SPECIAL REPORT

RBC WEALTH MANAGEMENT

Global Insight

2018 Outlook

Compliments of The Wealth Management Team of Stephanie Woo, FMA, CIM
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RBC Wealth Management

A look ahead

Over the past few years, our road map for investment portfolios has hinged on expectations for economic stability and growth. So long as our indicators are pointing toward a continuation of global and U.S. economic growth, equities should be given the benefit of the doubt. We believe this approach will once again serve investors well in 2018 as the synchronized upswing in most major economies leaves us optimistic and positioned with a modest Overweight in global equities.

While we expect major central banks to follow the lead of the U.S. Federal Reserve and begin to slowly normalize monetary policy next year, interest rates should remain contained, though prohibitive valuations keep us Underweight fixed income and focused on select credit sector opportunities.

If continued economic expansion gives us comfort, the prudent investor will rightly wonder how to gauge when the business cycle will turn down, given the U.S. is entering an above-average 9th year of expansion. We explore some of the warning signs that have successfully and repeatedly heralded recessions in the past, as they have tended to signal equity downturns as well.

We also discuss the impact of emerging innovations and associated investment opportunities. One article looks at cryptocurrencies and their underlying "blockchain" technology, which could be even more transformative. Another explores the convergence of technology and health care as artificial intelligence, surgical robotics, and other high-tech advancements are integrated into every aspect of the health care sector.

Finally, we conduct a Q&A about the prospects for the world's debt hot spots with RBC Global Asset Management's chief economist as this usually tops the list of client concerns over the outlook for financial markets.

We hope you enjoy this special outlook edition of *Global Insight*.

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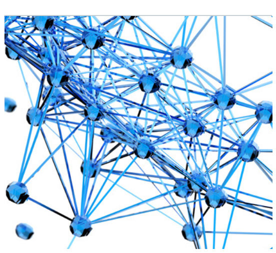

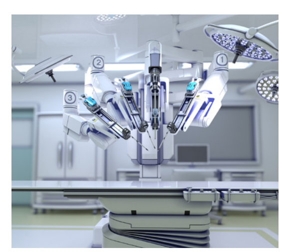

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For important and required non-U.S. analyst disclosures, see page 25.

All values in U.S. dollars and priced as of market close, November 13, 2017, unless otherwise stated.

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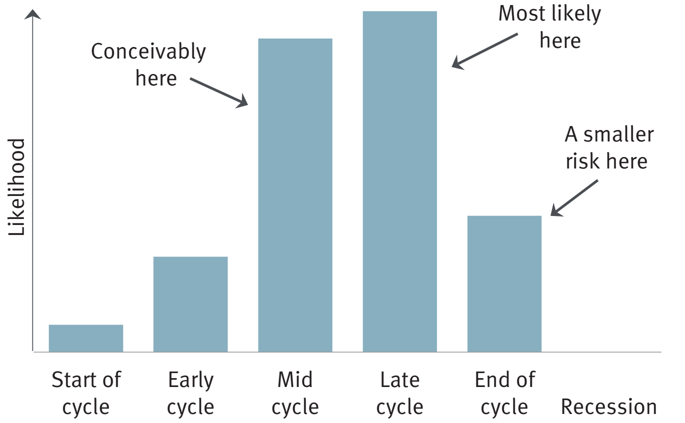
2018 investment stance

A synchronized, durable upswing in most major economies leaves us optimistic, invested, but still vigilant toward global equities for 2018. And as central banks slowly ease off the gas, ending the era of "peak money," we look at how fixed income markets will likely react. We also provide our 2018 outlook on commodities and currencies.

For years, our investment stance has flowed from the premise that the global economy would gradually return to something approaching normal, led by the U.S. This has finally occurred, as major regions are in sync for the first time during the eight-year recovery cycle, providing a firmer footing for the global economy. We believe the U.S., Europe, China, and Japan have the potential to grow GDP at trend rates or better in 2018. Assuming U.S. recession risks remain low (we think they will), the stage seems set for worthwhile gains in developed equity markets and select opportunities in the credit segment of fixed income. Following are our thoughts on how to position portfolios in 2018.

U.S. most likely at late point of cycle



Note: Calculated via scorecard technique by RBC GAM
Source - RBC Global Asset Management (RBC GAM)

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Equity

We remain constructive on global equities given the synchronized upswing occurring in most major economies accompanied by low recession risks and relatively tame monetary policies. Corporate revenues, earnings, and estimates should continue to rise. While a consolidation period or pullback would be normal following the strong rally in 2017, we believe a moderate Overweight position in global equities is warranted as our positive long-term thesis remains intact. Valuations of major markets have pushed higher, but are not high enough to foreclose further gains and remain attractive compared to bond prices.

United States

- Continued GDP growth and profit gains should extend the long-term U.S. bull market for another year, at least. None of our domestic recession indicators are flashing red or even yellow. We forecast S&P 500 earnings of $141 per share in 2018, which would represent 7.5% y/y growth, roughly an average rate. The passage of corporate tax reform could add another $7–$15 per share.
- We favor the economically-sensitive Financials and Industrials sectors, and continue to like secular growers in the Technology sector. Health Care and Energy are our preferred value plays. Small-capitalization stocks are on our radar screen for a potential upgrade in 2018, particularly if earnings momentum accelerates.

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Canada

- We recommend a Market Weight allocation to Canadian equities. Valuations appear attractive relative to the U.S. but are elevated on an absolute basis. We are monitoring uncertainties including the future of NAFTA and the impact of higher rates on consumers.
- We are constructive on banks in light of reasonable valuations and conservative earnings expectations. We believe mortgage growth will slow but that the housing market remains supported by solid fundamentals.
- We expect crude prices to remain range-bound as support from OPEC-led production curtailments is tempered by short-cycle U.S. shale production. We are cautious that further strength in oil prices could prove self-defeating should it prompt U.S. producers to increase output.

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Continental Europe/ United Kingdom

- Despite an improving macro economy background, relatively loose monetary policy should remain in place until autumn 2018 in Europe. Equity valuations are now slightly above long-term averages, though this can be said of most regions. Relative to the U.S., the discount remains unduly high, in our view. We like sectors exposed to the domestic economy.
- The U.K. economy continues to be mired in uncertainty. The weak government is struggling with the mammoth task of redefining the country's business model after Brexit. The risk of the U.K. crashing out of the EU without a deal remains uncomfortably high, and we hold our long-held preference for companies that generate a large part of their revenues abroad. We would wait for more attractive valuations before changing this position.

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Asia

- The Japanese equity market has reached levels not seen in 25 years. The earnings outlook and valuations are still somewhat supportive of equities. However, the chance of consolidation or a pullback in equities is moving higher. Inflation is modestly positive—arguably the key achievement of Abenomics. Key risks include currency appreciation and weakening global economic indicators.
- After an outsized performance in many Asia ex-Japan equity markets in 2017, we expect much more modest returns in 2018. We believe the risk of a correction is high, and the key risk factor is an end to the steady Chinese economic data. We also think mainland Chinese stocks are overvalued. Meanwhile, a number of large-cap stocks in Hong Kong are close to fully valued, although opportunities in new economy stocks still exist.

