
Payden & Rygel

POINT of VIEW

FALL 2015

Our Perspective on Issues Affecting Global Financial Markets

Pg **1** **WECHAT: WHAT THE WORLD CAN LEARN FROM CHINA'S MOST POPULAR MESSAGING APP**

Discussions about China often sound like lectures on how the up-and-coming economy ought to behave. But, in at least one area, China is far ahead of its developed world peers: mobile payments. What can the West learn?

Pg **5** **OIL'S OBSOLESCENCE AND THE BRIGHT FUTURE FOR ENERGY**

The days of burning wood to provide our energy are no more. Today the world depends on fossil fuels to power our homes, drive our cars, and even wrap our children's sandwiches. But some think the era of fossil fuels is coming to an end as we harness new energy sources. Will solar power finally flip the switch on the world's energy landscape?

Pg **9** **SEA IT TO BELIEVE IT: SHIPPING AND THE RISE OF GLOBAL TRADE**

Your lifestyle would not be possible but for scores of silent giants slowly traversing the earth's oceans. Swollen ships, up to 1.5 times as long as the Titanic, are responsible for transporting 90% of everything that you use.

Pg **11** **INDEXING THE WORLD**

Economist Friedrich Hayek mused, "The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design." We might draw the same lesson from a market index. From the dusty desks of newspaper men and academics to center stage in the global financial markets, market indices have become essential - if controversial - features of our modern investment landscape.

WeChat: What the World Can Learn from China's Most Popular Messaging App

Discussions about China often sound like lectures on how the up-and-coming economy ought to behave. Commentators opine on appropriate reforms and how the lessons learned from the path tread by more advanced predecessors will help the economic fledgling on the global stage.

But, in at least one area China is way ahead of its developed world peers: mobile payments.

Are you still handing out your telephone number to friends or business contacts? Do you have to mail a check to your landlord or mortgage servicer each month? Is your smartphone home screen cluttered with dozens of apps?

Have no fear. There is a magical place where you can pay your rent and your utility bill, order food, send holiday cards, and send text messages to friends, family, employees, or even customers—all inside a single smartphone app.

Impossible, right? Wrong. Transactions like these are conducted nearly 600 million times a day by users in China, and an app called WeChat makes it possible.

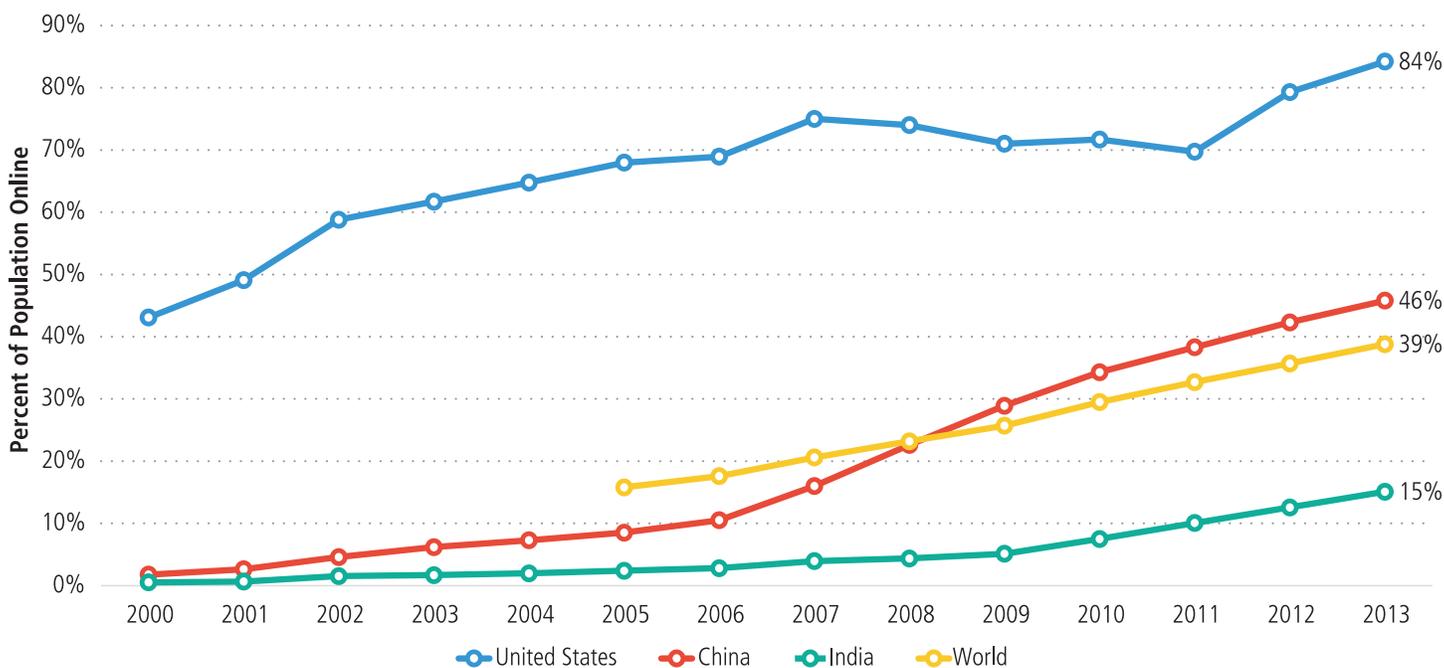
What's WeChat? How does a single chat app dominate the landscape when the US and Europe are plagued by a wide constellation of apps? Why does it matter for the economy that a single app predominates? Below we explore.

