
Payden & Rygel

POINT of VIEW

FALL 2014

Our Perspective on Issues Affecting Global Financial Markets

Pg **1** **JOHN MAYNARD KEYNES:
ECONOMIST BY DAY, HIGH FLYING
PORTFOLIO MANAGER BY NIGHT**

The most famous economist of all time was also the chief investment officer at King's College, Cambridge for 25 years. Apart from producing 16% annual returns, Keynes' work as an investor tells us that the keys to investment performance often reside outside of economics.

Pg **5** **THE DROUGHT: AMERICA'S NEXT
DUST BOWL?**

Drought doomsayers and deniers are both wrong. Despite the record levels of drought in California, understanding where water comes from and how it is used puts the historic dryness in perspective. We respond to questions from a local resident "Hal," and leave him hopeful for our water future.

Pg **10** **CITIUS, ALTIUS, FORTIUS: FASTER,
HIGHER, STRONGER...BUT HAVE
HUMANS REACHED THE LIMITS
OF PERFORMANCE?**

We look across a wide array of human sporting endeavors, from sprints to the grueling Kona Ironman, and conclude: human progress has slowed. But have we reached the limits of human athletic potential?

Pg **11** **UBERNOMICS: THE FUTURE IS HERE,
IT'S JUST NOT EVENLY DISTRIBUTED**

A fleet of vehicles ready at a moment's notice to ferry passengers anywhere they desire? It used to be such luxuries were reserved for Kings and American Presidents. Now an ordinary person like me enjoys the services.

John Maynard Keynes: Economist by Day, High Flying Portfolio Manager by Night

John Maynard Keynes. You know him as the author of the groundbreaking 1936 *General Theory of Employment, Interest and Money*. We introduce here an altogether different Keynes: Keynes the Chief Investment Officer (CIO). From 1924 until his death in 1946, Keynes was the CIO of Cambridge's King's College.¹ While economists rarely furnish practical advice, the grandfather of modern economics transcended his own theory and produced superb investment returns.

Over his twenty-five year CIO career (he managed the endowment even before obtaining the CIO title), Keynes brought annualized returns of 16% to the King's College Discretionary portfolio. That compares to returns of 10%, 7%, and another 7% for the UK equity market, the King's College Restricted portfolio (consisting mostly of real estate), and UK government bonds over the same time period.² What is more, Keynes made 8% above Treasury-bill yields (what many today call "alpha") with lower average volatility than the market.

Was it the consummate economist's superior knowledge of the inner workings of macroeconomics which led to his success? Precisely the opposite. As we show below, Keynes' virtuous performance came as the result of his willingness to question prevailing opinion and act against the consensus. Keynes' convictions to diversify out of illiquid, widely-held real estate assets, to invest abroad, and to maintain a very long time horizon, drove his excellent investment returns.

«WAS IT THE CONSUMMATE ECONOMIST'S SUPERIOR KNOWLEDGE OF THE INNER WORKINGS OF MACROECONOMICS WHICH LED TO HIS SUCCESS? PRECISELY THE OPPOSITE.»

THE LANDED ENDOWMENTS

Among the investment orthodoxies in Keynes' early 20th century college endowment world was the primacy of real estate holdings. Often held as the legacy assets from founding bequeathment, land and property dominated university investment portfolios. In the case of King's College, in 1453 King Henry VI endowed thirty-six manorial estates and eight appropriated rectories (clerical landholdings). Annual income from leases, timber and crop sales replenished the coffers for the next four centuries.

To be fair, "until the late 1850s the [Cambridge] colleges were prohibited by their statutes from selling land."³ But data from as late as 1910 show little change after the statutes modernized. In the decade before Keynes took control of King's College funds, real estate income provided 85% of the college's total income. By way of context, King's College's real estate holdings today produce only 13% of King's College annual income (see Figure 1).

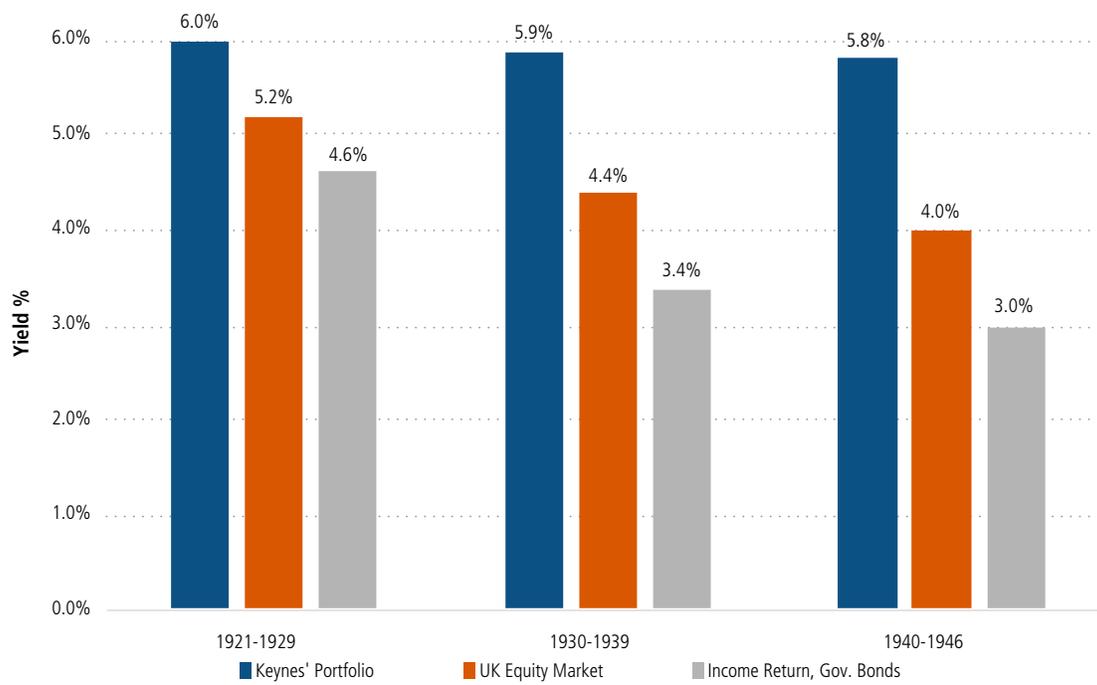
After Keynes assumed the helm, his first priority was to divest a portion of the real estate portfolio. His reasoning was twofold. First and foremost, Keynes stressed the cost of illiquidity and the danger

fig. 1 FROM PROPERTY MANAGEMENT TO INVESTMENT MANAGEMENT: KING'S COLLEGE INCOME BY DECADE

	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Total income £'000	36	52	81	93	219	313	572	2,218	5,582	7,712	13,033
	%	%	%	%	%	%	%	%	%	%	%
Property Income	85	71	50	46	41	32	29	31	30	13	13
Securities Income	7	14	12	24	34	38	36	26	35	28	22
Academic Fees	2	10	8	7	5	6	7	15	11	15	17
Residence, Catering, etc	7	5	26	23	20	22	28	27	22	33	34
Donations	0	0	4	1	0	2	0	1	1	11	14
	100	100	100	100	100	100	100	100	100	100	100

Source: Chambers, David, Elroy Dimson and Justin Foo (2014). "Keynes, King's and Endowment Asset Management." NBER Working Paper 20421

fig. 2 OUT-YIELDING THE COMPETITION:
DIVIDEND YIELD COMPARISON FOR KEYNES' PORTFOLIO



Source: Chambers, David, Elroy Dimson and Justin Foo (2014). "Keynes, King's and Endowment Asset Management." NBER Working Paper 20421

of comfort with an investment portfolio that was never "marked-to-market." Agricultural and land holdings were rarely sold: leases turned over, farm managers changed, but by and large, institutions were not buying and selling real estate. As a result, few institutional investors assigned value to liquidity. But Keynes, who had other ideas for asset allocation, fretted over not being paid a premium for locking up capital in real estate investments.