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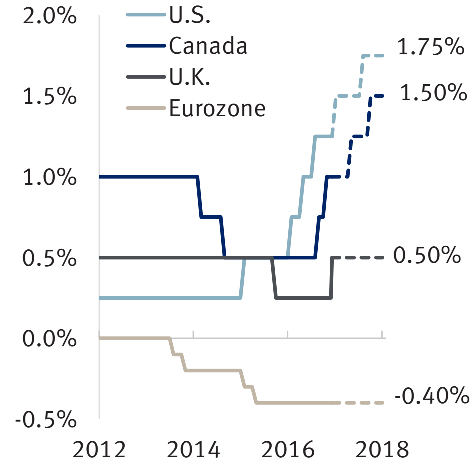
Fixed Income

In 2018, global central banks will be in focus as they gradually follow the Fed in deliberately normalizing monetary policy. Slow growth, low inflation, and shifting demographics should ensure this is a gradual process and, as a result, interest rates should remain contained. We expect Jerome Powell to be confirmed to lead the Fed, and foresee no major monetary policy shifts, although he could promote a lessening of financial regulations. Credit will continue to provide selective opportunities, but investors will be challenged by rich valuations.

Market expectations for bank policy rates



Source - RBC Wealth Management, Bloomberg; implied rates based on Overnight Index Swaps; data as of 11/9/17

United States

- The Fed is forecasting three rate hikes in 2018. In our view, the Fed's belief that inflation will move toward its target shouldn't sidetrack its "gradualist" rate hike plans.
- We expect the U.S. economy to maintain its steady-growth path as key indicators show few recession risks on the horizon. A wild card that could result in stronger growth would be the Trump administration delivering on its fiscal stimulus plans.
- 10Y Treasury yields inched higher late in 2017, but we don't anticipate significant additional upside largely due to patient central banks. We think the Fed's forecast for a 2.75% terminal fed funds rate should be viewed as a cap on 10Y Treasury yields.
- Credit spreads have little room to tighten further, but we don't foresee significant spread widening amid solid economic fundamentals. We recommend a focus on quality and feel slightly higher Treasury yields could provide an opportunity to extend duration. Preferred shares and munis will continue to provide selective opportunities.

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Canada

- With the Canadian economy likely to operate near full capacity and fiscal policy to remain expansionary, the anticipated speed of interest rate hikes is likely to dictate the direction of bond markets. A flatter curve keeps our focus on short to intermediate bond maturities.
- Despite an improving economic backdrop, credit spreads are at the tightest levels in nearly a decade, which keeps us wary of taking on too much credit risk. We continue to utilise the growing non-domestic issuer (maple) market as a source of diversification.
- Higher interest rates over the medium term provide a constructive backdrop for preferred shares, while the development of the hybrid market could divert supply and provide additional support. We believe investors are being adequately compensated for the subordination risk in preferred shares relative to corporate bonds.

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Continental Europe /United Kingdom

- Despite the European Central Bank deciding to taper its monthly bond purchase program from €60B to €30B from the beginning of 2018, we see yields within the region remaining well-underpinned given the central bank's ongoing accommodative approach and its focus on maintaining an extended period of stimulus. The current low level of inflation, at 0.9%, compared to its target of "close to but below 2%" provides support to its accommodative approach being maintained for the coming year.
- In the U.K., we do not see the recent 25 basis points hike from the Bank of England as the start of a tightening cycle. With ongoing uncertainty around Brexit negotiations and signs of a slowdown in economic momentum, we see rates in a holding pattern.

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Currencies

United States dollar – On the right track

- The dollar is poised to gain ground in 2018 after broadly underperforming through 2017. The ongoing tightening cycle set against firm economic growth should underpin USD strength with the market underpricing the trajectory of rate hikes. Tax reform uncertainty is the chief source of downside risk.

Canada dollar – Caution for now

- The Bank of Canada adopted a more cautious tone in the face of elevated household debt with a pause in the tightening cycle likely to limit near-term CAD support. Tighter monetary policy through 2018 should provide scope for renewed strength, though risks around NAFTA renegotiations will be watched closely.

Euro – Potential weakness

- The long path towards normalisation of monetary policy signaled by the ECB surprised the market, and ostensibly ended the euro's rally. The continued adoption of a "lower for longer" stance will likely keep the euro under pressure over the coming year.

British pound – Under pressure

- Brexit uncertainty and a continued squeeze on U.K. consumers underpin our expectation for a weaker GBP next year. With no further rate hikes expected in 2018, as the Bank of England downplays inflation concerns, potential support for GBP is likely to be limited.

Japanese yen – Possible underperformance

- With monetary policy likely to remain highly accommodative in Japan, as others move gradually towards normalisation, we would envisage the yen underperforming. Continued sensitivity to exogenous factors, such as swings in risk appetite, is likely to make trends difficult to spot amongst heightened volatility.

Commodities

Oil – Eye on OPEC

- Global oil inventories fell for the third consecutive quarter in Q3 2017. The rebalancing effort will push into 2018, with OPEC contemplating a further extension of the current production cut agreement beyond March 2018.
- The International Energy Agency (IEA) revised oil demand growth higher to 1.6% in 2017 following a strong Q2, and expects 2018 growth to moderate slightly to 1.4%.
- A significant push of prices past $55 per barrel will likely be curbed by resurgent shale output.

Natural gas – Obstacles of oversupply

- The Industrials sector is expected to emerge as the main engine of natural gas demand growth, according to IEA, but power generation also continues to expand, albeit at a more modest rate.
- Oversupplied markets will likely keep pressure on prices and discourage new upstream investment in gas production.

Gold – Pricing limbo

- Geopolitical risks remain a supportive factor of spot prices, but the prospect of higher U.S. interest rates could keep a lid on price momentum.

Base metals – China's important impact

- We expect global economic growth to moderate slightly in 2018 as real estate investment slows in China and the impact of 2016–17 stimulus wanes. Infrastructure spending in China will remain key for base metals prices, and the "One Belt, One Road" initiative could provide potential upside depending on the scale and speed of execution.
- Near term, most base metals have ample supply, leaving them vulnerable to downside pressure if demand doesn't materialize.

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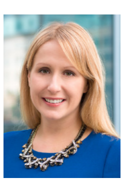

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Pressure points

While the pace of the U.S. economic expansion has been more muted than usual, its duration has been impressive. We think there's wind left in the sails—good news for the global economy and for equities. But prudent investors are always on the lookout for signs of change on the horizon. We share our favorite gauges of recession risk.

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The U.S. and global economies are signaling there are additional equity market gains to come in 2018 and probably beyond.

Since WWII, all prolonged U.S. equity bear markets—declines of 20% or more—and related slumps in corporate profits have been associated with recessions. The only exception was the crash of 1987, which was short-lived and featured no associated profit decline. The stock market has typically peaked right before a recession or in the early stages of one. Most other equity markets tend to follow the same pattern—bear markets come with recessions.

Following we take a look at the status of our favorite recession indicators and other data that can provide clues about the durability of the economy and, by proxy, the equity bull market.