I CHAT, YOU CHAT, WE ALL CHAT THROUGH WECHAT

In parts of the world "What's your WeChat name?" is a more important question than "What's your telephone number?" For lack of a better descriptor, it's a story of East versus West.

«FOR THOSE UNFAMILIAR WITH THE SERVICE, THINK OF WECHAT AS THE MOBILE FACEBOOK OF CHINA. DEVELOPED BY THE CHINESE CORPORATE GIANT TENCENT, WECHAT IS A PLATFORM WITH MILLIONS OF APPS»

fig. 1 INTERNET PENETRATION (% OF POPULATION THAT ARE INTERNET USERS)



Source: International Telecommunication Union

For those unfamiliar with the service, think of WeChat as the mobile Facebook of China. Developed by the Chinese corporate giant Tencent, WeChat is a platform with millions of apps. On different applications within WeChat, users can share their location, audio messages (“voicemail” in the West), GIFs as stickers, group messages (e.g., to all employees of an entire firm), or even transfer files like PowerPoint presentations.

Last year for the Chinese New Year of the Horse, one billion “red envelope” messages - user-initiated gifts sent via group chats - were couriered via WeChat. Almost half of all the videos watched online in China are shared via WeChat. In Shanghai, residents use WeChat to make hospital appointments, process passport applications, and pay their utility bills. If they are hungry, app users can order food for delivery—China online food delivery is already a nearly US\$1 trillion market.

Contrast the WeChat phenomenon with the mobile environment in the West, where it is common to have a smartphone cluttered with dozens of different apps. Which app do you open first? Facebook messenger? WhatsApp? The iMessage app? Regardless of your preference, messaging apps in the West are many, and their functionality is surprisingly limited.

FROM MESSAGING TO MONEY

The advantage of a single all-encompassing app with built-in messaging is that it sits at the center of your mobile life. It begins with your identity and it connects with your address book/contact list. It's quick and easy to share information, from a picture to a hyperlink to a news article.

«LET'S GO BACK TO 1995. IN THOSE DAYS, ABOUT 35 MILLION PEOPLE AROUND THE WORLD USED THE INTERNET (0.6% OF THE WORLD'S POPULATION), WITH THE VAST MAJORITY OF USERS RESIDING IN THE US AND EUROPE»

Aside from ease of use and navigation, a single app makes online and offline payments seamless. When one app dominates them all, you need only type in your payment information once, not with every app. With your bank or credit card information entered into WeChat, payments happen seamlessly in the background of the WeChat wallet.

And the ease with which payments are made goes beyond online payments. The dominant messaging app makes in-store, brick-and-mortar payments seamless as well. A WeChat user approaches the register with her basket of items, scans the QR code on their smartphone—et voila!—the tab is paid.²

Meanwhile, in the West, online shopping is still clunky. To purchase an item from Brooks Brothers, for example, a customer first needs to remember his screenname and password for his BrooksBrothers.com account. Next, he must enter his billing address. Then his shipping address if they are different. Finally, he has to enter his payment card details.

As for offline payments via mobile? Forget about it. There's an app for buying your coffee (Starbucks), another app for payments through your iPhone (ApplePay), but cash and credit or debit cards still dominate the in-store purchases. So what is the deal here? Is the West just stodgy, slow-moving, stagnating, or slow to adapt?