Inaccessible capital wasn't the only hidden cost of real estate investing. Later in his career, after a particularly challenging 1938, Keynes reminded the King's College investment committee of the virtues and vices of public price quotes: "Some Bursars will buy without a tremor unquoted and unmarketable investments in real estate which, if they had a selling quotation for immediate cash available at each Audit, would turn their hair grey. The fact that you do not know how much its ready money quotation fluctuates does not, as is commonly supposed, make an investment a safe one."⁴ The balance of liquidity and the dangerous illusion of prices not marked to market presented as much of an investment problem for Keynes as it does for any CIO today.

The second reason Keynes encouraged the college to diversify out of real estate was that doing so sacrificed very little income and gained the upside of industrial growth. Researchers have concluded that the dividend yield on Keynes' King's College portfolio averaged well in excess of the average dividend yield on the UK equity market and the current yield on government bonds (see Figure 2).

Most impressive about Keynes' decision to direct a large portion of the endowment to shares was the fact that few other institutions pursued the same strategy. From 1930 to 1939, the King's College average allocation to equities was 57%. By way of contrast, other endowments with more than \$15 million in assets (gigantic at the time) invested only 25% of their portfolios in equities.

Then as now, following the herd offered little in the way of returns. Keynes' maverick decision to move institutional funds into the equity market and out of real estate was not popular. However, recognizing that the past need not chain present and future investment policy, Keynes' contrarian equity allocation nearly put King's on par with Trinity as the top earning college at Cambridge.

«AND INDEED, IF ANY GLOBAL MACRO FUND MANAGER WERE CAPABLE OF FORETELLING THE EVOLUTION OF THE ECONOMY (AND PROFITING FROM IT), ONE SHOULD THINK IT MIGHT BE JOHN MAYNARD KEYNES.»

fig. 3 HOME BIAS IN EQUITIES IN 2008 FOR SELECTED COUNTRIES

	Domestic Market in % of World Market Capitalization	Share of Portfolio in Domestic Equity in %
Australia	1.8	76.1
Brazil	1.6	99
China	7.8	99.2
Canada	2.7	80.2
Euro Area	13.5	57
Japan	8.9	73.5
South Africa	1.4	52
South Korea	1.4	89
Sweden	0.7	44
Switzerland	2.3	51
United Kingdom	5.1	54.5
United States	32.6	77.2

Source: Coeurdacier, Nicolas, and H el ene Rey (2013). "Home Bias in Open Economy Financial Macroeconomics." *Journal of Economic Literature*, Vol. 51, No.1, pp. 63-115

HOME AWAY FROM HOME: INTERNATIONAL DIVERSIFICATION

Not only did Keynes elevate the earnings power of the King's College endowment by shifting into equity securities, he also managed to avoid the plague of home bias and diversify share holdings outside of the United Kingdom.

Precisely defined, home bias is "the strong preference for domestic [securities] that investors in international markets exhibit, despite the well-documented gains from international diversification."⁵ Behavioral explanations, transaction costs, and changes in the ways in which savers invest (now mediated through funds) have all been advanced as explanations for why investors prefer to remain local, even when their home country constitutes a very small fraction of the investable universe (see Figure 3).

In 1920 the United Kingdom produced 10% of total global economic output while the United States accounted for 46%. By 1950, shortly after Keynes' death, the US accounted for 52% of global activity, while the UK accounted for less than 7%.⁶ To his credit, and in spite of home bias, "Keynes championed the virtues of US common stocks."⁷

He also put his money where his mouth was. From 1921 onward, Keynes insisted on diversifying away from UK common stocks. Whether in India, Africa, or the US, roughly 40% of the total equity allocation was invested outside of the UK (see Figure 4 on next page).

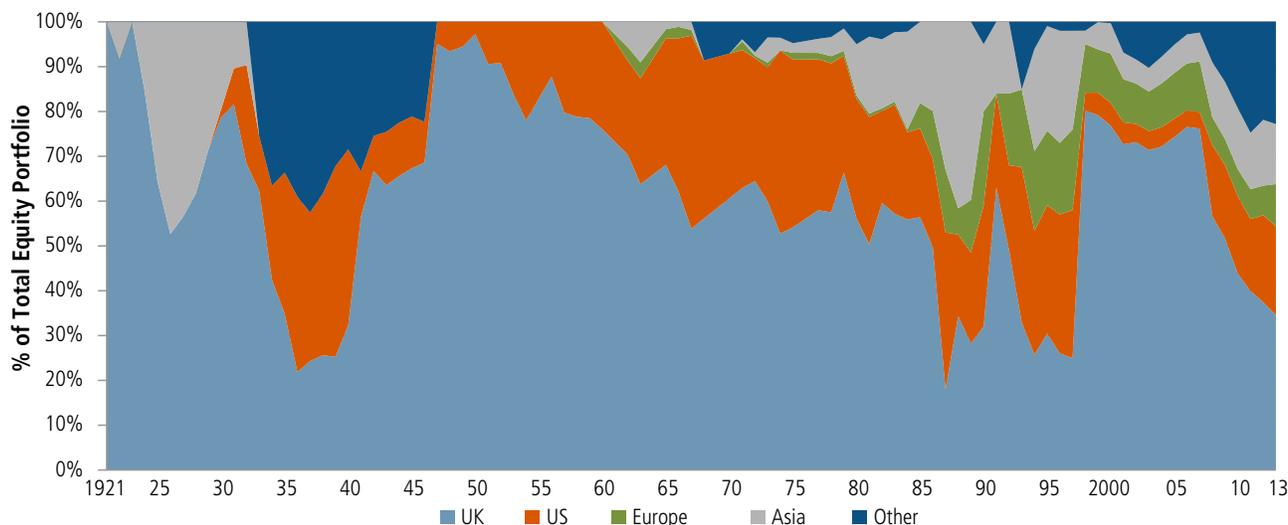
FOR THE LONG HAUL – KEYNES AND THE INSTITUTIONAL TIME HORIZON

Keynes' ability to put money in US railroad stocks during the depression, or to buy equity in speculative British/Indian ventures was as much a consequence of his position as an institutional investor who could afford to wait as it was about fundamental attractiveness. For all the virtues of global diversification, it was Keynes who famously quipped, "the market can stay irrational longer than you can stay solvent."

«THE REMARKABLE GROWTH OF PEER-TO-PEER FINANCE FOLLOWING THE FINANCIAL CRISIS SHOULD NOT COME AS SUCH A SURPRISE... INVESTORS AROUND THE WORLD ARE SEARCHING FOR YIELD.»

But it was a lesson hard won. Early in his investing career, Keynes practiced what most today know as "global macro" investing. Using his economics acumen, he invested under the assumption that "he had the ability to time moves into and out of equities, bonds and cash." The technique is now called "market-timing" and often not spoken of nicely! And indeed, if any global macro fund manager were capable of foretelling the evolution of the economy (and profiting from it), one should think it might be John Maynard Keynes.

fig. 4 STOCKING UP: KING'S ENDOWMENT ASSET ALLOCATION 1919-2013



Source: Chambers, David, Elroy Dimson and Justin Foo (2014). "Keynes, King's and Endowment Asset Management." NBER Working Paper 20421

The truth is rather different. Not even the grandfather of modern macroeconomics could predict the future. In 1938, Keynes confessed to the King's College investment committee: "We have not proved able to take much advantage of a general systematic movement out of and into ordinary shares...at different phases of the trade cycle."

Thus, in the latter part of his investing career, Keynes' eschewed speculative habits and assumed an investor's mindset: his time horizon extended, portfolio turnover fell, and the total number of securities in his portfolio declined. Sounding more like Warren Buffet than George Soros, Keynes reflected in 1934, "As time goes on, I get more and more convinced that the right method in investment is to put fairly large sums into enterprises which one thinks one knows something about ... there are seldom more than two or three enterprises at any given time in which I personally feel myself entitled to put full confidence."

Switching investment styles produced better returns for Keynes and King's College. University of Cambridge researchers have estimated that in the time from 1924 to 1932, average monthly returns were 0.2%. From 1932 to 1946, in the period after Keynes switched from frenetic speculator to longer-term investor, average monthly returns improved to 0.7%. The performance of the portfolio speaks for itself (see Figure 5). For our cynical readers, keep in mind that both periods featured large market corrections (in 1930 and in 1938).