Beware a credit squeeze

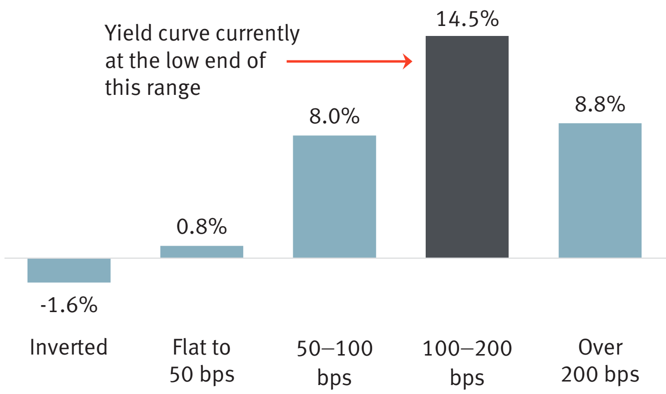
Since WWII, U.S. recessions have *always* been preceded by the arrival of restrictive credit conditions when loans have become prohibitively expensive for borrowers and difficult to get at any price. The gap between short-term and long-term interest rates has been a reliable guide to the ease or tightness of credit conditions.

Long-term rates are usually higher than short-term rates. But during Fed tightening, the gap between short-term rates and longer-term bond yields usually narrows, indicating that credit (liquidity) is in short supply. In the postwar era, whenever the gap between 90-day Treasury bill rate and the 10-year Treasury note yield has narrowed to less than 30 basis points (bps) the economy has weakened significantly. All recessions since the war were preceded by such a tightening.

Today the gap is about 115 bps, comfortably above the “less-than-30 bps” danger zone, and is still within the range that historically delivered attractive equity returns (see top chart).

S&P 500 returns by yield curve steepness

Yield curve measured by 10-year minus 3-month yields (in bps)

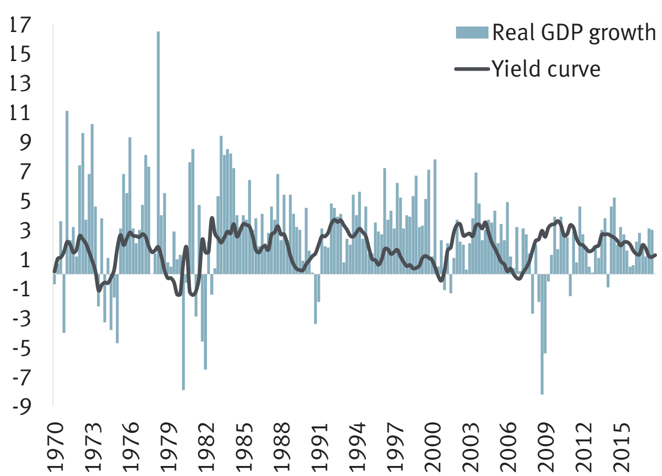


Typically the market performs well unless the yield curve is nearly flat or inverted.

Note - Data represents the average of S&P 500 returns 12 months after the yield curve observation.
Source - National research correspondent, Haver Analytics, Standard & Poor’s, Federal Reserve; data from 1954 to November 13, 2017

GDP wilts when the yield gap approaches zero

10-year to 3-month Treasury yield curve and U.S. real GDP growth (%)



The yield gap is safely above the economic danger zone.

Source - RBC Wealth Management, Bureau of Economic Analysis, Federal Reserve; quarterly data through Q3 2017

The unemployment rate tells the tale

The unemployment rate tends to move steadily upwards in recessions and downwards through economic expansions. Unemployment turning higher on a trend basis is usually one of the most dependable signals that a recession has begun or is about to begin.

The unemployment rate has been trending lower since shortly after this economic expansion began in late 2009. Today, at 4.1%, it is about one-tenth of a percentage point away from an 18-year low and only six-tenths above a 50-year low.

In our view, it will be some time before the unemployment rate turns convincingly higher, a negative signal that a recession lies immediately ahead. But when the trend in the unemployment rate does turn higher, history suggests that investors should strongly resist the urge to rationalize away the uncomfortable message it will be conveying.

Jobless claims give early warning

Unemployment insurance claims have always signaled the arrival of a U.S. recession in advance. Claims have typically set a cycle low one-to-four quarters before a recession gets underway. And the trend of claims reverses and pushes higher at least a few months ahead of a recession.

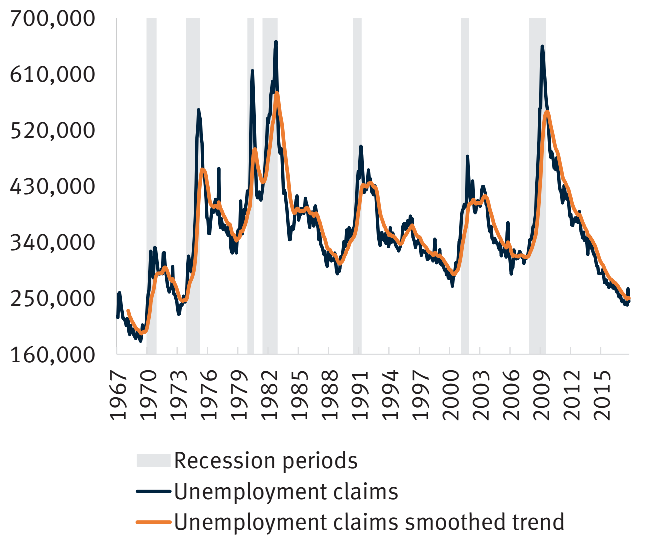
Jobless claims are at a new all-time low when described as a percentage of the labor force.

Currently, there are more than 6 million jobs available and unfilled in the U.S. Hiring is elevated while layoffs remain low. Fifty-nine percent of small and medium-sized businesses report they tried to hire last month, but 88% of those failed to find qualified candidates.

Jobless claims are at a new all-time low when described as a percentage of the labor force. The smoothed trend is decisively downward. We believe it would take several quarters of deterioration before this data would signal a U.S. recession was imminent.

Jobless claims in a strong downtrend

U.S. unemployment insurance claims



Investors should take notice when unemployment claims reach an inflection point.

RBC Wealth Management, Federal Reserve Bank of St. Louis (FRED); data through 10/31/17

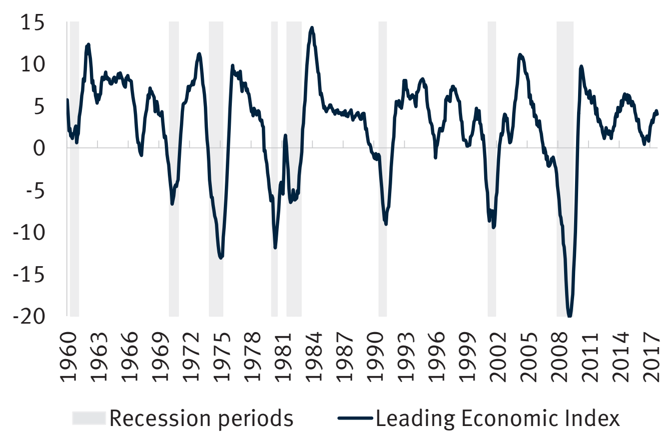
Leading Index leads the way

The U.S. Leading Economic Index from the Conference Board has done a good job of flagging the rising risks of a recession's arrival in advance. The Board's 10-factor model, incorporating proprietary factor weightings, is based on broader, more diverse inputs, engendering a high level of confidence as a result.

