

# E.Q Trendwatch™

## The Next Big Shift



*“Thinking is the hardest work there is, which is probably the reason why so few engage in it.”* –Henry Ford

*“You can’t change the conditions of a system without damaging a lot of people, business, practices and habits that go with it. People lose not from some fault of their own, but because they are in the wrong place in history.”* – Anne Norton Green, Historian, Author

Throughout the early-ages, horses were the transportation of nobles and people of means, while everyone else had to walk or be pulled by oxen-cart. In the late 19<sup>th</sup> century, however, the use of horses for all things transport became so pervasive that the four-legged wonder was referred to as a “living machine”.

By the 1890’s, New Yorkers were taking some 300 horse-driven transportation modes annually per person. Horses were so plentiful in urban centers it was said that a banker could encounter more horses in Boston than a cowboy in Colorado.

Despite the advent of steam and coal-powered machines, horses were deemed superior for their ability to move economically in any direction, quickly and over difficult terrain in all types of weather. Steam engines in comparison were expensive, dirty, slow to reach operating temperature, and restricted to life on a track. In 1894, a US steam engine expert by the name of Robert Thurston noted that horses were not only, *“self-feeding, self-controlling, self-maintaining and self-producing, but they are far more economical in the energy they are able to develop from a given weight of fuel material, than any other existing form of motor.”*

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History agrees. Between 1840 and 1900, the number of living machines used for farming and transportation ballooned six-fold from four million to twenty-four million and therein lay their demise. Congested cities had 500 horses per square mile and each one was capable of releasing a gallon of urine and 20-50 lbs of manure on the street each day, spreading human disease with it:

*“Nineteenth century urbanites considered the stench or miasmas produced by the manure piles a serious health hazard, but cleaning was sporadic at best. Manure piles also produced huge numbers of flies, in reality a much more serious vector for infectious diseases such as typhoid fever than odors. By the turn of the century public health officials had largely accepted the bacterial theory of disease and had identified the “queen of the dung-heap” or fly, as a major source. Inventors and city officials devised improved methods of street cleaning, and street sweeping became a major urban expense. Increasingly, however, it became obvious that the most effective way to eliminate the “typhoid fly” (so named by L.O Howard, chief of the Bureau of Entomology, Department of Agriculture and a leader in the campaign against flies), was to eliminate the horse.”*

--“The Centrality of the Horse to the Nineteen Century American City”, C. McShane (1997)

### The evolution of urban vehicle propulsion systems 1827 to 1973

Omnibus		horse-drawn carriage that ran along a fixed route	1827 - 1907
Horsecar		horse-drawn streetcar that ran on tracks	1832 - 1917
Elevated train		train that ran on above-ground tracks	1869 - 1973
Cable car		streetcar operated by underground steam-driven cable conduits	1883 - 1909

By 1900 ‘horseless carriages’ were appearing on the scene. As with horses before them, automobiles were viewed as play-things for the wealthy—noisy contraptions with no utility but to alienate the poor. Then President of Princeton University, Woodrow Wilson, encapsulated the

sentiment in 1906: *“Nothing has spread socialistic feeling more than the use of the automobile...a picture of the arrogance of wealth”.*

Early manufacturers turned out three different propulsion systems: steam, electric and a new, unperfected, internal combustion engine (“ICE”). Steam-powered “Locomobiles” were the earliest. Steam had proven dependable with rail transport, but for personal transportation there were two central drawbacks. First, range depended on access to water, and without sufficient supply on a given route, owners would literally run out of steam. Second, in cold temperatures it could take the boiler 45-60 minutes to reach operating temperature.

The *Stanley Steamer* engine (on right) was considered one of the best of the era; but clean operation and ample power could not outweigh its shortcomings. Twenty-two years after its founding in 1902, the Stanley Motor Carriage Company was defunct along with many of the companies tied to its success. General Motors tried to resurrect the technology in 1969 with a steam-powered SE124 (Chevelle) and SE101 (Pontiac Grand Prix). The cars weighed 600lbs more than their V8 engine counterparts, with half the horsepower, so the experiment ended quickly.



## Electrics

In 1842, early EVs with rechargeable batteries were devised by two separate inventors at the same time: Thomas Davenport in America and Robert Davidson in Scotland. Forty-six years later, in 1888, the first AC induction electric motor was demonstrated and patented in America by inventor Nikola Tesla, after Thomas Edison's 1882 patent of the lightbulb drove the electric infrastructure to enable charging hubs.