Well, not so fast. Another, less glamorous, explanation may be at hand: the zig-zag march of technology and economic development.

THE INTERNET IS MOBILE (AND GLOBAL)

Let's go back to 1995. In those days, about 35 million people around the world used the internet (0.6% of the world's population), with the vast majority of users residing in the US and Europe. If you were living in the United States in 1995, chances are you accessed the internet via a “walled garden” like America Online (AOL), a subscription service that charged an hourly rate for online access.

While email may have been the first “killer app,” instant messaging (IM) rapidly gained popularity on the early internet as well. Engineers at AOL developed a “Buddy List” for their IM app “AIM,” so that a user could first locate and then chat with a list of online friends in real-time (yes, a huge innovation at the time). Friends shared hyperlinks, pictures and even music files. The internet world revolved around messaging.

Other companies quickly followed suit, realizing the popularity of messaging in the “always on” world of broadband and cable internet, instead of dial-up. Microsoft's MSN Messenger became a popular IM service.

But a messaging war ensued. AOL refused to make AIM “interoperable” with Microsoft's Messenger.³ In order to talk to friends across multiple platforms, one had to use multiple messaging services. AOL executives, worried about problems with “file sharing,” stripped AIM of some of its messaging functions. And with the lack of interoperability, messaging on the desktop web floundered.

THE RISE OF THE MOBILE WEB

Back in 1995 only Zach Morris and Gordon Gekko had mobile phones (actually, 80 million people worldwide, or about 1% of the world did), but none of those users were accessing the internet from a mobile device. In the US and Europe, desktop computing dominated.

«BACK IN 1995 ONLY ZACH MORRIS AND GORDON GEKKO HAD MOBILE PHONES (ACTUALLY, 80 MILLION PEOPLE WORLDWIDE, OR ABOUT 1% OF THE WORLD DID), BUT NONE OF THOSE USERS WERE ACCESSING THE INTERNET FROM A MOBILE DEVICE»

That changed by 2014, when 2.8 billion people were using the internet, or 39% of the world’s population (see figure 1), with the largest majority of those users in China. More startling, 5.2 billion people had mobile phones, which is about three-quarters of the world’s population. Most of those phones are still basic “feature phones” but more and more “smartphones” are purchased everyday. Mobile-only internet users have risen dramatically over the past five years, with much of the growth led by Asia (see figure 2).

More mobile usage also means vastly more internet usage overall: adults now spend 5.6 hours per day on the internet, with half of that on mobile devices. The world is rapidly gaining online access, and for much of the world the mobile internet is the first—and the only—access point to the internet. It is the Internet.