The year-over-year change in this index has always fallen below minus 5% immediately before or a few months after a recession has started. Any drop below zero should be noted. Today the year-over-year percentage change in the index sits at plus 4%. In our judgment, a persuasive negative signal from this indicator is nowhere in sight and is unlikely to be for some time.

A recession unfolds when this indicator plunges

Conference Board U.S. Leading Economic Index of 10 economic indicators (y/y % change)



A drop below zero spells trouble for the economy and equity markets.

Source - RBC Wealth Management, Bloomberg; data through 9/30/17

Interest rates far from restrictive

"How high do rates have to go before they choke off growth in the economy?" is a difficult question to answer after 70 years during which short-term interest rates "round-tripped" from 1% in 1950, to 18% in 1980, and back to 1% today.

It would seem to be quite a while before rates reach a critical level and choke off growth.

What we can say is that over the past 60 years, the federal funds rate has climbed above the nominal growth rate of the economy a few months prior to the onset of each recession. (The "nominal growth rate" is the rate before adjusting for inflation. The rate that is usually reported is the "real rate," which has the effect of price inflation removed.)

Today, the effective fed funds rate is 1.10% and the year-over-year nominal growth rate of the U.S. economy is 4.1%. So if the nominal growth rate flat-lined over the next two years then the fed funds rate would have to rise by more than 3% for this condition to be satisfied. That's 12 hikes of 25 bps. Given the Fed's guidance that, after a December increase, the Federal Open Market Committee expects to hike three more times in 2018, it would seem it will be quite a while before rates reach a critical level.

Even if the nominal growth rate declined to just 3%, it would require more rate hikes than the Fed currently has penciled in through the end of 2019.

Stockpiles and demand

The ISM Manufacturing Index is closely watched as a harbinger of future economic activity. However, in our view, while it tells a lot about current activity it is much less useful as a leading indicator. But two subcomponents, the New Orders Index and the Inventory Index, when combined do tell something useful about where the economy is heading next. Whenever an index comprised of ISM's New Orders Index minus the Inventory Index falls below zero, recession risks are elevated. This measure has occasionally given a false signal—calling a recession when none arrived—but it has never failed to give some useful forewarning of every recession since the late 1940s.

The current reading from this indicator is a comfortable plus 8.6%.

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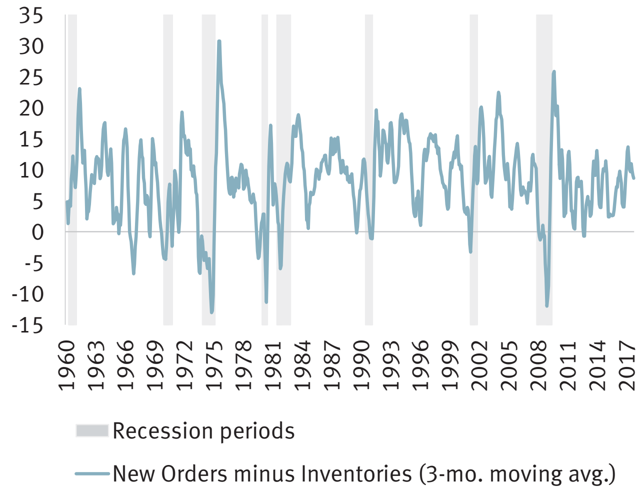
"All clear" for now

ISM Manufacturing New Orders Index minus Inventories Index
(3-month moving average)



Until this indicator approaches zero, recession risks are typically not elevated.

Source - RBC Wealth Management, Institute for Supply Management, Bloomberg; data through 10/31/17

Early warning indicators all flashing "green"

For much of the postwar era not only the U.S. equity market, but those of most developed economies have moved to the cyclical drumbeat of the world's largest economy. For a global equity investor, seeing a U.S. recession coming in advance or at least acknowledging one when it arrives have been important components in the risk management toolbox.

Several of the indicators cited above have outstanding track records at giving such advance warning. All of them, taken together, in our judgment, provide a valuable risk assessment framework.

As things stand, none are giving any indication a U.S. recession is on the horizon. We expect it will be some time before they do. Until then, as has been the case for several years, we think the appropriate course is to give equities the benefit of the doubt.

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New kids on the blockchain

Looking back at 2017, cryptocurrencies stole the headlines, with Bitcoin enjoying a spectacular sixfold increase in value. Despite this interest, we surmise that cryptocurrencies are unlikely to replace fiat, or traditional, money. However, the technology which underpins cryptocurrencies, blockchain, could have wide-ranging implications in many industries and for investors in the medium-to-long term.

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Crypto creep?

Cryptocurrencies use decentralised technology called "blockchain" that enables users to make and receive payments and store money anonymously without the need of an intermediary. Bitcoin, with a market cap approaching that of McDonald's, is the most recognised, and makes up over two-thirds of the market capitalisation of the top 10 cryptocurrencies. Given its astonishing ascent and with more cryptocurrencies emerging, many are questioning whether they are the future of money.

Despite this year's hype, Eric Lascelles, RBC Global Asset Management's chief economist, believes cryptocurrencies are unlikely to replace traditional money in the short and medium term for several reasons.

Firstly, they are not a store of value as are traditional currencies. After all, we hold our countries' currencies because we expect to trade them for a future good or service in an economy backed by a legal, political, and economic system. Bitcoins are not created by a central bank, but by a network and complex algorithms, or computer instructions. Secondly, there is no legal recourse as cryptocurrency ownership is anonymous—hence, no one to pursue in case of a theft, or hack.

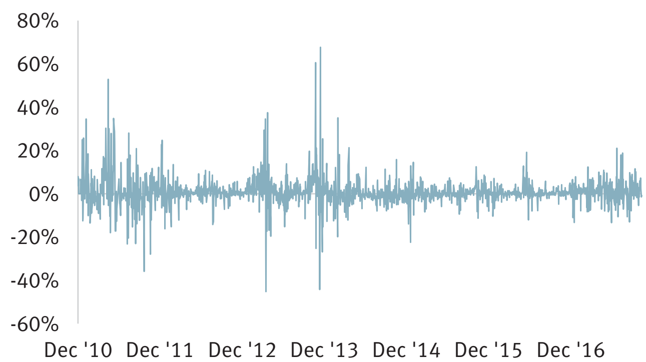
Top five cryptocurrencies

Cryptocurrency	Price (USD)	Market cap (USD billions)	Initial date
Bitcoin	$7,376.55	$122.9	2009
Ethereum	$302.04	$28.9	2015
Bitcoin Cash	$624.13	$10.5	2017
Ripple	$0.21	$8.0	2012
Litecoin	$56.10	$3.0	2011

Bitcoin dominates.

Source - RBC Capital Markets, RBC Wealth Management, Coinmarketcap; data as of 11/6/17

Daily change in Bitcoin (BTC) price %



A daily variation in price of 10% either way is not unusual.

Source - RBC Wealth Management, Bloomberg; data as of 11/7/17

Finally, their value is both "unstable and widely unpredictable," as depicted by the chart directly above.

In the long term, full replacement of traditional currencies is unlikely, in his opinion, though he acknowledges this picture is somewhat hazy. The biggest advantage of using cryptocurrencies at the moment is the ability to transfer money not only cheaply, as it is a peer-to-peer system which cuts out the middle man, but also without being detected. In effect, they can be used to evade the supervision of unlawful money transfers.