Electric vehicles (EVs) became the mode of choice for wealthy city residents and New York City was filled with them. An estimated 90% of NY taxis (pictured left) in the early 1900's, were powered by electricity.

Taxi drivers and private owners marveled that EV's were quiet, smooth, simple to operate, no gears or transmissions to contend with, had lavish interiors similar to horse-drawn coaches, no toxic emissions, offered instant power and were simple to



maintain. They were also ready to use at a moment's notice with no boiler to wait for or dangerous crank starter with which to wrestle. Automotive engineer Ferdinand Porsche liked the technology enough to make the first car he ever designed electric with an "in-wheel electric hub" motor in front (pictured on right).



The two significant drawbacks of electric coaches were price and range. Despite having far fewer parts, their batteries made the vehicles more expensive to build. Also, as with its steam-powered cousin, the limited distance one could travel with a rechargeable battery restricted it to in-town trips. This was unattractive to an increasingly urban population wanting to explore beyond city limits. Then three major blows quashed EVs.

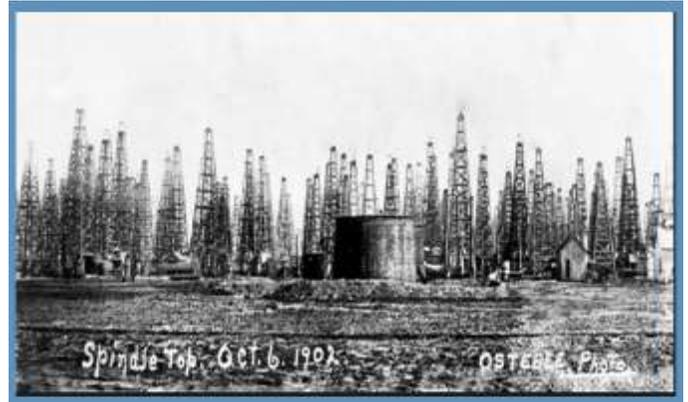
Starting in 1908, Henry Ford's internal combustion 'Model T' offered unfettered range into the countryside. Though initially marred by noise and frequent breakdowns, Ford's new moving assembly line in 1913 (pictured above), dramatically boosted reliability and reduced cost.

The new assembly method could complete a vehicle in just two and a half hours, where static lines took more than twelve. This allowed Ford to slash the price of his car, making them affordable for the average worker while still turning a profit. At just \$500 for the base version, the Model T sold for 50 and 60% less than steam or electrically powered models, and enabled Ford to take market share from everyone including other ICE competitors.

Ironically, another thing that tipped preference in favour of combustion engines was the 1916 addition of the electric 'self-starter' invented by Charles F. Kettering



(pictured left). This device saved drivers physical exertion and injury-risk in hand-cranking combustion engines, and this greatly increased their appeal.

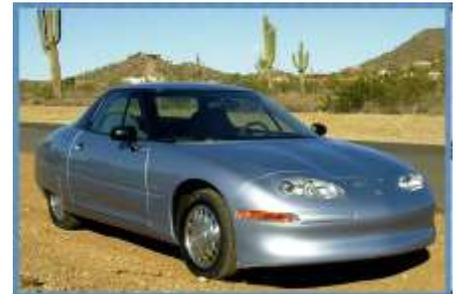


About the same time, drilling near Beaumont, Texas in 1901 tapped the first salt dome oil discovery and gushed thousands of barrels from Spindletop (pictured above). The find encouraged exploration and drilling in Texas that continues today and helped fuel the combustion engine as the propulsion system of choice in the 118 years since.

### GMs EV1: The electric car returns

In 1990, General Motors unveiled an electric concept car called *Impact* which caught the imagination of consumers and regulators alike. To combat rising air pollution problems, the California Air Resources Board (CARB) mandated the production of zero-emission vehicles (ZEV) for automakers who wanted to continue marketing vehicles in the state.

GM evolved its *Impact* car and produced the *EV1* from 1996 to 1999 (pictured right) as the modern era's first mass-produced electric vehicle (EV). The car was available by lease only, and owners were part of GM's feasibility study of commuter EVs in California, Arizona and Georgia.