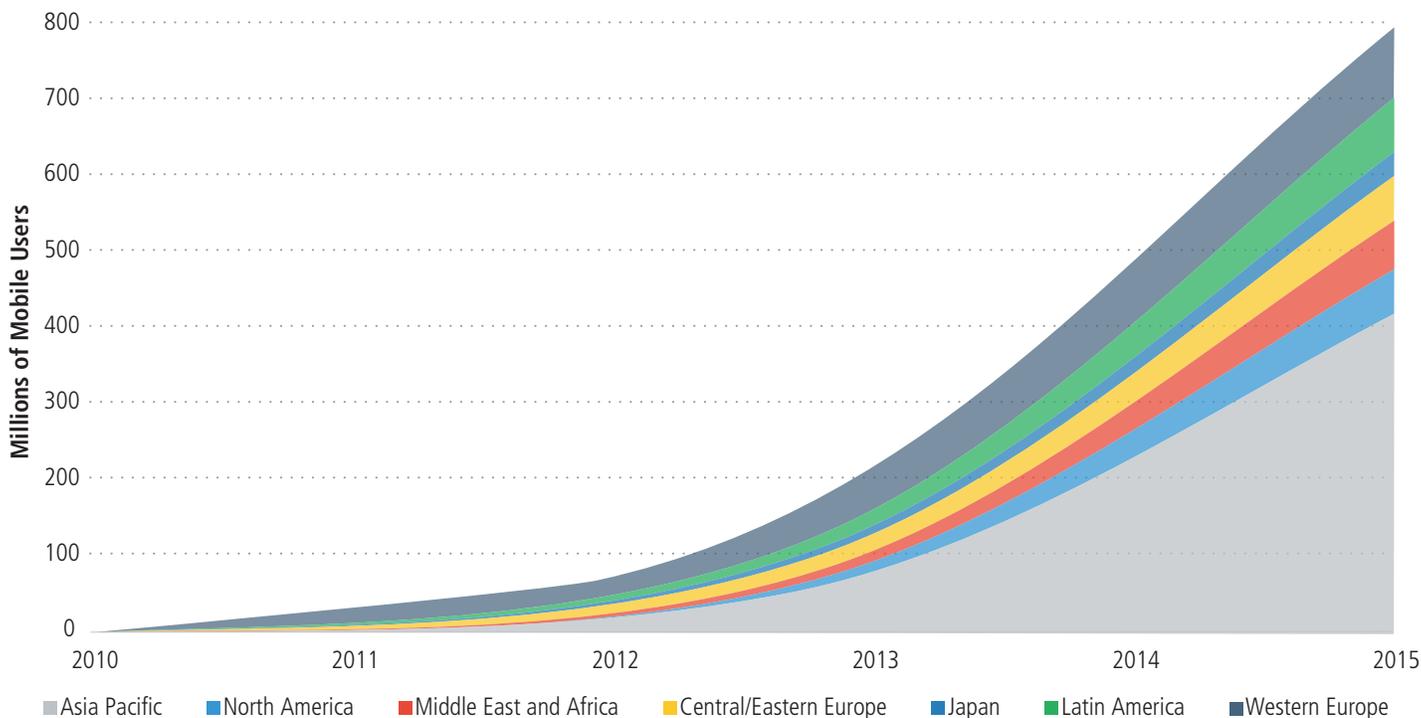
The history of instant messaging on the internet is telling, because what played out on desktops in the West seems to be playing out on mobile all over the world. Once again, the most popular mobile apps are the messaging apps. In fact, six of the top ten most used apps on a global basis are messaging apps. In terms of monthly active users (MAUs), WhatsApp has 800 million, Facebook Messenger has 600 million, WeChat has 549 million, Line has 205 million, Snapchat has 100 million, and KakaoTalk has 48 million.⁴

TWO PATHS

So the West is not necessarily behind, but on a different path. In China, we encounter a middle class whose first computer and first on-ramp to the internet is the one in their pocket. The jump straight to mobile electronic payments was made possible by a popular messaging app. Unshackled by past attempts, mistakes and entrenched institutions, they can embrace the new and surge ahead.

In the West the “wall garden” approach of internet companies has stifled messaging interoperability and made it difficult for a single dominant messaging app to emerge. Thus we are stuck with dozens of

fig. 2 THE TIRELESS RISE OF WIRELESS INTERNET: MOBILE ONLY INTERNET USERS



Source: CISCO Systems

messaging apps and little progress on payments, either online or in-person. Reinforcing this slow approach, the most popular social networking app in the West was built for the desktop, not mobile.

One other impediment is worth noting. Westerners also have short messaging service (SMS), which has been around since well before WhatsApp or WeChat or the iPhone emerged. This is what we know as text messaging. SMS is interoperable across cellphone carriers: it doesn't matter which carrier your friends or family use—AT&T, Verizon, Sprint or TMobile—you can zip them a message with the click of the send button. There is no need to download a new app. Your phone comes fully loaded with an already familiar “text app.”

ONE APP TO RULE THEM ALL?

But that's changing. Mobile app usage is spreading in the West. Among the 18-30 year old crowd, splitting a check or beaming payments from smartphone to smartphone is a reality with services like Venmo. The number of messages sent from global messaging apps (such as WhatsApp) recently surpassed the total SMS messages sent worldwide.⁵

For now, we find China's one-app solution fascinating and worth watching as mobile smartphones speed ahead. It seems that cultures differ as much as cluttered smartphone homescreens do. Maybe then it should not come as a shock that messaging and payment systems also differ? 

SOURCES

- 1 Connie Chan. “When One App Rules Them All: The Case of WeChat and Mobile in China.” Andreesen Horowitz. 6 August 2015.
- 2 Note: Quick Response (QR) codes are two-dimensional barcodes that can be scanned by a smartphone with a camera. The smartphone then displays the images, text, or other digital content stored in the codes.
- 3 As Tim Berners-Lee, the creator of the World Wide Web, notes, “The sites [e.g., Facebook] assemble these bits of data into brilliant databases and reuse the information to provide value-added service—but only within their sites. Once you enter your data into one of these services, you cannot easily use them on another site. Each site is a silo, walled off from the others.” Tim Berners-Lee. “Long Live the Web: A Call for Continued Open Standards and Neutrality.” *Scientific American*. December 2010.
- 4 Mary Meeker. “2015 Internet Trends.” Kleiner Perkins Caufield Byers. 27 May 2015.
- 5 “What's up? Messaging apps.” *The Economist*. 25 March 2015.