Lascelles surmises that governments are likely to intervene. China banned Bitcoin earlier in 2017, as it was being used to elude capital controls and transfer funds out of the country. Even in countries without capital controls, governments are likely to want to pin down fund flows to track taxation and potential criminal activities. Because cryptocurrencies do not enable this, Lascelles expects governments are likely to regulate them ever more tightly if their popularity grows. And as more pressure is put on cryptocurrencies to leave a paper trail, the cheapness of transferring funds could also erode, making them less attractive instruments, in his view.

While not necessarily displacing fiat currencies, cryptocurrencies could change the global economic system as more individuals use them and more companies launch them, according to RBC Capital Markets. Certainly, it is an area of increasing policy focus.

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Chain reaction

While there are hurdles to cryptocurrencies replacing traditional money, the underlying technology, blockchain, seems to hold considerable promise and could redefine several industries' rules of operation, in particular those with recordkeeping at their core.

Blockchain is in effect a giant database, or ledger, that can maintain an ever-growing list of data. It is a distributed ledger; it is not kept nor altered in a centralised manner by an institution, but collectively by users. All data "blocks" are encrypted—they cannot be changed or erased without leaving a record of previous blocks thanks to proprietary algorithms designed to protect data. As such, the data records seem to be manipulation-proof and much more difficult to hack.

Blockchain's decentralised nature is considered less prone to errors, in effect making many aspects of recordkeeping simpler and safer, while dramatically reducing paperwork and costs. It is a potential solution for hard-to-maintain, complex databases.

Blockchain's decentralised nature is considered less prone to errors, in effect making many aspects of recordkeeping simpler and safer, while dramatically reducing paperwork and costs.

To illustrate, blockchain could be used to keep track of the history of a car, with records of the initial purchase, the mileage, and where the car has been driven, as well as its repair history, making buying a used car much less of an adventure.

Blockchain and RBC

The financial services industry is one of the leaders in evaluating blockchain's potential, and RBC is a case in point. In an interview with *Reuters*, while RBC CEO Dave McKay stressed the technology is still in its infancy, he asserted that by bypassing a centralised third party, blockchain can reduce frictions and expand banks' payments and transfer network more easily with more flexibility than current systems. He believes the technology is likely to play an important role in the industry's future, transforming the way money is moved and stored.

RBC, like many banks, has been experimenting with blockchain in its personal, commercial, and capital markets businesses. The bank recently announced the implementation of a blockchain-based shadow ledger for cross-border payments between the U.S. and Canada. The pilot project's performance is being scrutinised by management, which is acutely aware of the need to clarify legal, regulatory, and security questions, including around the enforceability and reversibility of transactions. Other applications for banks would be keeping up with regulatory requirements around knowing their customers and applying anti-money laundering rules.

In time, if blockchain can help banks be more efficient and lower costs, it could also put cost-intensive payment systems, such as bank transfers and credit card payments, under pressure.

Chain links

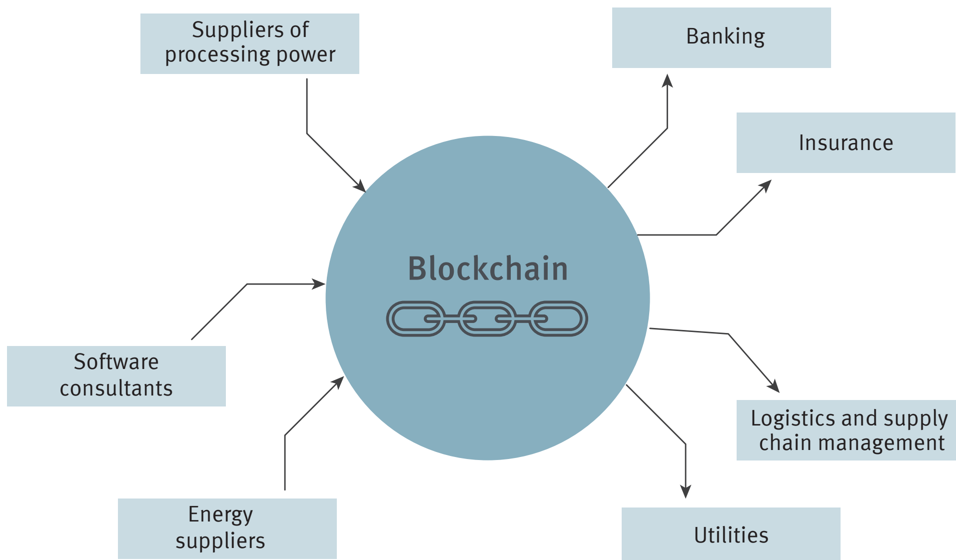
The use of blockchain is also being observed outside banking. Consultancy PwC estimates that annual savings of \$5B–\$10B in reinsurance are possible with the application of blockchain, thanks to improvements to data processing and claims settlement, and the reduction in fraud it could bring. Major stock exchanges and clearing houses are also testing the technology.

Outside financial services, utilities could make significant use of blockchain technology to replace their current costly administrative networks that often require human input into many databases. Possible applications, according to PwC, include peer-to-peer retail and wholesale trading of energy as well as metering and energy consumption billing, among others.

There are also many ongoing projects to test the technology for logistics and supply chain management purposes. For example, retailers are piloting the technology for provenance and safety tracking of the goods they sell.