Although just two seats and a range of less than 100 miles, the car was a big hit with drivers. However, automakers soon realized that fewer parts, less friction and maintenance, meant EV's were long-lasting and less profitable for service-reliant dealer networks. ICE automakers joined forces to challenge California's ZEV stipulation in court and cleared the way for them to produce more profitable 'low-emission', natural gas and hybrid gas/electric rather than pure electric vehicles. In 2002, over passionate resistance from their drivers, GM collected its entire fleet of leased EV1 cars and crushed 99% of them. One was given to the Smithsonian Institute intact. Forty more were donated to museums and educational institutes on condition that their deactivated powertrains never be reactivated or driven on roads again.

The 2006 award-winning documentary *Who Killed the Electric Car?* and its 2011 follow up *Revenge of the Electric Car* spotlight the EVs 1996 birth (well, twentieth century rebirth, at least), the 2002 death and 2003 third birth led by independent start-up Tesla Motors. Tesla founders said it was GM's destruction of the EV1 in 2003 that inspired them to action. The company's stated plan was to commercialize electric vehicles, starting with a premium sports car aimed at early adopters and then moving to more mainstream vehicles: sedans and affordable compacts. Against all odds, Tesla produced the Roadster sports car (2008), the Model S sedan (2012), Model X SUV (2015) and the compact Model 3 (2017), winning industry awards and driver acclaim.

**In 2015, news broke that Volkswagen had installed manipulation software as early as 2005 in order to hide that its 'low emission' vehicles were actually forty times more polluting than advertised.** In the four years since, legal actions have begun against every major European and American ICE automaker for similar acts of emission fraud. As company executives plead ignorance and legal teams negotiate financial penalties, studies confirm that air quality and human health have paid a heavy price the world over.

With 23 million sold there last year, China is the world's largest automobile market and, in 2018, toxic air quality led its government to follow California's emission control efforts. [China's New Energy Vehicle \(NEV\) mandate set a goal of selling 4.6 million EVs by 2020 and banning ICE vehicles over the long term.](#) (See [How China raised stakes re electric vehicles](#)).

Within 48 hours of China's NEV announcement, General Motors and Ford announced major EV initiatives, with GM offering plans for twenty new electric models by 2030. All of the legacy automakers have now committed to rolling out EV versions of their popular brands, starting this year.

**Amid slowing Chinese exports and record domestic debt, Chinese auto sales fell nearly 3% in 2018**—the first annual decline in more than 20 years—**while its EV sales rose 62%** to 1.3 million (4% of total vehicle sales). In April, [Chinese auto sales fell for the 10<sup>th</sup> consecutive month](#) but EV sales rose 60% to 360,000 year to date in 2019. Similar patterns are evident in American and European auto sales as well.

Recognizing the benefits of emission reductions, energy security and sector leadership along with needed revenue and jobs, over the past three years, twenty automakers and twenty countries have set EV targets. In September 2018 there were just over 4 million EVs in use around the world—more than double the number in 2015 and six times as many as in 2013. From here, the global growth potential is enormous.

Despite its history as a fossil-fuel producer and one of the world's largest exporters of natural gas, Norway draws nearly all of its electricity from a network of hydroelectric power plants, and its government has implemented incentives to move the country away from ICE vehicles. In March, 58% of all car sales in Norway were EV's. Tesla's mass market Model 3 starting at \$45k CAD (pictured on right) was especially popular, accounting for nearly 30% of new passenger vehicle sales (Norwegian Information Council for Road Traffic).



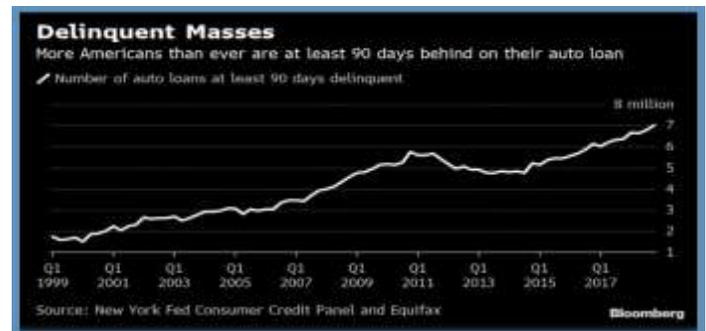
Now behind the curve, Ford's sales in China declined 36% year-on-year in the first quarter of 2019, while GM's

fell 18%. In April, auto sector layoffs rose 207% year over year. Ford announced this month that it will cut 10% of its global workforce; Daimler, BMW and GM have also launched large cost-cutting programs, noting that slowing global demand and trade pressures, combined with the need to retool factories and accelerate investment in electric and self-driving cars will lead to a [significant drop in their profits this year](#). (See [US sales tumbled in first quarter and BMW shareholders worry about Tesla's competitive advantage](#)).