Oil's Obsolescence and the Bright Future for Energy

It allowed the industrial revolution to occur, created economic prosperity for billions and provided light to let us read in darkness while cruising 30,000 feet in the air. We carved up mountains and waged war for it. We are, of course, talking about energy. In one year the average individual in the US will use 90,000 kilowatt-hours of it. That is enough energy to watch TV non-stop for 100 years (a record many teenagers are keen to break) or toast 4.5 million slices of bread.¹

Creating that energy has been one of humankind's largest projects. To generate the average American's annual energy use, one would have to either run 14 horses nonstop for a year, burn more than 19 tons of wood from their three acre forest, burn 47 tons of coal or burn 158 barrels of oil.²

«WE ARE, OF COURSE, TALKING ABOUT ENERGY. IN ONE YEAR THE AVERAGE INDIVIDUAL IN THE US WILL USE 90,000 KILOWATT-HOURS OF IT. THAT IS ENOUGH ENERGY TO WATCH TV NON-STOP FOR 100 YEARS (A RECORD MANY TEENAGERS ARE KEEN TO BREAK) OR TOAST 4.5 MILLION SLICES OF BREAD»

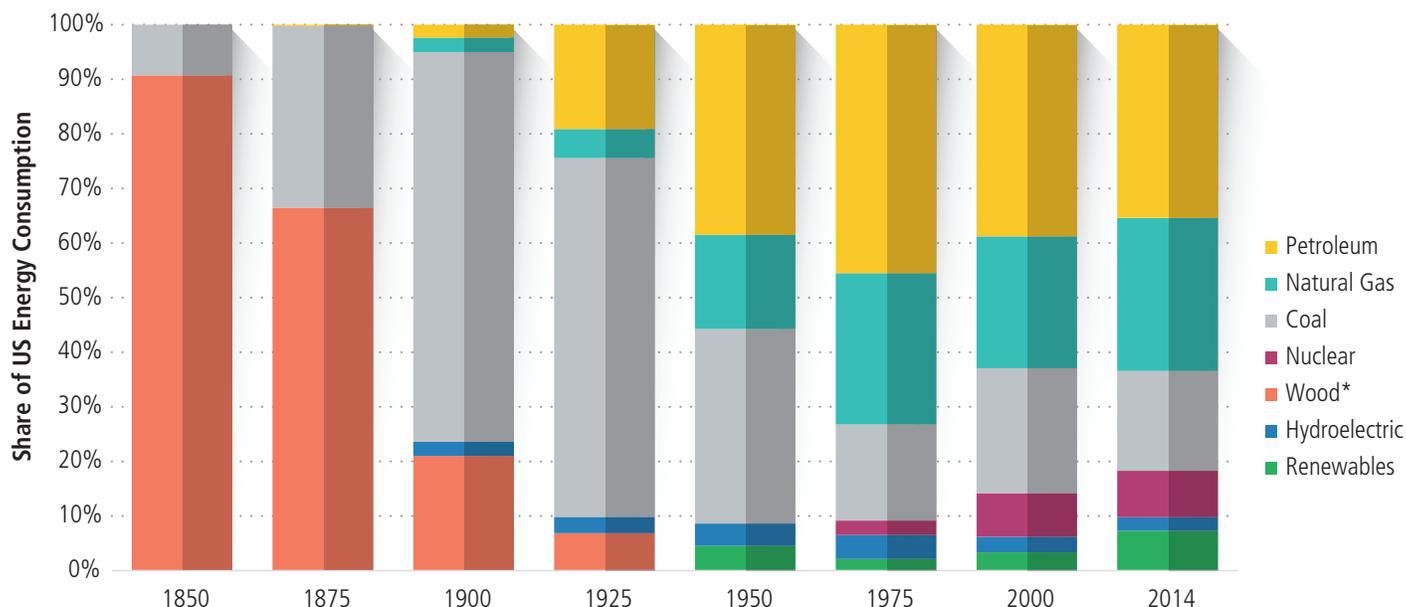
Today, we might be on the edge of discovering an alternative fuel source, one which burns all the time millions of miles away: the sun. After laying nearly enough oil and gas pipelines to make 4.5 trips to the moon and back³, is it possible to find an alternative energy source? Could fossil fuels be replaced by solar panels? Could oil become obsolete?