Unlocking the chain

Blockchain ecosystem: Investing directly in blockchain is tricky

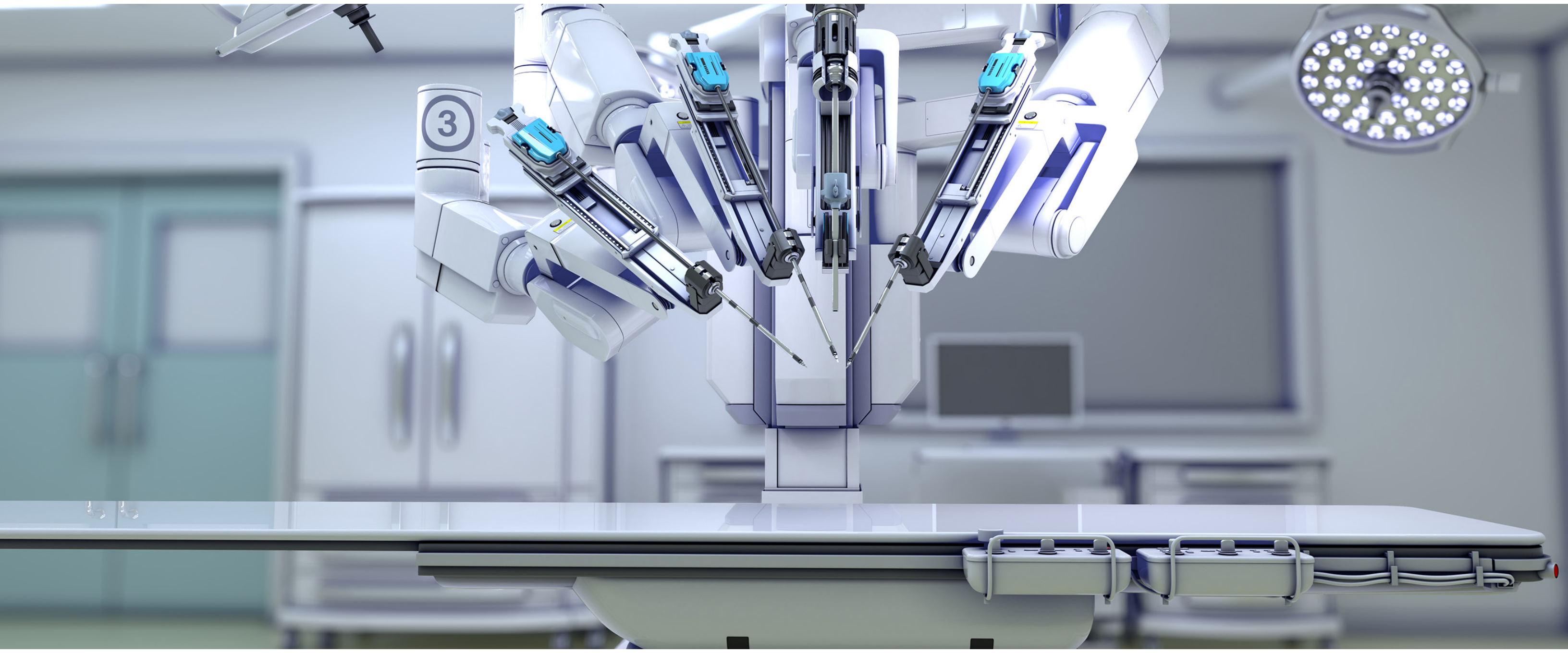


Source - RBC Wealth Management

Publicly listed pure plays on blockchain providers are few and far between and do not tend to have an established track record, which make them a risky proposition. Blockchain leaders within established business models make the most sense, though the technology is unlikely to influence group earnings at this stage.

Investors wanting exposure to this promising technology could also look at software consultants, tasked with testing or integrating the new technology. Hardware providers, such as companies making the processing units used to generate cryptocurrencies, could be an alternative, though these have already had a good run. Companies poised to benefit from successful implementation of this new technology are also possibilities, though several other factors are likely to determine share price performance in the short term.

It is still early days to gauge the impact of this new technology. More testing must be done as the security of blockchain might yet prove fallible in the hands of the hackers of the future. Moreover, the scalability of the technology has yet to be tested and, as it sucks up a lot of energy as a computer-based solution, its proliferation could yet be limited by the current capacity of the grid. Yet, its potential makes it a technology well worth watching closely, which we intend to do.



Just what the doctor ordered?

Health care is rapidly adopting cutting-edge innovations that could bring about fresh sources of growth. The convergence of technology and health care will likely expand the horizons for patient care and for investment opportunities in the Health Care sector.

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The sweeping innovations in the global technology sector are not happening in a vacuum. Increasingly, other segments of the worldwide economy are benefiting from high-tech advances.

We believe the health care industry stands to gain as technology will play a greater role in transforming patient care and speeding up the development and delivery of medical advances, while at the same time opening new frontiers of growth for companies involved.

In the past, health care has been "notoriously technophobic," according to a top-ranked medical university in tech-rich San Francisco. But that is changing as tech-related innovations begin to bear fruit for the industry.

There are a myriad of ways tech and health care "convergence"—the intertwining of the two industries—could bring about additional sources of growth within health care, providing attractive opportunities for long-term investors.

Big data is a big deal

The early stages of tech and health care convergence centered on advancements in electronic medical records. But now convergence is about much more, and partnerships between large firms are becoming commonplace.

Just what the doctor ordered?

The explosive growth of "big data" has created a new field of digital epidemiology.

The explosive growth of "big data"—massive amounts of digitally generated data that reveal human behavioral patterns—has laid the foundation for health care providers and research institutions to integrate digital technologies into the study of diseases in large populations, in the process creating a new field of digital epidemiology.

For example, Genentech can analyze billions of patient records in seconds and identify patterns much more effectively and efficiently based on big data systems it has built over the past three years. This speed would have been unheard of for much smaller batches of records even five years ago. This U.S.-based biotech firm, owned by Switzerland's Roche Holdings, has the most substantial data science unit among biotech and pharma companies worldwide.

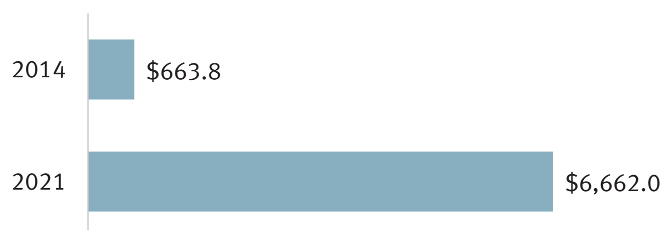
App, app, and away

Convergence will not stop with big data.

More advanced data methods, such as artificial intelligence (AI) and machine learning, will likely play a greater role in disease management and will enable health care practitioners to customize treatments based on specific, individual needs.

Global artificial intelligence market for health care applications

U.S. $ millions



Analysts forecast a 10-fold increase in the AI health care market.

Source - Frost & Sullivan, PwC

Health care providers are already taking the first steps in communicating with patients via tech apps. The Mayo Clinic provides first aid advice through Amazon's Echo devices. Users can ask Mayo what to do about minor ailments or illnesses. It is powered by Alexa, Amazon's cloud and AI-based personal assistant service.

In coming years, mobile applications and devices will increasingly monitor chronic diseases and treatments on a real-time basis. Patients may ultimately get advance warning of potential health problems before they even have symptoms.

Following are just two examples of advanced data initiatives that could take health care well beyond our imaginations of just a few years ago.

Medical device firm Medtronic is partnering with IBM's Watson supercomputing unit to analyze data from 125 million diabetes patients. Watson's machine learning architecture will power Medtronic's diabetes apps with real-time glucose data to help patients more effectively and easily manage the disease. And the technology should enable Medtronic to improve diabetes treatments overall.

Chinese startup iCarbonX seeks to capture DNA data, other biological samples, and a myriad of health, lifestyle, and environmental data in order to continuously monitor users' health and recommend wellness programs and behavioral changes, potentially before illnesses or diseases strike.

iCarbonX is no ordinary startup. Its founder hails from one of the world's leading genomics firms and it has financial backing from WeChat, China's biggest social media app, which is owned by internet giant Tencent. It is one of more than 100 AI-oriented health startups worldwide that have cropped up in the past few years, according to CB Insights.

Paging Dr. Robot

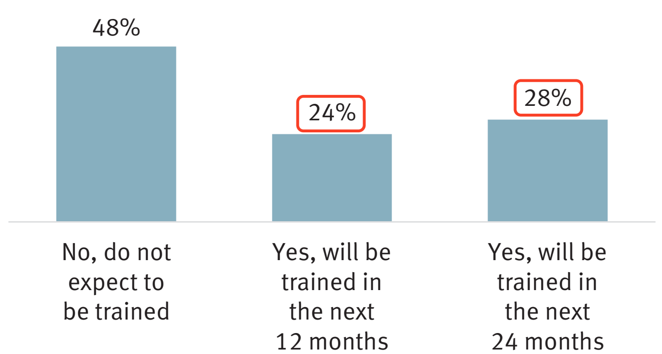
Robotics could reduce surgical complications, thereby improving patient outcomes while cutting costs.