**After ignoring the potential of EVs for so long, legacy automakers are now drowning in record inventories of old tech vehicles.** While credit was cheap, and sales-incentives rich, consumers were willing to take on record long financing terms. Producers ramped up output and dealers built expensive service centers on the hope that sales and associated maintenance fees would continue apace.

[Moody's reported in March](#) that average auto loan terms had increased to almost six years in Canada, while [the proportion of disposable income being eaten up by debt repayments reached a cycle high at 14.5% in the fourth quarter of 2018](#). At the same time, tighter lending and weak property markets on both sides of the border have pinched access to further home equity withdrawal loans (HELOCs aka house ATM).

While auto loan delinquency rates are still below historic averages in North America, more than 7 million Americans were at least three months behind on their auto loans at the end of 2018—more than in 2010 when delinquency rates last peaked (chart right).



Defaulting homeowners can move to rental accommodation, but personal vehicles are often a necessity for work and mobility. As such, [auto loans are usually the last thing people stop paying](#). The latest rise in delinquencies therefore suggests that financial strain is intense even with unemployment near cycle lows and incomes near cycle highs. [As revenue and incomes weaken in economic downturn, attention moves to lowering operating expenses and waste, working down debt, and building up savings and needed capital for investment.](#)

**The traditional EV drawbacks of price and range have seen significant improvement in recent years. [EV battery prices fell 84% between 2010 and 2018 while the standard range on a single charge has doubled.](#)**

With recent upgrades, Tesla's Model S can travel over 500km (300 miles) per charge while legacy automakers are rolling out their competitor EV models that average 320km (200 miles) per charge. *Autotrader* senior analyst, Michelle Krebs notes: *"We are on the verge of a transformation of the industry we haven't seen since Henry Ford. I think it's all up for grabs."* (See [Auto industry faces its biggest challenge yet](#)).

As with the horseless carriage and the horse before that, EVs were initially dismissed as expensive playthings, unattainable for all but the wealthy. Yes, a public transit pass is much cheaper; but for those who want or need to have their own vehicle, a **2018 study from the University of Michigan's Transportation Research Institute found that EVs now cost less than half as much to operate as gas-powered cars**. Not only that, but industry analysts forecast that [electric cars will be cheaper to buy than gas and diesel-powered versions within](#)

**five years.** Cost-competitiveness comes sooner once operational savings are accounted for.

EVs have no oil, fan belts, timing belts, fuel pumps or filters, clutch, transmission or spark plugs needing repair or replacement. Their motors play two roles: to propel forward and backward, and to capture the vehicle's kinetic energy and redirect it back to the battery when the accelerator is released. This regenerative 'braking' slows the vehicle and dramatically extends the life of brake pads. Presently EVs can fully recharge in 40 minutes at roadside superchargers, or in 4 hours at home while you sleep. At the same time, with 1/10<sup>th</sup> of the parts to repair, and the highest crash-safety ratings, EV auto insurance is significantly less expensive.

In July 2015, Tesloop launched the first electric car mobility service with ride share routes across southern California. The fleets run an average of 17,000 miles (30,000 km) per month. Tesloop's original Model S 90D, dubbed 'eHawk', surpassed 640,000 km (400,000 miles) in July of 2018, making it the EV with the highest reported mileage in the world, at that point (it's still active today). The company publishes a spreadsheet summarizing all-in vehicle operating costs which have totalled .05 cents a mile—77 and 80% less than a Lincoln Town Car (.22 cents/mile) and Mercedes GLS-Class (.25 cents/mile). [View the spreadsheet at this link.](#)

**Walking our talk...** After completing our own research and financial analysis, this month we traded in our old Blue-tech diesel ML320—which we had purchased a decade ago on the automaker's fraudulent representation that it was 'low emission'—for a used Tesla Model S with 25,000 km on the odometer.