A BRIEF HISTORY OF ENERGY

The history of energy use in the United States can be told in a few episodes. In antebellum America, wood was the primary energy source. The first major shift occurred during the industrial revolution as burning coal replaced wood and powered steam engines across the country (and across Europe and the UK). But as the world crept into the 20th century, the widespread use of the internal combustion engine meant that oil would replace coal as the energy source of choice.

Today, petroleum, natural gas, and coal provide more than 86% of the world's energy.⁴ Such a strict dependence on these fuel sources (and questions about their environmental impact) have an army of scientists, engineers, and activists calling for a major transition in the way humans power their world. But if fossil fuels are so bad, why have they been the prominent source of energy for more than a century (see figure 1)?

fig. 1 WOOD YOU BELIEVE IT? US ENERGY CONSUMPTION BY SOURCE SINCE 1850



Source: US Energy Information Administration

*'Wood' category was discontinued in 1950 and is included in the 'Renewables' category since that time.

FOSSIL FUELS: THE GIFTS OF THE PAST

The massive amount of energy we use today is a gift from the living organisms that passed away millions of years ago. Their decaying remains created coal, oil, and natural gas, the fossil fuels that provide energy to an increasingly thirsty world. These fuels were relatively easy to extract, transport, and store and combusted easily to produce a spectacular amount of energy.

Oil allowed us to travel longer distances. The advent of oil drilling helped us avoid the near certain extinction of oil-producing fauna, whales and seals. Burning coal slowed the deforestation of the world. But what if we don't find a new source? What if the coal/oil revolution fails to give way to a more sustainable means of generating energy?

Long have humans feared the prospect of exhausting our natural, non-renewable resources. A 1922 US presidential commission pointed out that the "output of gas has begun to wane," and in 1977 President Jimmy Carter said that "we could use up all the proven reserves of oil in the entire world by the end of the next decade."⁵ Yet human innovation continued to find new reserves while energy efficiency rose sharply.

«TODAY, PETROLEUM, NATURAL GAS, AND COAL PROVIDE MORE THAN 86% OF THE WORLD'S ENERGY»

For example, the boom in natural gas occurred because technological innovations (and high prices) made formerly inaccessible gas profitable to extract via drilling.

As we continued to diversify our energy sources, we were able to produce great amounts of energy with lower carbon dioxide emissions per unit of GDP. Our rate of growth outpaced the rate of emissions (see figure 2). However, this trend was not enough for the critics of fossil fuels. As voices on climate change became louder and oil prices reached historic highs, public perception shifted against fossil fuels. Scientists, policymakers, activists, and a growing number of private industrialists began to call for a transition to renewable energy. But is it as simple as building vast numbers of solar plants?