WHY FUND MANAGERS CAN STILL LEARN FROM KEYNES

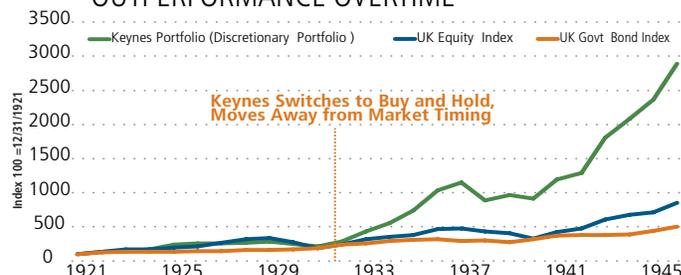
Uniting each of the three elements highlighted in Keynes' investing career—openness to new asset classes, geographic diversification, and avoiding market-timing and macroeconomic predictions—was a profound contrarian impulse. In each case, Keynes flew in the face of accepted wisdom, preferring to find what worked, not what was popular.

To be sure, his untouchable contemporary status granted him considerable leeway with the board of directors. But by honestly surveying the investment landscape and asking questions which tested the accepted narrative of "what college endowments do," Keynes provided his institution with healthy long-term returns and a more stable endowment through time. 

SOURCES

- 1 Keynes was technically the first Bursar, who held responsibility for endowment investment.
- 2 Chambers, David, Elroy Dimson and Justin Foo (2014). "Keynes, King's and Endowment Asset Management." NBER Working Paper 20421.
- 3 *Ibid.*
- 4 Capitalideasonline.com. Accessed 5 December 2014.
- 5 Coval, Joshua D. and Tobias Moskowitz (1999). "Home Bias at Home: Local Equity Preference in Domestic Portfolios." *The Journal of Finance*, Vol. 54, No. 6, pp. 2045-2073.
- 6 Goetzmann, William N. and Philippe Jorion (1999). "Global Stock Markets in the 20th Century." *The Journal of Finance*, Vol. 54, No. 3, pp. 953-980.
- 7 *Ibid.*

fig. 5 KEYNES THE PORTFOLIO MANAGER'S OUTPERFORMANCE OVERTIME



Source: Chambers, David, Elroy Dimson and Justin Foo (2014). "Keynes, King's and Endowment Asset Management." NBER Working Paper 20421

The Drought: America's Next Dust Bowl?

Hal is a resident of Southern California. In the past two years, stories about the drought have packed his local TV news. Local billboards have been repainted to warn profligate water users of fines for over-watering. One-hundred percent of California is “abnormally dry” and more than 55% of the state is experiencing “exceptional drought”—the worst classification according to the National Drought Mitigation Center. For a state which, if it were measured against other countries, would be the ninth largest agricultural economy in the world, a shortage of water means higher food prices across the globe.

But Hal is not a farmer. Environmentally conscious though he is, city-living does not feel much different. After all, water still comes through the faucet. How bad could it be?

We met Hal and introduced him to the environmental, social, and economic consequences of the worst drought in North America since the 1930s. What follows is a transcript of our discussion. First, we gave Hal the background: defining a drought, explaining the historical precedent, and describing the scope of the problem. We then answered some of his water-related questions — everything from desalination to Dasani. Before we went our separate ways, not wanting to leave Hal in despair, we talked with him about the future prospects for the water economy which make us hopeful.

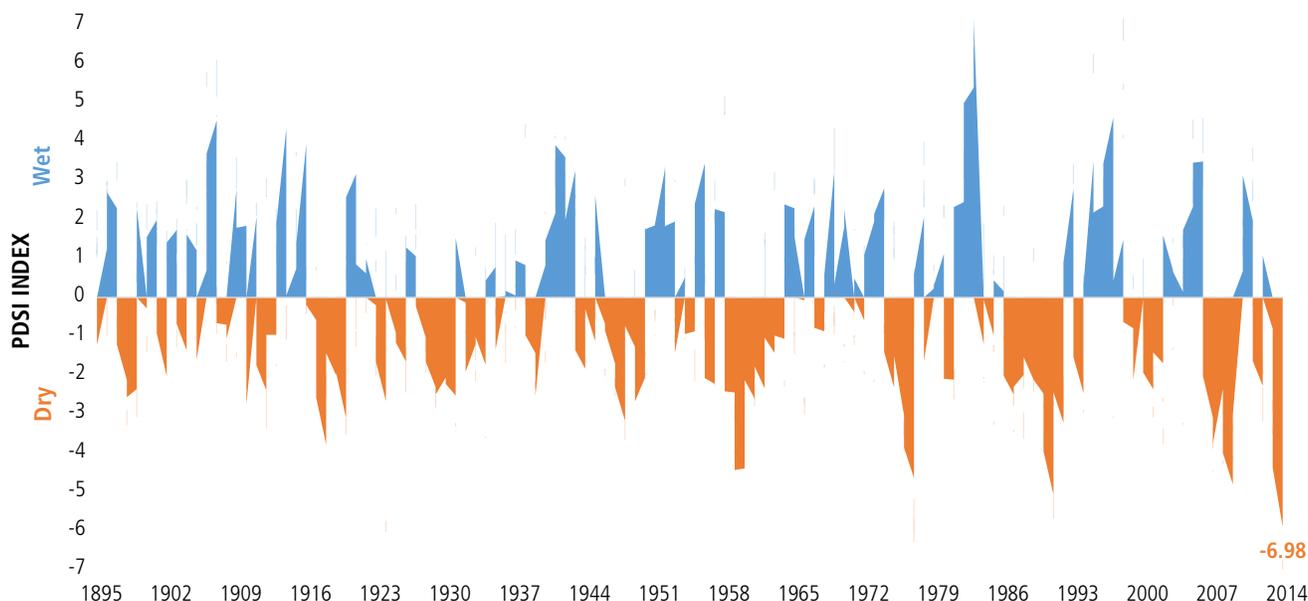
HAL: I HAVE LIVED IN SOUTHERN CALIFORNIA MY WHOLE LIFE. NOT TO BE INSENSITIVE, BUT IT SEEMS LIKE WE ARE ALWAYS IN A DROUGHT. IS THIS TIME ANY DIFFERENT?

Conceptually, everyone knows a drought is a dearth of water. But defining drought scientifically is not as easy. Eight inches of precipitation over the course of a year in Egypt is four times average and would likely cause flooding. On the other hand, if Costa Rica received only eight inches of rain, it would be catastrophically dry: average annual precipitation in the Central American country is 115 in.

For our purposes, Hal, the Palmer Drought Severity Index will suffice. The index, created by W.C. Palmer in 1965, uses data stretching back to 1895 and attempts to measure the duration and intensity of drought conditions in a given area (see Figure 1). As the National Oceanic and Atmospheric Administration describes, included in the calculation of the index are data such as “weekly precipitation total and average temperature, division constants (water capacity of the soil, etc.) and previous history of the indices.”

So how bad are things in 2014? In July 2014, the Palmer Index for California registered the lowest value since recordkeeping began in 1895 (see Figure 1)! No surprise then that in January 2014, California

fig. 1 DRIED UP: RECENT DROUGHT CONDITIONS IN CALIFORNIA ARE AS BAD AS THEY HAVE EVER BEEN



Source: NOAA

«IN JULY 2014, THE PALMER INDEX FOR CALIFORNIA REGISTERED THE LOWEST VALUE SINCE RECORDKEEPING BEGAN IN 1895!»

Governor Jerry Brown declared a state of emergency and called on all Californians to reduce water consumption by 20%. Years of elevated temperatures and limited precipitation have left Shasta Lake, the largest man-made reservoir in the state, filled to only 24% capacity. And with snowpack in the reservoir-feeding Sierra Nevada Mountains only 18% of average in 2013, do not expect much of a change.

WOW. I DIDN'T REALIZE THINGS WERE SO BAD. DOESN'T CALIFORNIA PRODUCE A LOT OF FOOD? HOW MUCH IS THIS DROUGHT LIKE GOING TO COST THE STATE?