Because Tesla has been making cars for eleven years now, there is finally a decent supply of used models available on the market. Buying used meant we paid about 35% less than the same model new, and nearly the same price paid for our SUV ten years ago. The 35% lower price more than offset the fact that used EVs do not qualify for any government subsidy in Canada. Where under four years old and less than 80,000 km, Tesla sells its used cars with an extended 4-year warranty (8 years for the battery). We intend to drive the vehicle for more than a decade. The drop in our operating costs was immediate:

- Our auto insurance fell 22% compared with the old car.
- Setting the vehicle to charge during off-peak utility hours, our fuel costs fell 94% from 13.8 cents per km for diesel to 1.3 cents per km for electricity. Our 90D goes 425km (264 miles) on a single charge.
- Software upgrades are done automatically over the internet as needed, so it's the only vehicle we have ever owned that will continue to improve over time.
- Annual maintenance costs are next to nil compared to an average of 2k a year for the ML 320. When small physical adjustments are needed, Tesla sends a mobile service to your house. Any major repair needed goes to the nearest service center.

**University of Calgary energy analyst and research fellow, Blake Shaffer, recently conducted his own analysis of EV math in considering whether they were beneficial for consumers.** Shaffer explained his findings on BNN this month (Here is a [direct video link](#)). Spoiler alert: he too ended up buying an EV. Going forward, consumers will have more and more models to choose from since, as we mentioned earlier, starting this year, every major automaker is rolling out electric versions of their most popular brands. A world of innovation and investment is now hyper-focused on advancing battery technology and greater range per charge.

**Canada is the world's third largest producer of hydroelectricity (behind China and Brazil).** We produce 66% of our electricity from renewable sources (81% from non-GHG emitting sources) and currently export 11% of it to America. As a result, EVs are not just a lot cheaper for the consumer, they also create much less pollution.

Former GM CEO, Rick Wagoner, led the company when it crushed the EV1 in 2002 and then filed for Chapter 11 bankruptcy in 2008 (followed by a taxpayer bailout). In a 2006 [Motor Trend magazine](#) interview, he said that “*axing the EV1 electric-car program*” was one of his worst decisions ever. In 2017, Wagoner, now 66, joined the board of [ChargePoint](#), the world's largest electric vehicle (EV) charging network and said:

*“The time for electric mobility has finally arrived, the important drivers of EV growth currently coming together and it's clear that charging infrastructure will be one of the key factors in the success and growth of EVs. I'm eager to work with ChargePoint as the company continues to develop charging solutions to support the significant growth of the electric vehicle market.”*

**The auto sector has been a major driver of global economic growth over the past century, particularly in the most affluent economies—the US, Europe and Japan—which account for 80% of world sales.** Vehicles are Canada's top export (95% of which go to America) driving about 12% of Canadian GDP ([CVMA](#)). More than half a million Canadian jobs are connected to the auto industry and associated goods and services. Meanwhile, auto sales growth has been declining for more than a decade. This should have led to reduced capacity and output, but mass production plants and jobs are costly to scrap and retool, so government subsidies and loose lending enabled excess production of ICE vehicles to continue unsustainably.

The auto industry is ripe for major disruption and financial strain, as the over-indebted masses pull in spending, of necessity, in the months ahead. The global downturn has negative near-term implications for investors and gross domestic product, as well as employment; doubtless, there will be pressure for more taxpayer-funded bail-outs ahead.

On the upside, there is an opportunity here to evolve Henry Ford's 110-year-old business model. Challenges remain, but evolutionary technologies like EVs and wider electrification that slash user operating costs and free up net cash flow for other needs are key. Companies and countries that fail to evolve with this next ‘big shift’ will no doubt suffer. But for households, businesses and governments that can adapt, savings, productivity gains, and growth opportunities, in the transition, are exciting and much needed.

*“Quebec Premier Francois Legault says his government will move to electrify transportation systems, buildings and businesses in order to reduce oil consumption in Quebec by 40 per cent by 2030. ‘This is great news for the electric vehicle industry in Quebec...’ Legault said his plan to electrify Quebec will require massive investments, which he said could be unlocked by reviewing the management of the government's Green Fund and by increasing funding for infrastructure planning. He said that from now on his government will only finance public transit projects that are electric and that are built mostly in Quebec and will take steps to ensure that all new public buildings be powered by clean energy as of 2020.”*  
—[March 2019 Quebec's Public Infrastructure Plan](#)

**The C\$ declined in May against the U\$ as trade angst intensified.** Shown below since 2000, from .74 CAD per U\$ today, a retest of the 2001-3 cycle low in the .65 area (green band below) remains plausible as money flows move out of emerging and commodity-centric economies and equities to safe-haven U\$ and treasuries. The loonie bottomed with equity markets in 2002 and 2009, and it is likely to do so again in the months ahead.



