sorts, as all participants bring more computing power to bear.

We also believe it's important to think a great deal about how to avoid the “nightmare” scenarios in this new world — runaway systems, like the trading firm whose HFT technology breaks down to catastrophic effect, or cybercrime, such as the theft of hundreds of millions of dollars from a Bitcoin exchange by hackers. This is why we have a strong “first, do no harm” ethos. Trading is an operational risk area for any asset manager. When you're buying or selling, you need to make sure that you receive either the security or the cash that you're expecting. I sometimes say that it's like being a rancher: when you let the livestock out of the fence to graze, you have to make sure they all come back. So while we certainly want to achieve best execution in a way that improves results for our clients, in a faster-moving world it's also vital to keep a sharp focus on our fiduciary duty to preserve the client's assets.

Finally, it's important to be on the lookout for the “unknowns” — the risks and unintended consequences of building markets that are faster and more reliant on complex technology.

#### **What does Wellington Management have to do to be prepared for the changes that are coming?**

**CUSHING:** We have many incentives to want to participate where possible and foster these changes. Our traders are already trading multiples of the volume they used to, and that's thanks to the electronification of the markets and our internal trading systems, as well as our efforts to ensure that our trading staff is prepared to work more efficiently.

But we're also having to think far ahead and gauge where the change will come and how fast, so that we can decide how we operate and thrive in a “post-counterparty” world. We need to learn about new entrants in the market, what they're doing that's different, and how much progress they're making. Then we have to pick our spots in terms of how we innovate, based on an informed strategy. We make the investment in research up front — the better our forecast, the greater our probability of successfully navigating all this change for our clients.

We also have to ensure that our resources are sophisticated, whether it's our own in-house resources or third-party research and capabilities that we leverage. That includes a substantial technical component that will grow over time, including more engineers and scientists — as we progress from magnifying-glass to microscope-like methods of measuring our trades. While technology has permeated many markets, the industry is only just scratching the surface in terms of signal detection and risk management, so certainly our investment in those areas will grow.

In addition to changes in market velocity and transparency, we have to consider forces that are adding to the complexity of trading and challenging traditional assumptions. One example is central bank monetary policies of recent years, which, though driven by the best of intentions to revive the global economy, have led to abstractions like negative interest rates. The challenges this can create become clear when you recognise that markets are places where people exchange not just assets for money but different cash flows, liabilities and risks.

I'd conclude with a point I made at the beginning: being prepared to address these issues and make the most of this “faster, cheaper and better” world of trading will require not just technology, but also the right people in the right roles. ■



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