We find the area of surgical robotics particularly compelling due to the potential health benefits and market share gains.

The integration of robotics into general surgery procedures should increase significantly in coming years. It could reduce surgical complications, thereby improving patient outcomes while cutting costs.

RBC Capital Markets estimates that robotics represents only 5% of the U.S. general surgery market, and could gain share quickly. Based on our analyst's survey of surgeons, robotics is now used in roughly 15% of colorectal procedures, but that could rise to 39% in five years. Robotic devices play a role in about 9% of hernia surgeries, and could increase to 31% five years from now.

Survey question of spine surgeons: If you have not been trained on any robotic systems for spine procedures, do you expect to be trained over the next 24 months?



Slightly over half of U.S. spine surgeons expect to be trained on at least one robotic system over the next 24 months.

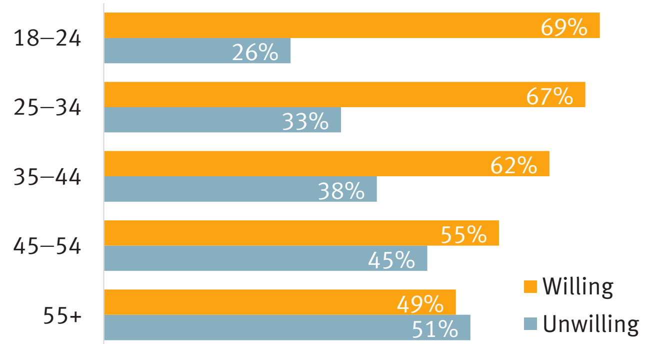
Source - 2017 RBC Proprietary Spine Surgeon Survey; October 2017 report

Intuitive Surgical is currently the surgical robotics market leader, but other companies are challenging the firm.

For example, diversified health care heavyweight Johnson & Johnson and Verily Life Sciences, a unit of Alphabet (the group of companies that includes Google), are partnering to develop surgical robots through startup firm Verb Surgical. It seeks to take the technology to the next level. In an interview with MDDI Online, Verb's CEO said, "We call it digital surgery … Instead of having robotics that is used in just 5% of procedures and it's like a mainframe computer, we're thinking of robotics like it's a PC. It's always there, it's always on."

Percentage of respondents willing/unwilling to engage with AI and robotics for their health care needs (by age)

Survey of adults in Europe, the Middle East, and Africa



No surprise, younger people are more willing to embrace AI and robotics for health care.

Source - PwC survey, June 2017

The future is arriving

There are many other convergence initiatives in the works or already in the market.

For example, what is normally found in a semiconductor chip is being integrated into contact lenses. Alcon, an optical division of Switzerland-based Novartis, is partnering with Verily to develop "smart" lenses for diabetics that can continuously monitor glucose levels. The lenses actually contain tiny integrated circuits and sensors, and can communicate via wireless technology.

The potential for convergence to spark productive advances seems open-ended to us.

U.K.-based GlaxoSmithKline (GSK) is working with Verily on bioelectronics innovations, specifically for neurotransmitters. Researchers are attempting to fine tune nerves in order to regulate a group of neurons and improve patient outcomes for those who don't respond to traditional treatments.

Using supercomputing simulations, engineering, data science, and AI, GSK is also attempting to significantly accelerate cancer therapy development from the current six-year average to only 12 months as part of a newly formed public-private consortium that includes Lawrence Livermore Labs, the University of California San Francisco, and the National Cancer Institute.

The field of medical imaging could also see big changes. The equipment will likely become much smaller, cheaper, and more efficient as deep learning technologies are integrated.

Also, virtual reality is being incorporated into medical school curriculum and research methods. It can do what textbooks can't. Students can "move" anatomy, from skin down to bones, and can even zero in at a microscopic level.

Scratching the surface

This is just a sampling of the innovations that are in the works as the fields of technology and health care become intertwined. The potential for convergence to spark other productive advances seems open-ended to us at this juncture.

While we favor investments in the Health Care sector over the near term due to attractive valuations and what we perceive to be overblown pricing and regulatory risks, the convergence of tech and health care has us enthusiastic about the sector's long-term potential as well.

Compliments of The Wealth Management Team of Stephanie Woo, FMA, CIM
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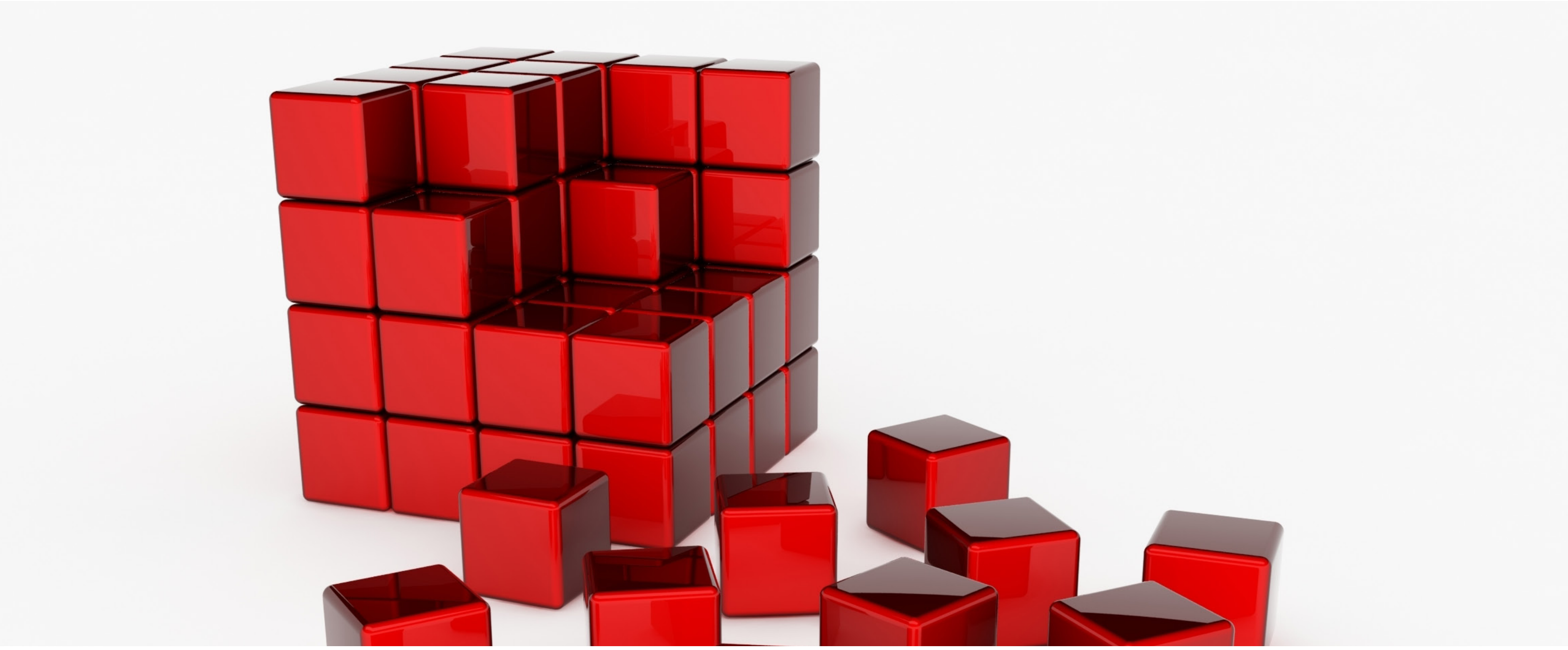

Managing the load

The prospect of moderately higher interest rates demands a closer inspection of the world's debt hot spots. RBC Global Asset Management's chief economist discusses debt challenges facing the U.S., China, and other major economies. While a debt upheaval is unlikely in the near term, longer-term vulnerabilities linger.