**Oil (WTIC), here since 2000, relapsed 11% in May on slowing global growth and rising trade impediments.** Heavily traded by speculators, crude bottomed with the market cycle in 2002 and 2009. In 2016, it broke briefly below the 2009 bottom before bouncing into 2018 on 'Trump-phoria' tax cuts and promised capital investment and economic growth. This dream was short-lived as tax dollars saved went into share buybacks, not operations or demand expansion. A bottom with the equity cycle in the months ahead is likely, potentially at a third lower low around the \$25 per barrel area, with West Canadian Select (WCS) back in the low teens.



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**US large cap stocks (S&P 500 here since June 2017) have spent the last two years carving out a massive topping pattern.** After prices broke down in early 2018, and to a lower low in December, large S&P companies buying back their own shares drove a rebound into April. However, the largest corporations are also the most negatively impacted by lower global trade and a stronger US dollar. As business confidence, earnings and exports have all rolled over significantly year to date, buybacks are slowing, and true value investors will not be enticed to buy until much lower price levels. A retest of the December 2018 lows is in the making.

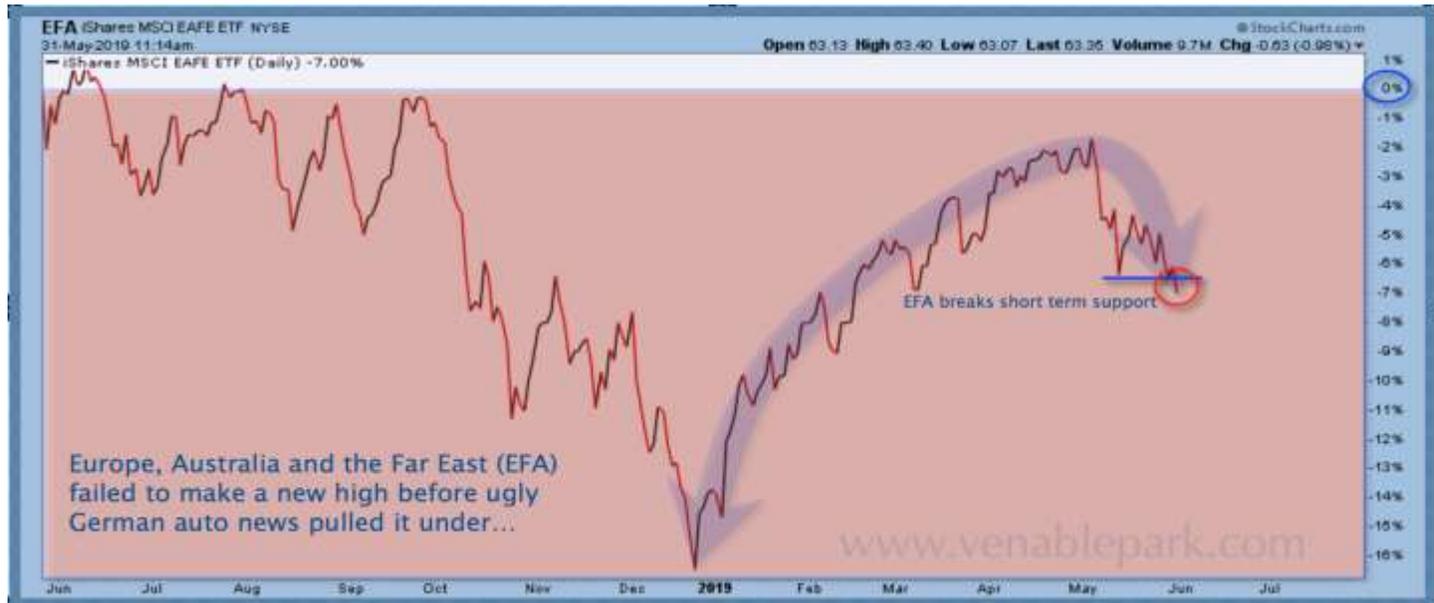


**After plunging in the fourth quarter of last year, FAANG (Facebook, Apple, Amazon, Netflix and Google) leaders could not make new highs in the 2019 rebound into April and have rolled over since, taking the NASDAQ with them.** Lower highs typically lead to lower lows: we watch for a retest of December lows next.



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**A similar story for European, Australian and Far East stock markets (EFA below since June 2018):** the rebound in the first 4 months of 2019 was unable to make a new high, before rolling over 7% this month.