For the largest state exporter of agricultural commodities, and for the state which accounts for 65% of the non-citrus fruit and nut production in the US, water shortages are catastrophic (see Figure 2). California alone accounts for 4/5 of the world's total almond production. The problem is that all this agriculture consumes massive amounts of water. In the opinion of one academic, expressing his concern for the groundwater pumping to which many parched almond farmers have turned: "The people of the state of California are more or less destroying themselves in order to give cheap almonds to the world." Not that cheap, though. In the last two years, almond prices have jumped 50% and are more than 100% higher since 2009 (see Figure 3 on page 7).

In the San Joaquin Valley (the Central Valley running through the middle of California, home to Big Agriculture) alone, forecasts estimate the loss of up to 17,000 agricultural jobs. In total, drought-related costs in California could reach \$2.2 billion in 2014, roughly the same amount as the state spends on corrections and rehabilitation.

Other costs jump as well in the absence of water. The last three years of drought have primed the western United States for fire. Fire officials have called in additional firefighters anticipating the worst (this is not the type of job growth we want). Indeed, in 2014 California exhausted its \$209 million budget for fighting wildfires just four months into its fiscal year.

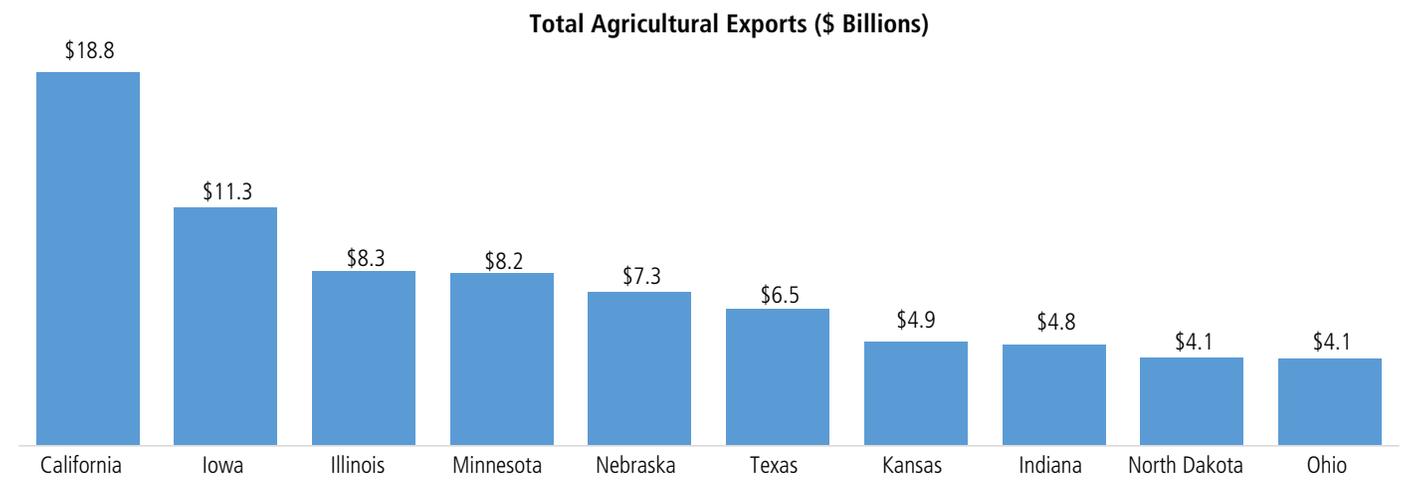
BUT ALMOST THREE-QUARTERS OF PLANET EARTH IS COVERED IN OCEAN WATER. IF THE DROUGHT IS SO BAD, WHY DON'T WE JUST REMOVE THE SALT FROM OCEAN WATER AND USE THAT?

You are in good company asking. It was English poet Samuel Taylor Coleridge who wrote in 1798, "Water, water everywhere, nor any drop to drink."

About ocean water: you must mean "desalination." Just because there is a lot of water in the world doesn't mean we can use it all (see Figure 3).

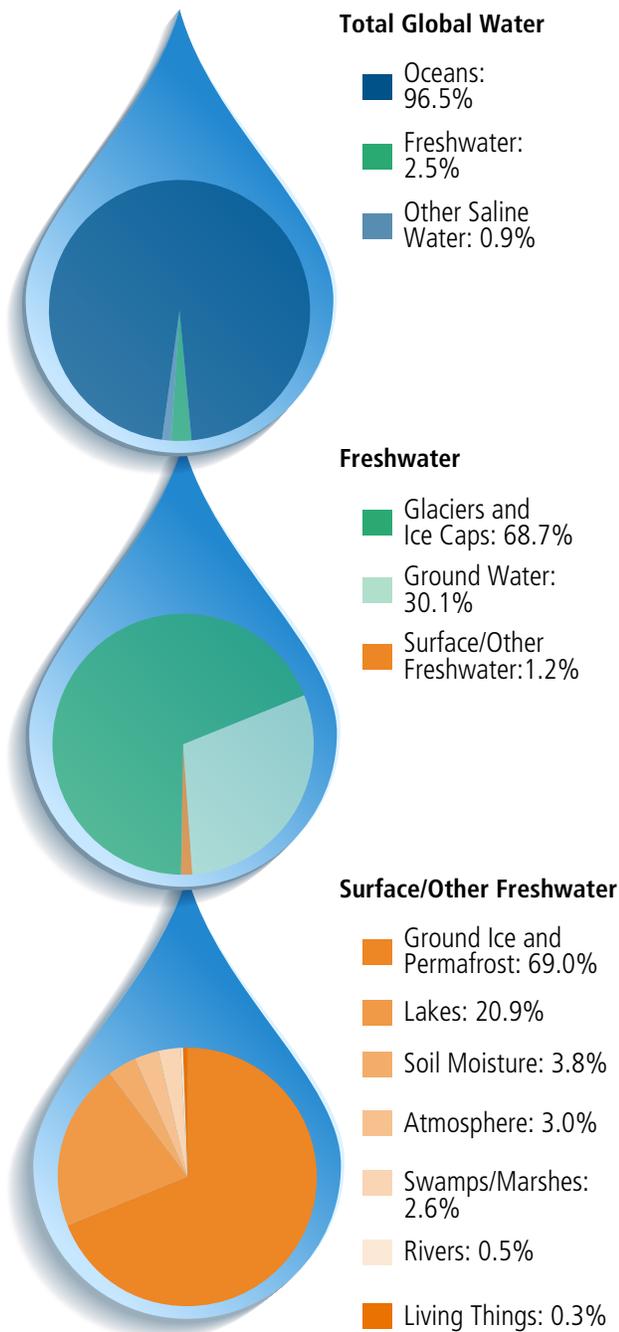
Over 17,000 desalination operations exist around the world. The problem with desalination is that it is extremely expensive—no matter how disguised such expenses are by public subsidies. Consider a proposed desalination plant in Huntington Beach, CA. Some estimates put the cost to produce potable water at \$2,000 per acre foot.

fig. 2 **HIT IN THE BREAD BASKET: CALIFORNIA'S DROUGHT MEANS BAD NEWS FOR FOOD PRICES WORLDWIDE**



Source: USDA

fig. 3 WHERE IS WATER IN THE WORLD?



Source: Water in Crisis: A Guide to the World's Fresh Water Resources (Oxford University Press)

To import the same amount of water, it would cost only \$1,000. Cheaper still, recycled water from a nearby water treatment plant costs only about \$900 per acre foot and uses one-third the amount of electricity.

Unlike desalination, which if done at scale produces mammoth amounts of salty-brine by-product, recycled (or reclaimed) water takes waste water and makes it new. Well, sort of new. After removing all

«THE OTHER SERIOUS - AND MORE RELEVANT - PROBLEM IS THAT THE MAJORITY OF WATER USE IS NOT HOUSEHOLD CONSUMPTION. GLOBAL WATER STATISTICS COMPILED BY THE FINANCIAL TIMES INDICATE THAT AGRICULTURE ALONE ACCOUNTS FOR 70% OF TOTAL WATER USE.»

trash and solids, a variety of filtration techniques take waste water and make it suitable for the tap. Don't believe us? 30% of Singapore's water is recycled.

WHETHER DESALINATED OR RECYCLED, I NEVER DRINK WATER FROM THE TAP. BOTTLED WATER IS JUST BETTER. COULD WE JUST USE MORE BOTTLED WATER TO AMELIORATE THE EFFECTS OF THE DROUGHT?