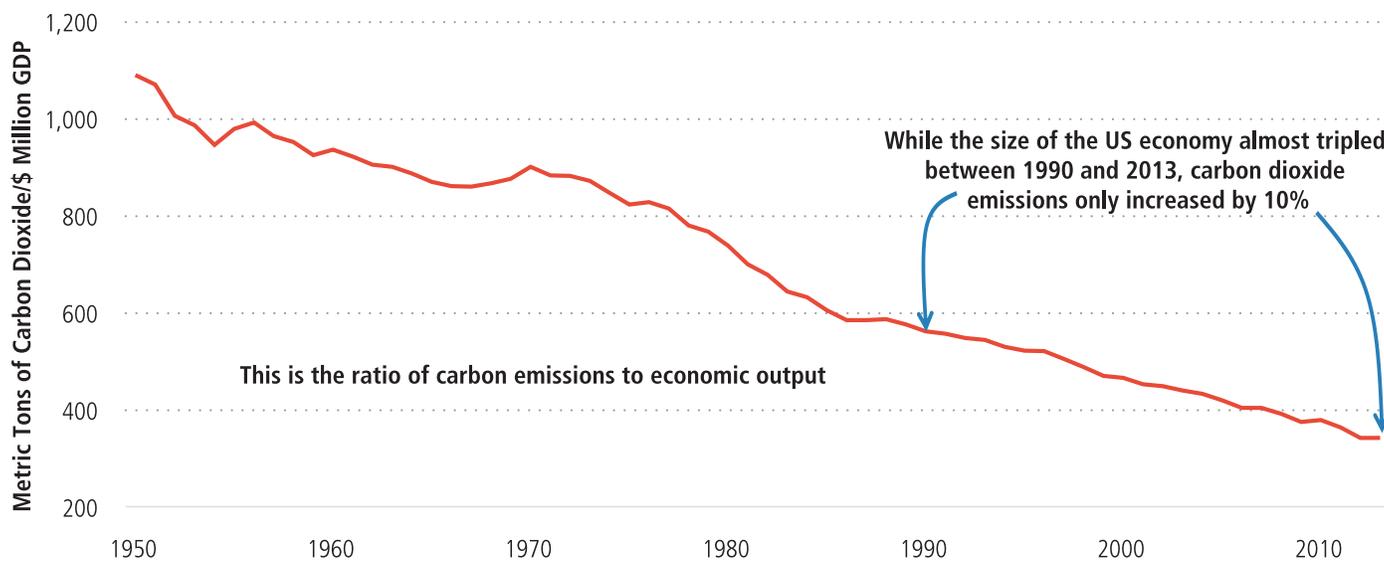
THE SUN ALSO RISES

As a clean, renewable source of energy, solar power is often envisioned as the next logical energy source. Consider the possibilities: if we could capture all the solar energy that strikes the state of Texas alone and convert it into electricity we would have 300 times the energy of all power plants around the world.⁶ The issue is capturing all that energy without losing too much in the process.

This is where solar plants come into play. In the past few years, solar energy has become the fastest-growing energy source in the world. In fact, of all the new energy created in the US last year, one third was solar.⁷

Earlier this year, luxury electric car manufacturer Tesla made headlines when it released an industrial scale battery that fits in your garage. Who needs a home battery, you ask? You do—a home-battery unit can store energy from solar panels during the day and utilize the stored power to run your entire house at night.

fig. 2 THE CARBON INTENSITY OF THE US ECONOMY IS IMPROVING ALL THE TIME



Source: US Energy Information Administration, Environmental Protection Agency

BRINGING IT FROM THE SCIENCE LAB TO YOUR ROOFTOP

Transitioning to a new energy source for the world is not that simple. As a way to think about the switch, consider four factors critical to any energy transition in the context of solar.

First, the price of solar panels. The price of photovoltaic cells (the “panels”) has dropped from around US\$80/watt to US\$0.65/watt (see figure 3). Yes, you read that right, it fell from 80 dollars to 65 cents. This can be largely attributed to greater panel and component supply from China. Supply in China was in turn driven by easy credit and government support, which spurred a solar manufacturing bubble and drove prices down as much as 40% in 2011 alone.⁸

Second, solar panels need to efficiently convert sunlight to energy - otherwise they cannot provide for the growing demand around the world. Current technology converts around 16% of sunlight into energy, but scientists argue that further research could bring that number up to 50%. Lower costs coupled with increased efficiency could eventually make solar as cheap as conventional sources of energy in use today.

Third, transitioning to solar requires significant help from the government. Subsidies have played a huge role in making residential solar power (the panels on your rooftop) cheaper. In fact, when you take away subsidies, residential solar is not even close to grid parity in any of the 50 US States. For larger solar plants, the levelized cost of energy, a measure that includes the cost of installation, is 10.5 cents per kilowatt-hour in California, a state with abundant sunlight and ideal conditions for solar panels. This is still higher than the cost of a natural gas power plant which does the job for 6.6 cents per kilo-

watt-hour.⁹ As a result, any transition would require continued support from the government until innovation catches up.

Fourth, one must consider the issues of space and storage. Opponents of solar power often argue that solar power takes away too much land and does not work when the sun is not present. However, by just covering 4% of the world’s deserts, or just the Gobi Desert in China, we could supply the world’s entire electricity demand. We could then store that energy in batteries to use when the sun is not outside. (The great thing about the sun is that it has thus far always come back!)