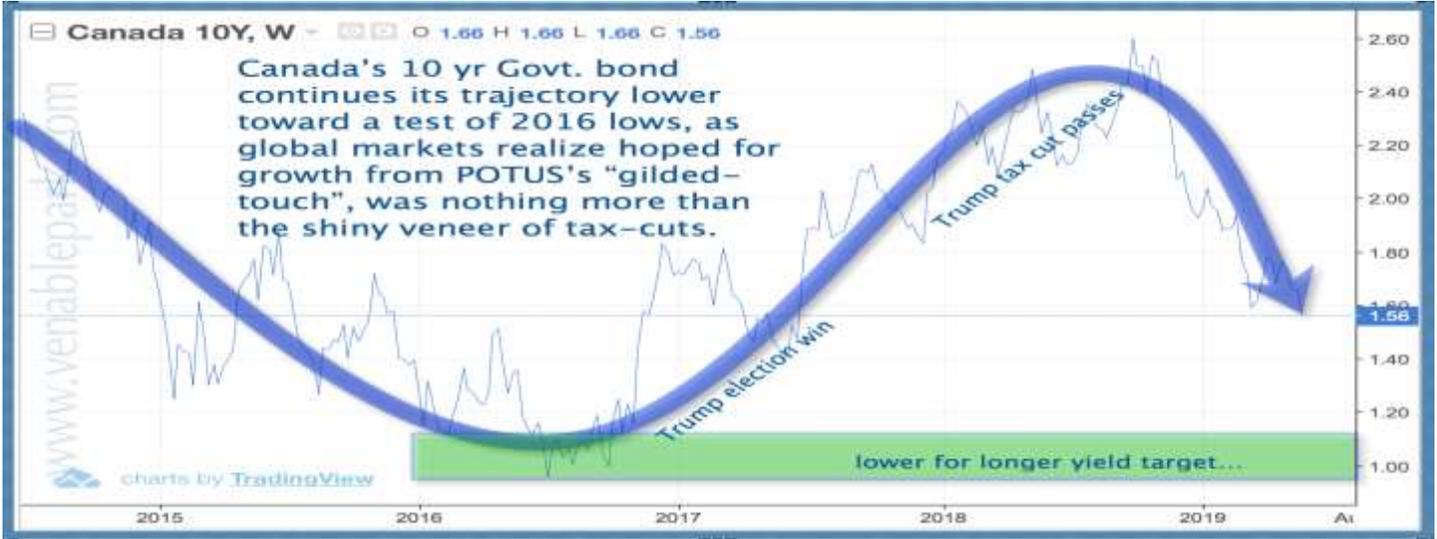


**Canada's TSX tumbled more than 3% this month led by losses in energy companies (-10%), financials (-4%), materials (7%), and dividend-paying sectors (-2.95%).** Only real estate investment trusts (REITs) held up with a gain of 1%. Canadian stocks have been range-bound now since 2014 and are less than 6% above their cycle peak in June 2008, eleven years ago. The coming recession and 3<sup>rd</sup> bear market since 2000 are likely to take Canadian stocks back to levels seen in the late 1990's. This would be a secular buying opportunity for value-focused cash at the ready, with dividend yields 3 and 4 times higher than recent years; well worth waiting for.