In short, no. Americans spend \$11 billion to consume more than 8 billion gallons of bottled water annually, and per capita consumption of bottled water runs close to 30 gallons per year.

Unfortunately for the disbelievers in public "tap water," bottled water is no safer or healthier than tap water in most municipalities. In fact, for popular brands like Aquafina and Dasani, the original water source is actually a municipal water system! In total, over 45% of bottled water sold in the US originates as tap water.

WELL, I DO MY PART AT HOME. WE HAVE WATER-EFFICIENT APPLIANCES AND LOW-FLOW SHOWERHEADS. IF EVERYONE UNDERSTOOD THE IMPORTANCE OF WATER CONSERVATION AS MUCH AS I DO, WOULD WE STILL HAVE THIS PROBLEM?

Efficient appliances are an excellent beginning. But the truth is, most modern homes already come equipped with these technologies and per capita water consumption has continued to rise. So what has contributed to the rise? The USGS' landmark 2009 study of water use identified the major culprit: outdoor watering.

If you want to make a difference at home, the big changes come from watering the lawn. Especially in arid and semi-arid climates, outdoor watering can account for as much as 60% of a household's water use per day. In Los Angeles, city officials provide property owners with a \$3.75-per-square foot incentive payment to replace lawns with low-

fig.4 WANT TO SAVE WATER AT HOME? STOP WATERING THE LAWN!

Activity	Equivalent to Watering Lawn*
Car Wash	1 car wash every week for 3.4 months
Bath	1 bath every day for 45 days
Load of Laundry	5 loads of laundry a week for 9 weeks
Shower	1 shower every day for 90 days
Load of Dishes	1 load of dishes every day for 90 days
Meal Preparation	3 meals/day for 45 days
Toilet Flush	6 flushes/day for 56 days
Dripping Faucet/Day	9 months of Faucet drip

* Approximate amount of water used for identified activities in relation to a one-tenth of an acre (4,356 sq. ft.) of landscape (turf) for each irrigation
Source: University of Nevada Reno

water landscaping. Don't think it's that important? Consider that with the same amount of water used to irrigate your lawn, you could wash your car once a week for nearly 3 ½ months (see Figure 4).

The other serious - and more relevant - problem is that the majority of water use is not household consumption. Global water statistics compiled by the Financial Times indicate that agriculture alone accounts for 70% of total water use. That compares to 22% of total water used for industrial purposes, and only 8% used domestically. So keep buying new toilets and washers, but, try as we might, the real change in human water use will come from agriculture and industry...if it comes at all.

SO WHAT CAN WE DO? IS THERE ANOTHER PROBLEM AT PLAY HERE?

So much water use, so little water. The urgency of drought and the scale of the problem are enough to make anyone shudder. But, luckily, thousands of very smart people go to work every day—at municipal water authorities, at Federal agencies, businesses, and startups—trying to lessen our water woes. Whether by boosting water supply, or increasing water conservation, there is hope that we can improve conditions of the water world.

A universally-acknowledged problem - and one that humans have struggled to fix - is the pricing of water. Due to subsidies, arcane legislation, and political incentives, water in dry farming areas can be cheaper than water in wet environments. For New York Times commentator Eduardo Porter keys in on a particularly egregious example: In Fresno, California, which gets less than 11 inches of rain a year, a

family of four using 400 gallons a day faces a monthly water bill of \$28.26. In Boston, where rainfall exceeds 40 inches, the same family would pay \$77.73."

So pricing is a problem...and it has been since the advent of municipal water. So the best solution would be proper water pricing. But we are realistic. We found a nineteenth-century New York Times article which featured complaints about cheap water indistinguishable from the complaints we hear today!

WHAT STEPS CAN WE ALL TAKE THAT SHOULD MAKE US HOPEFUL?

First and foremost, water use should be metered. One might think all households have water meters to measure use, but they don't. The Fresno study cited above found that homes without water meters used 1.25x the amount of neighboring communities with meters. As soon as meters were installed, water use fell 22%. Perhaps people should be free to have large-scale water features and swimming pools: but they should also pay more.

Second, as an intermediate step to changing the price of water, permitting widespread water trading will improve allocation. In the western region of the US, water rights are assigned to the first claimant of the water. Such rough and ready legislation may have been prudent in the Wild Wild West. In today's world though, we need water flowing to those who put it to best use. With a properly functioning water market, end users could bid depending on their need, and water would make its way more efficiently to its ends. Companies like Watrhub, which goes under the moniker of the "Bloomberg Terminal for water," work with existing water companies to make their bidding processes and distribution better.

Third, a whole host of start-up companies have taken to solving our water woes. These new companies work on everything from building fiber optic monitoring systems to helping measure the chemical

«A UNIVERSALLY-ACKNOWLEDGED PROBLEM - AND ONE THAT HUMANS HAVE STRUGGLED TO FIX - IS THE PRICING OF WATER. DUE TO SUBSIDIES, ARCANE LEGISLATION, AND POLITICAL INCENTIVES, WATER IN DRY FARMING AREAS CAN BE CHEAPER THAN WATER IN WET ENVIRONMENTS.»

«THE FRESNO STUDY CITED ABOVE FOUND THAT HOMES WITHOUT WATER METERS USED 1.25X THE AMOUNT OF NEIGHBORING COMMUNITIES WITH METERS. AS SOON AS METERS WERE INSTALLED, WATER USE FELL 22%.»

makeup of our water and developing wastewater disinfection systems that create renewable energy. One Israeli company has even built machines which purify the water exhaust of air conditioning units.

Any one of these changes alone may not be enough to overcome drought. But, the optimist would say, the combined force of new techniques for measuring, exchanging and recycling water may actually make the resource more renewable and more plentiful in the future.

When pundits and doomsayers trot out charts foretelling a future of water-related violence and desiccation, we recommend a healthy dose of skepticism. 