Eric Lascelles
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Q. As interest rates are being normalized, are there any debt threats that could surface in the near or medium term?

A. We are budgeting for a palpable increase in interest rates, and this does increase the vulnerability of all debt.

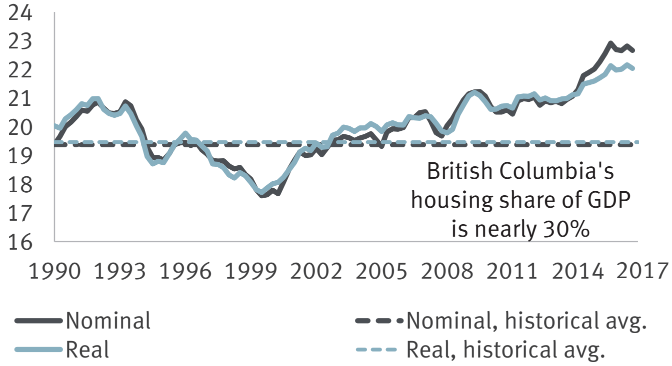
There are problematic debt situations in the world, but they're mostly manageable. Think of Venezuela which is likely to officially restructure/default on its $89B of debt. While a large amount, it's not world-altering and should be of limited consequence for global debt markets given that it has been widely expected.

Housing bubbles in the world and some of the leveraging that's happened in certain household sectors are more worrying, including in Canada and Australia.

Beyond this, there is Chinese debt risk and Southern European banks are still vulnerable, with high non-performing loans in Greece, Italy, and Cyprus.

In addition to these hot spots, we must recognize more generally, that with the global economy healthy, leverage is rising in many places, and investors are taking more risk as they seek additional return. Inevitably there will be some nooks and crannies that grow larger than they should, such as volatility funds or high-yield debt. One can easily imagine some pain coming eventually from one of these.

Canadian housing share of GDP (%)



The share is high, signaling risk.

Source - Haver Analytics, RBC Global Asset Management; historical average from 1990 to 2006; data through July 2017

Q. Chinese debt risk seems to have diminished. Is the country moving in the right direction?

A. Chinese debt is the biggest credit risk, with potentially global consequences. Fortunately, the associated risks have shrunk to some extent recently, and are thus less likely to manifest themselves in the near term.

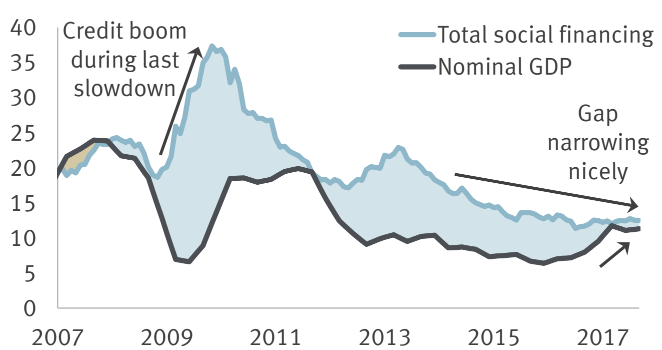
The good news on Chinese debt is two-fold. One is the country's recent pivot toward focusing on the quality of economic growth rather than simply targeting high economic growth. In so doing, Chinese authorities aim to be less reliant on credit which would very much reduce the risks going forward. In fact, Chinese credit growth is already slowing quite considerably. We'll see if that sticks.

Less appreciated are the bad loans on Chinese banks' books. The loans aren't housing-related as widely thought, but are linked to heavy industries like steel and cement—mainly state-owned enterprises. Happily, these industries have begun significant consolidation efforts, prodded by a government effort to reduce excess capacity. As a result, bad loans seem to be shrinking quite quickly.

And so, the potential trigger for a Chinese debt crisis has faded in the near term, but I would still say China deserves a place of prominence in any list of medium-

Chinese total social financing or credit growth

Year-over-year % change



Chinese credit growth is increasing at a pace much closer to nominal GDP growth.

Source - China National Bureau of Statistics, The People's Bank of China, Haver Analytics, RBC Global Asset Management; data through September 2017 term debt risks given the magnitude of corporate debt and how quickly it has accumulated.

Restrained credit growth is one of several reasons why we expect the Chinese economy to slow over the next few years.

Q. Given U.S. federal debt-to-GDP is forecast by the Congressional Budget Office to surge to 150% over the next 30 years from 77% currently, is the U.S. vulnerable?

A. I'm not convinced that the U.S. is going to encounter a debt crisis. A 150% debt-to-GDP ratio is not necessarily unsustainable, at least for the U.S.

If any country can handle a whole lot of debt and still attract the necessary capital, it would be the U.S.

At the very start of the financial crisis, prominent academic research stated that a 90% government debt-to-GDP ratio was a threshold. And beyond that level, economic growth would suffer materially. It's not clear that's true. In fact, the International Monetary Fund did some subsequent work and argued that there was no obvious threshold—it is more likely that the causality is reversed: slow growth translates into high debt.

Even if debt-to-GDP does rise to 150%, I suspect the U.S. will still be able to borrow at a relatively low rate since the U.S. debt market and the U.S. financial markets more generally are the deepest and most liquid in the world. Moreover, the U.S. dollar is the world's main reserve currency. As such, if any country can handle a whole lot of debt and still attract the necessary capital, it would be the U.S. I would not blink an eye if in 50 or 70 years the U.S. debt-to-GDP is sitting at 230%, just like Japan, with a similarly low interest rate.

It's hard for me to envision the bond market complaining much about U.S. sovereign debt over the next decade. So as much as I would love for the U.S. debt profile to be on a more sustainable track, I don't look for this to be an essential issue.

Q. How should investors think about debt crisis risk in their portfolio if there is no real imminent debt crisis foreseeable at the moment?

A. I think it's more about recognizing that debt is one of several threats to the broader economic landscape that might at some point undermine economic growth and have a broad impact on financial markets as a whole.

These potential debt hot spots are not guaranteed to blow up. They are mainly just things that will be lingering in our mind over the next five to 50 years, and cause us to be slightly less risk-seeking than otherwise in our investments, but hardly cowering in the corner either.

Two factors are worth watching. One will be the business cycle. We believe this expansion could end in more conventional ways, with the economy overheating, such as it did in the U.S. in the early '90s, as opposed to the last couple of go-arounds when there was a full-on bubble or debt crisis that took the economy down.

And so we are also watching for evidence of rising leverage and debt levels, not because it's likely to create a full-on debt crisis, but because it can be a contributing factor to a cooler economy later.

Research resources

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