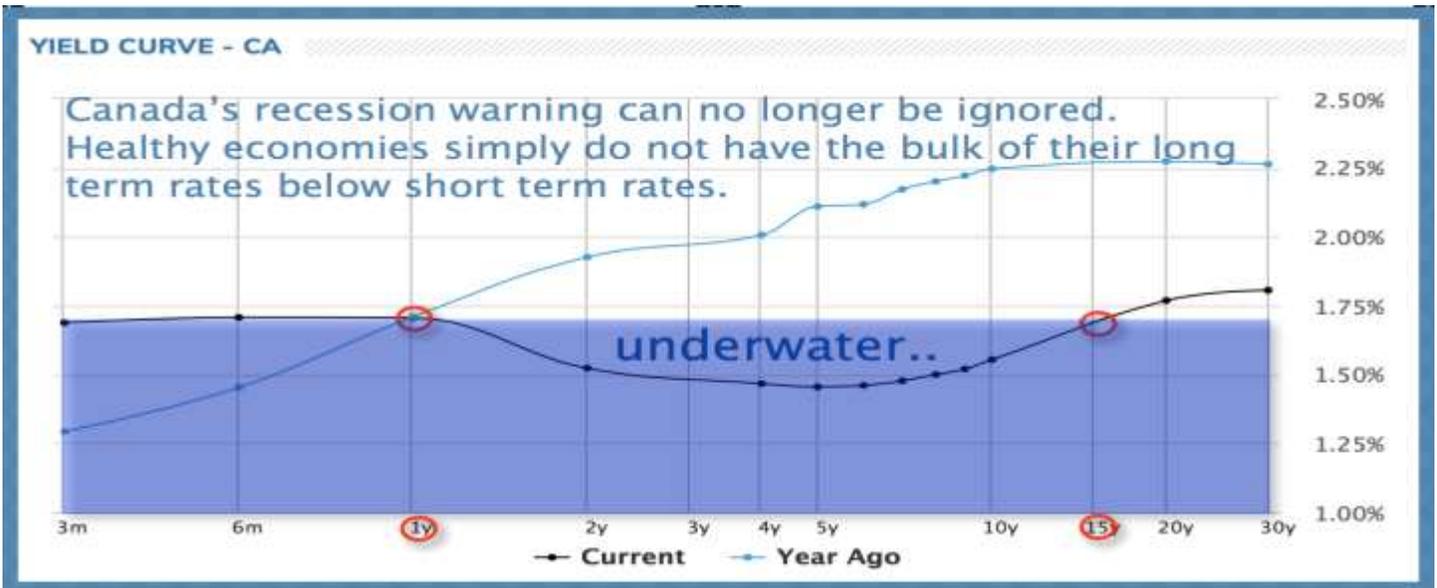


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**Canada's 10-Year Treasury yield, here since 2014, fell to 1.56 in May, as our government bond holdings rose in value.** The Bank of Canada (BOC) held its policy rate at 1.75% this month for the fifth time since October 2018. Though they were hoping to raise rates further before the next recession arrived, that is now unlikely. The BOC is expected to ease rates in the months ahead as financial stress spreads. Starting from just 1.75%, rather than north of 5% as in past cycles, they have very little stimulus to offer this time.



**Canada's yield curve inverted (short yields higher than long) at many different terms in May.** Examples: the 10-year treasury yield (1.50) and 20-year (1.73) are both lower than the overnight BOC rate of 1.75%. This means the bond-market is expecting disappointing economic data to force the BOC to cut policy rates and re-steepen the curve again in the months ahead. The BOC has a 1.2% growth forecast for 2019 and the bond market believes that is overly optimistic. Recession risks have reached the highest levels since 2007.



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**US 10-year Treasury Yield (here since 1984) fell 13% in May as nervous global capital flowed into treasury bonds.** After 9 rate hikes between December 2015 and 2018, the US Fed has been on pause since January, and the bond market is betting that financial strain will prompt them to start cutting rates again in the last half of 2019. Beginning from 2.5% the trip back near the zero-bound will be quick and less simulative than in 2009.



**We are there: US 3-month treasury yield at 2.35 is now higher than the 10-year yield at 2.17**—this inverted curve (red band below) has marked the start of central bank rate cuts and the last two recessions.



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Happy summer, at last!

**Quotes of the month:**

*"The U.S. car business was in a challenging enough spot already. President Trump's threat to **impose escalating tariffs** on Mexican goods puts it in an even more difficult one... Through April this year, U.S. light-vehicle sales were averaging an annualized 16.7 million compared with 17.2 million in sales last year. As sales have slipped, inventory levels have risen. Auto makers and dealers had a 78-day supply of unsold vehicles at the start of May, according to the Automotive News Data Center. That marks the highest number for the start of the summer selling season since 2009, when GM and Chrysler were preparing for bankruptcy."*

*—Wall Street Journal, May 31, 2019*

*"It's hard to overstate the existential crisis that car makers face. Electric motors and self-driving systems are upending about 120 years of investment and institutional knowledge."*

*—Bloomberg May 26, 2019*

*"The premium automakers also have been threatened by the growth of Tesla. At BMW's recent annual shareholders meeting, CEO Kreuger was criticized for his caution when expanding BMW's electric-car range. "Where is this model offensive?" German shareholder association Vice President Daniela Bergdolt said in a speech that generated loud applause from shareholders. "Sure, you've got the iNEXT, but I was expecting something that blows Tesla out of the water."*

*--Premium Automakers can't afford the luxury of current business model May 24, 2019*



Don't forget to visit our blog [www.jugglingdynamite.com](http://www.jugglingdynamite.com) for daily charts and commentary.