SOURCES

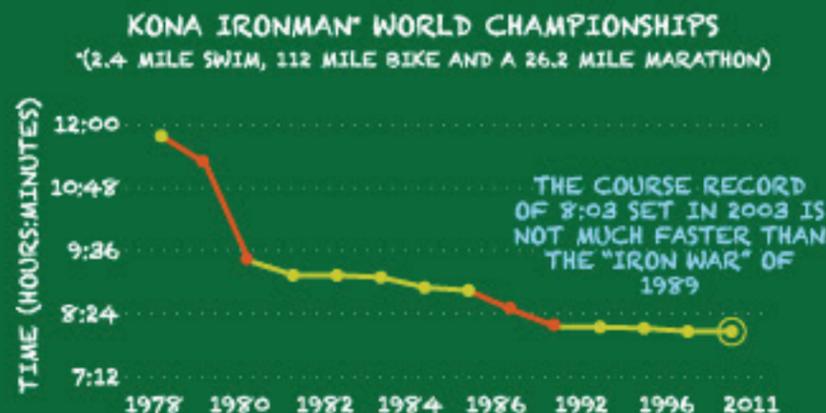
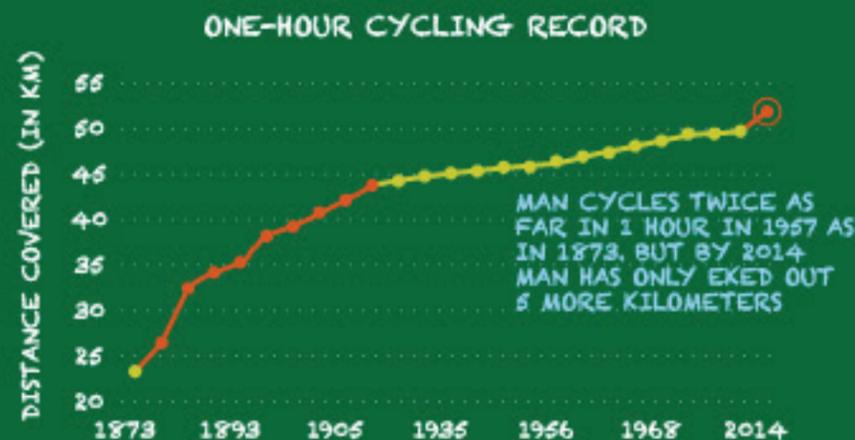
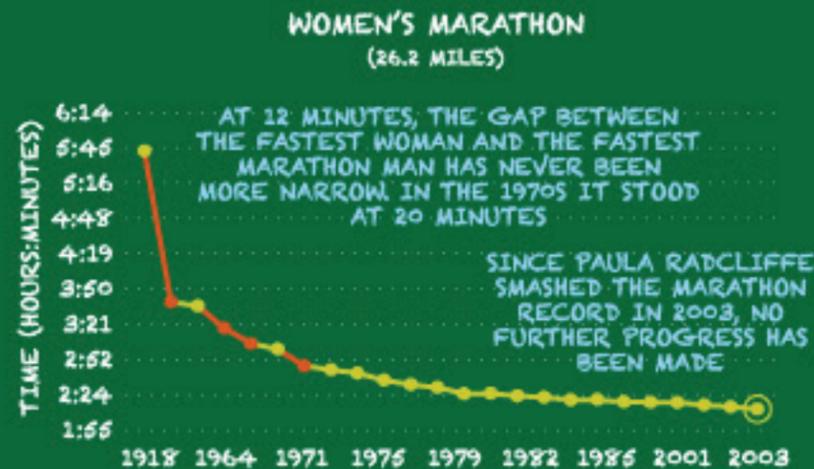
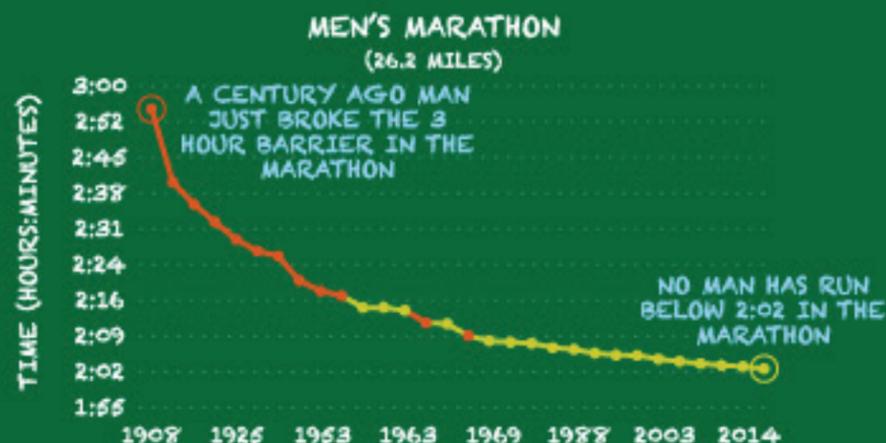
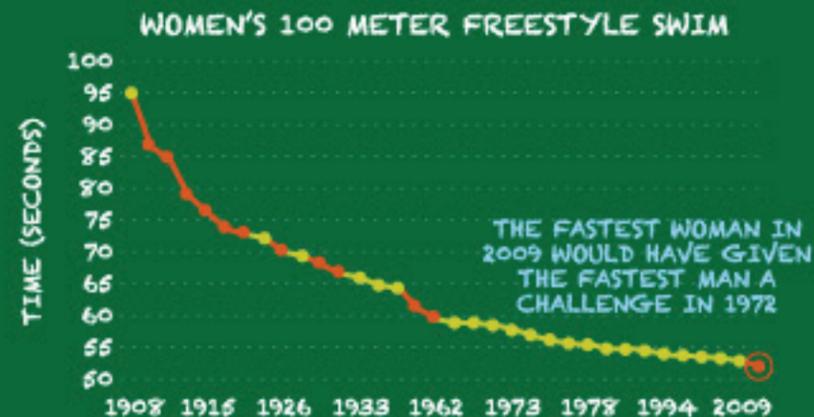
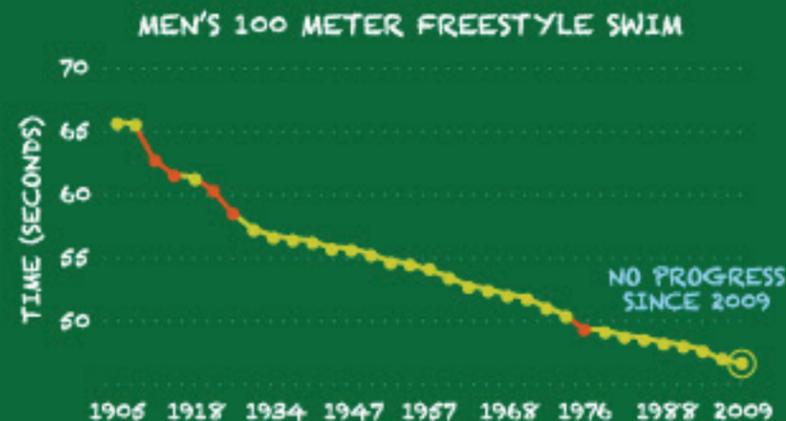
- 1 Bostock, Mike and Kevin Quealy. "Mapping the Spread of Drought Across the U.S." New York Times. Accessed 5 December 2014
- 2 National Weather Service Climate Prediction Center
3. Saylor, Amber, Linda Stalker Prokopy and Shannon Amberg (2011). "What's Wrong with the Tap? Examining Perceptions of Tap Water and Bottled Water at Purdue University." *Environmental Management*, Vol. 48, No. 3, pp. 588-601
4. Dunford, Lauren, et. al (2007). "Bottled Water Myths: Separating Fact from Fiction." *Nutrition Issues in Gastroenterology*, Vol. 50, pp. 87-93
5. USGS
6. Watrhub.com. Accessed 23 November 2014.
7. Zdnet.com. Accessed 23 November 2014.
8. Forbes.com. Accessed 24 November 2014.

CITIUS, ALTIUS, FORTIUS

FASTER, HIGHER, STRONGER...BUT HAVE HUMANS REACHED THE LIMITS OF PERFORMANCE?

EACH DOT REPRESENTS A NEW RECORD

- SLOWER PROGRESS IN WORLD RECORD TIMES
- RAPID PROGRESS IN WORLD RECORD TIMES



AS MARK MCCLUSKEY TELLS IT, IN 1986, BRUTUS HAMILTON, HEAD TRACK COACH AT THE UNIVERSITY OF CALIFORNIA, PREDICTED THAT "THE MATHEMATICAL LAWS DEALING WITH PHYSIOLOGICAL COMPENSATION" SET LIMITS ON HUMAN PERFORMANCE. IN PARTICULAR, THE 400 METER RECORD OF 46.2 SECONDS WOULD PROVE UNBREAKABLE. YET, TODAY, THE 400 METER RECORD IS 43.18 SECONDS.

AS MCCLUSKEY WARNS: "ALMOST EVERY TIME SOMEONE HAS CLAIMED THAT WE'VE REACHED THE OUTER BOUNDARIES OF OUR ABILITIES AS A SPECIES, THE STATEMENT HAS USUALLY BEEN PROVEN FALSE IN A DISTRESSINGLY SHORT TIME."

HAVE WE REACHED THE LIMITS TO PROGRESS? ABSENT THE USE OF NEW TECHNOLOGY, YOU MAY BE TEMPTED TO ANSWER "YES". COULD YOU BE WRONG?

LOOKING AT HUMAN-POWERED SPORTS SHOWS TWO CLEAR TRENDS:

- 1) HUMANS MADE A LOT OF PROGRESS DURING THE 20TH CENTURY, REGARDLESS OF EVENT-TYPE (SPRINT VERSUS ENDURANCE), SPORT (RUNNING, SWIMMING, CYCLING) OR GENDER.
- 2) THE PACE OF THAT PROGRESS HAS FLATTENED OUT IN RECENT DECADES ACROSS ALMOST EVERY HUMAN SPORTING EVENT—EVEN THE ONES LIKE THE IRON-MAN OR CYCLING WHERE ATHLETES ENJOY BETTER, LIGHTER, FASTER BIKES.

SOURCES: DEJOURGES P-B, BERTRELOT G, EL BELLOU H, FERRAULT J, GUILLAUME M, ET AL. (2009). "FROM IMPROVE TO HUMAN ECONOMIC PHYSIOLOGICAL BARRIERS LIMIT HUMAN PROGRESSION IN TEN SPORT DOMAINS." PLOS ONE 4(11): e6464.
 MCCLUSKEY, MARK. "FASTER, HIGHER, STRONGER: HOW SPORTS SCIENCE IS CREATING A NEW GENERATION OF SUPERATHLETES, AND WHAT WE CAN LEARN FROM THEM." HENSON STREET PRESS: NEW YORK, NEW YORK, 2014.

Ubernomics:

The Future is Here, It's Just Not Evenly Distributed

It's Saturday night in Los Angeles. After dinner with friends, I find myself across town without a car, not a pleasant situation in the City of Angels. Unfazed, I pull out my smartphone, open an app, and see a cluster of cars—sedans, Suburbans, Escalades—idling nearby, awaiting my summons. With a few clicks, my problem is solved.

Minutes later a black sedan arrives. The driver hops out, greets me by name and opens the passenger door. I climb in eagerly. As I depart toward home, he offers bottles of fresh water, candy and mints, as well as news on what's going on in the city.

Uber, a four-year old software platform that connects willing drivers with needy passengers via a smartphone app, is a startling success story in a sluggish economy. The fast-growing San Francisco-based company has attracted acclaim and become a verb in the process (as in, "I am Ubering over to your house right now"). Uber is available in 250 cities around the world and boasts a private valuation of \$40 billion.

As I settle back into the plush leather seats, I think to myself: a fleet of vehicles ready at a moment's notice to ferry passengers anywhere they desire? It used to be such luxuries were reserved for Kings and American Presidents. Now an ordinary person like me enjoys the services.

What's more, through an Uber trip, I gain a glimpse into the nature of economic progress and what the future might hold.

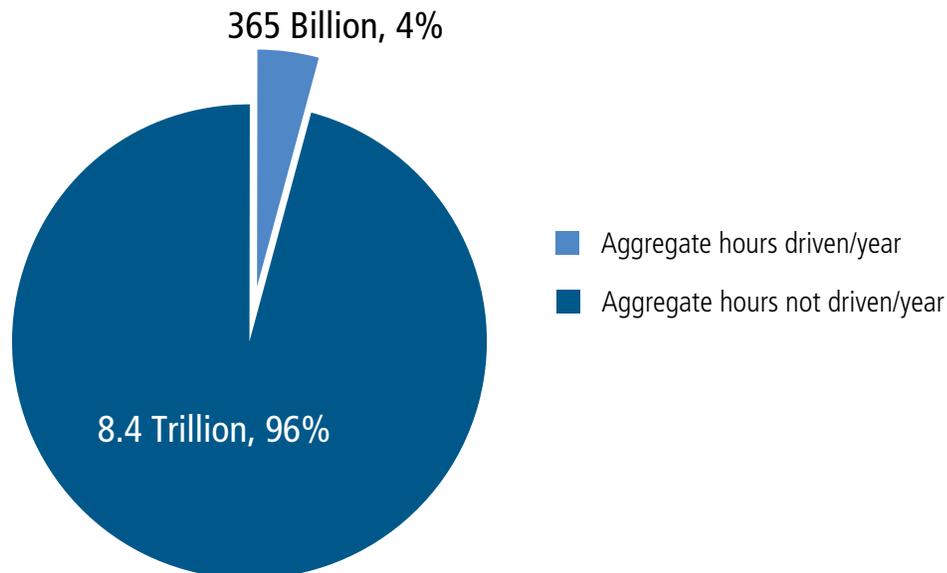
TAXIS FIRST

Getting a ride in Los Angeles wasn't always so easy. I couldn't hail a cab on the street. At the airport, I'd wait in a long taxi line regardless of where I was going. And, well, forget about trying to take a short trip within downtown Los Angeles—the cab drivers would become irate if my trip wasn't a longer, Los Angeles International (LAX) airport ride.

Why was getting around so difficult? Experts blame a period of "privatization" and "deregulation" that swept across the North American taxi markets in the 1970s and 1980s. A study of 43 American and Canadian cities showed that without local government "entry controls" (restricting the quantity of licensed cabs), the cab stand and hail market experienced an oversupply of cabs, leading to lower quality vehicles and drivers.¹

Meanwhile, dispatch services (where you call and request a ride from your home) were neglected by cabs. Why? It's "capital intensive" to set up a dispatch company to answer calls from customers and send

fig.1 WHAT DOES YOUR CAR DO ALL DAY? SIT IDLE



« RESEARCH PUBLISHED BEFORE 2008 DRIVES HOME [PUN INTENDED] A KEY POINT: EXPERTS AND INSIDERS NEVER ANTICIPATED THE DRAMATIC CHANGES TO AN INDUSTRY JUST OVER THE HORIZON. »

drivers to and fro to pick them up. One or two companies tended to dominate most cities due to the marketing advantage and name recognition. Wait times were extreme. Drivers often idled waiting for inconsiderate passengers. Trips were too short to make much money.

Yet Uber solves all of the above problems in an app on my phone. I can hail a cab from home, the restaurant or the airport. I can watch the car's progress to my location. Even the pricing adjusts during peak hours or demand surges to entice more drivers to the area. Reading research published before 2008 drives home [pun intended] a key point: experts and insiders never anticipated the dramatic changes to an industry just over the horizon.

SOFTWARE WILL REPLACE REGULATION

It occurs to me on my ride home: should I be worried about the quality of my Uber driver? Shouldn't a knowledgeable third-party (like a local transportation official) ensure quality and safety?

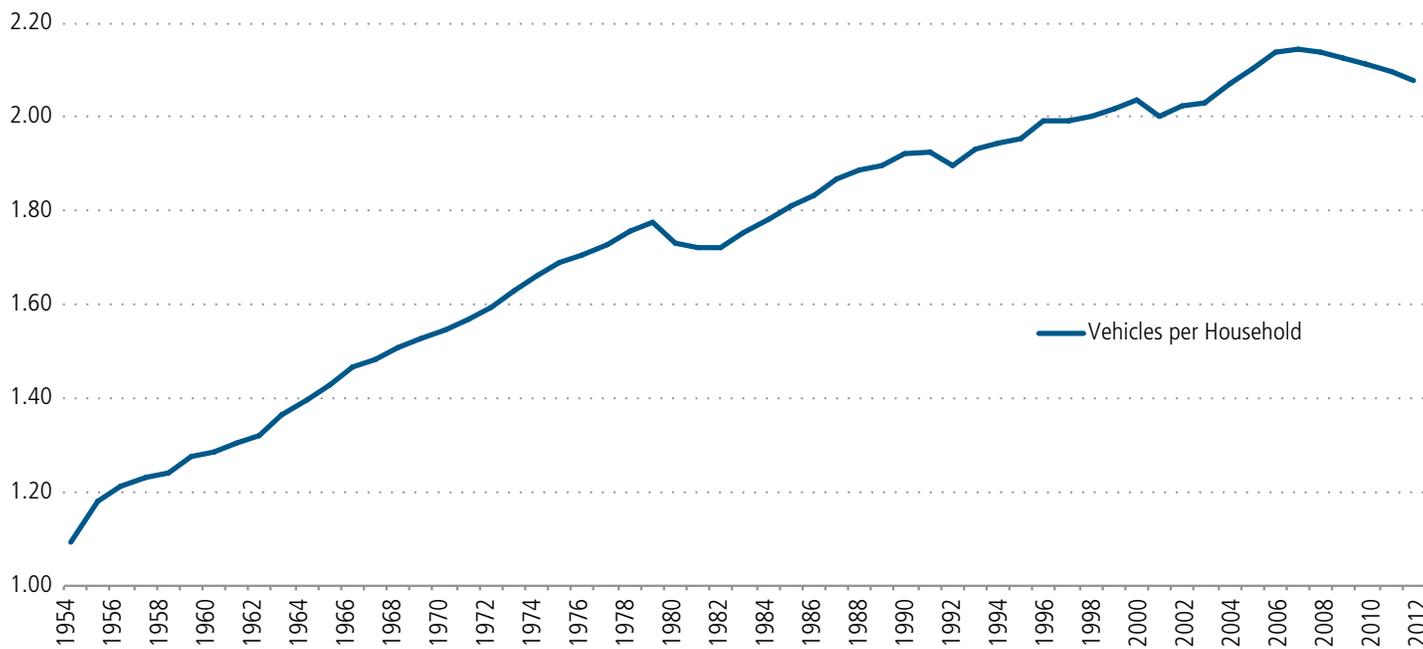
But then I realize, that's the old way of doing business: apply for a license. In theory, by restricting supply with licensing leads to higher quality drivers and better service. Nice in theory, unfortunately it fails miserably in practice.

The new way: Uber requires a ranking of each driver after every trip and drivers receive an email with feedback each week from customers. Lower rated drivers are culled from the herd. Think about it: do you rely on a regulator when purchasing books or products from Amazon.com? No, you rely on friends, family and, most importantly, reviews. In particular, you depend on reviews from users of the products in which you have interest. The same is true for trips and hotels (think: TripAdvisor). Ratings replace regulators. Not only have regulators been replaced by software and ratings, the system is safer, fairer and more efficient.

When the car arrives at the door of my downtown apartment building, I bid my driver 'goodnight' and quickly jump out and head inside. Because Uber has already secured the payment information for both driver and passenger, no cash changes hands. No credit card swipes. No waiting for the payment hardware to connect to a faraway server. No paper receipts to sign. A receipt arrives via email moments later, including a map of our exact route and the opportunity to rate the driver and provide feedback on the trip and service.

I gave my driver 5 stars.

fig.2 "PEAK CAR"?



Sources: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2012

« I'M REMINDED OF A QUOTE BY WILLIAM GIBSON: "THE FUTURE IS ALREADY HERE — IT'S JUST NOT VERY EVENLY DISTRIBUTED." »

“THE KNOWLEDGE” PROBLEM

But my Uber ride was not perfect.

For starters, navigating Los Angeles was a challenge for my driver. He wasn't familiar with downtown Los Angeles streets. Confusion about the address and cross-streets intruded in the otherwise smooth ride. Reluctance to rely on the GPS navigation required fumbling around to enter my address in a second phone.

But this isn't a new problem. It's age-old. In London, aspiring cabbies face years of learning “The Knowledge”—the codename for the maze of London streets and landmarks, with a particular premium placed on getting from A to B via the most efficient route.² To become a licensed cabbie, applicants must pass an oral examination including turn-by-turn navigation. To acquire such locational acuity, cabbies practice by zipping around London on scooter bikes until proficiency becomes second nature.

MOBILE + MAPS = THE NEW RAILROADS

And, suddenly, I realized that it wasn't just that the taxi experts' lack of imagination or an absence of entrepreneurs that plagued the taxi market. Instead, it was the absence of two key ingredients that had yet to be discovered: maps and mobile.

Mobile computers in the form of smartphones are in the pockets of 3 billion Earthly inhabitants. The computing power of each embarrasses desktops processing speeds from just 2003, connecting us to the web and each other.

But mobile alone is not enough. Detailed maps and satellites that know my precise position must exist in order for services like Uber to work. How can you route a black car to a needy passenger without a GPS maps program guiding the way? By 2008, both ingredients were in place and that opened the door for a whole new way of doing business.

Is the phenomena described above new? In 1771, Arkwright's mill opened in Britain, marking the start of the Industrial Revolution. By 1829, steam engines began running along the Liverpool-Manchester railway, as the railway age debuted. In 1875, the Carnegie Bessemer

steel plant opening in Pittsburgh, Pennsylvania, signaled the dawn of the Steel Age. The Age of Oil and the Automobile dawned in 1908 with the Model-T. And, in 1971, in Santa Clara, California, the Information Age launched with the Intel microprocessor.³

Each successive revolution created a new platform on which industry could flourish. Once railroads crisscrossed the United States and Great Britain during the 1800s, a whole new brand of industry sprung up on top - built as it were on the “platform.” Suddenly one could order merchandise from a catalogue and have it delivered over hundreds if not thousands of miles. And, of course, to consumers, it seemed like it could be no other way.

A new platform makes unforeseen businesses possible. It allows a market which did not exist before to bloom. A service which nobody predicted, built on a platform that did not exist just five years ago. This, ladies and gentleman, is the stuff of economic upheavals.

HAVE A CAR, WILL DRIVE

In fact, the new platform allows more than just a town car to zip me home. Now that the platform exists, the “UberX” model became practical. Unlike Uber's black car service, UberX allows *any* driver to become a provider of ride-sharing services. The development is astounding and goes further than you might imagine. It frees up time. It frees up resources. It frees up dead capital.

The average vehicle sits idle for 96% of the day—with the owner paying a car payment, insurance, maintenance, and parking fees (see Figure 1 on page 11). Now, those vehicles are freed up to provide ride services. If anyone can be a driver, we no longer face a cartel of companies that operate in the town car space, anyone can apply. In 2014, drivers signed up at a rate of 50,000 per month.

« IMAGINE WHAT AN UBER-LIKE FUNCTION WILL DO FOR OTHER SECTORS, WHICH MANY INVESTORS ASSUMED WERE IMPERVIOUS TO MARKET FORCES. UBER-LIKE SOFTWARE COULD UNLEASH A BEVY OF NEW OPPORTUNITIES: FROM MASSEUSES ON DEMAND TO DOCTORS ON YOUR DOORSTEP. »

ACCESS MORE IMPORTANT THAN OWNERSHIP

But why, I wondered, should I own a car at all when I can summon one more easily than ever? Could we be near “peak car” ownership (see Figure 2 on page 12)?

Access to a ride is more important than ownership. One way to think of the possible impact of ride-sharing on vehicle ownership is to compare it with the impact on bike sales (bear with us) in New York City after the adoption of the CitiBike bike sharing program. For the uninitiated, CitiBike program allows you to easily borrow a bike from its convenient locations throughout Manhattan. While bike-sharing took off, bike retail sales suffered mightily. Bike sales are down at some retailers by 20-50% in the year since the program debuted, according to Bloomberg. Of course, even with Uber, cars are needed. But here’s the key: far fewer cars than when everyone drives themselves.

More importantly, access opens opportunity for all types of passengers. Cars can be shared by a group of carpoolers. The blind or disabled have more opportunities for mobility, without relying on others or public transport. Whereas before you had to own and operate a vehicle, now all you need is access to a smartphone to achieve mobility.

LESSONS FOR THINKING ABOUT THE ECONOMY AND THE FUTURE

But, already critics have sprung up to opine on the negative impacts of sharing rather than owning on the economy. Some doomsayers have suggested Uber will reduce GDP.⁴ In fact, to the extent that it frees up “dead capital” and ignites productivity, it will boost GDP.⁵

The savings in my pocket from not owning, insuring, parking or maintaining a vehicle will be freed up to be spent elsewhere. Mapping and connecting services will supercharge efficiency and lead to lower prices for consumers across a broad range of services.

Imagine what an Uber-like function will do for other sectors, which many investors assumed were impervious to market forces. Uber-like software could unleash a bevy of new opportunities: from masseuses on demand to doctors on your doorstep. Any service you can imagine could now be connected, sans centralized authority. Call it the UberX model for the world economy: anyone can provide service X on demand. No longer do we need cartelized or centralized agency or third-party agency to provide service. Seek out service, contract person-to-person.

Think of the entire world economy as a knowledge problem—the same problem faced by our aspiring London cabbies. Information is dispersed. Resources and people are disconnected. But now software

can help close that gap and bring the world together. I’m reminded of a quote by William Gibson: “The future is already here—it’s just not very evenly distributed.”

Prepare yourself for the Uber-future. 

SOURCES

- 1 Bruce Schaller. “Entry Controls in Taxi Regulation: Implications for US and Canadian Experience For Taxi Regulation.” *Transport Policy* 14 (2007) 490-506.
- 2 “The Knowledge, London’s Legendary Taxi-Drive Test, Puts Up a Fight in the Age of GPS.” *The New York Times Style Magazine*. November 10, 2014.
- 3 Victor W. Hang. “Ubre Will Lower GDP” *Forbes*, October 21, 2014.
- 4 Daniel M. Rothschild. “How Uber and Airbnb Resurrect Dead Capital.” *The Umlaut*, April 9, 2014.



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