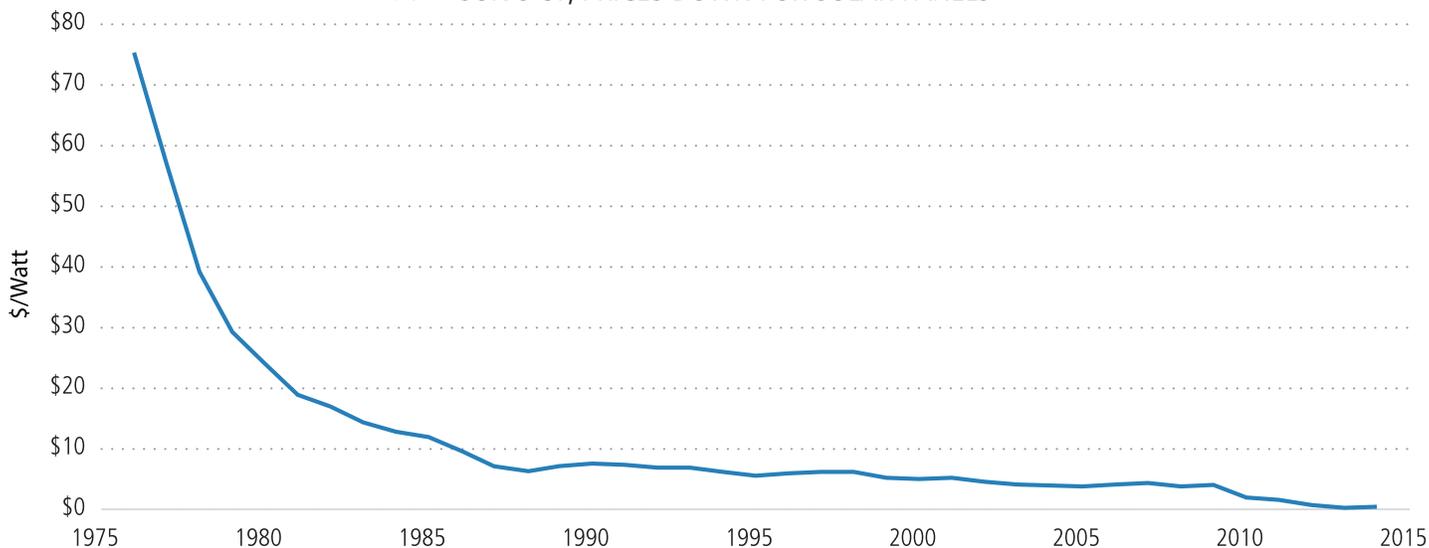
The future of battery innovation is bright, with the efficiency of batteries growing by 8% every year. As newer and more technology arrives in the marketplace, prices should drop while quality increases.¹⁰

If we are optimistic about technology and innovation driving this revolution ahead and addressing these four factors, are we ready for a transformation?

HOW RENEWABLE IS RENEWABLE?

People often overlook that the resources which go into producing solar panels and the batteries needed to store their energy might not be as unlimited as the sun. Silver is not unlimited, and mining for more silver for the numerous panels needed would replace the search for gas and oil reserves. Another “rare-earth” metal used in thin solar panels, tellurium, is three times rarer than gold. The main material in today’s batteries is lithium. A majority of the lithium reserves in the world can be found in Bolivia and Chile. It remains to be seen whether or not sufficient quantities of recoverable lithium exist to make the batteries needed to store all the solar energy needed.¹¹

fig. 3 SUN’S UP, PRICES DOWN FOR SOLAR PANELS



Source: Paul Maycock, Bloomberg New Energy Finance

Note: Prices inflation indexed to US PPI.

As a result of the scarcity of these basic battery materials, we might run into similar doomsday scenarios opponents of fossil fuels have been describing. That said, much of these resources can be recycled from old panels while oil and gas are not recyclable once used.

«IN 50 YEARS, WOOD LOST ITS DOMINANCE TO COAL. IN THE 50 YEARS FOLLOWING THAT, COAL LOST ITS DOMINANCE TO OIL AND GAS. LET'S SEE WHAT HAPPENS IN THE NEXT 50»

SO, WILL THIS TRANSITION OCCUR?

Energy transitions have happened in the past and they will happen again. But time and time again a new technology appears that is the “answer” to the world’s thirst for energy. In the end, investments in alternative energy sources will be driven by demand for them and the return on investment they provide, not by social pressures.

Don’t forget, it wasn’t just the government that spent billions of dollars to set up power plants. The private sector, willing to take the risk on natural gas, fracking, and deep ocean oil drilling, spent that money. As innovation continues, do not be surprised if 50 years from now, you find yourself scoffing on the prospect of a new energy source we have not yet discovered replacing the solar panels around the world.

In 50 years, wood lost its dominance to coal. In the 50 years following that, coal lost its dominance to oil and gas. Let’s see what happens in the next 50. In an energy-dependent global economy, the only constant is change. 

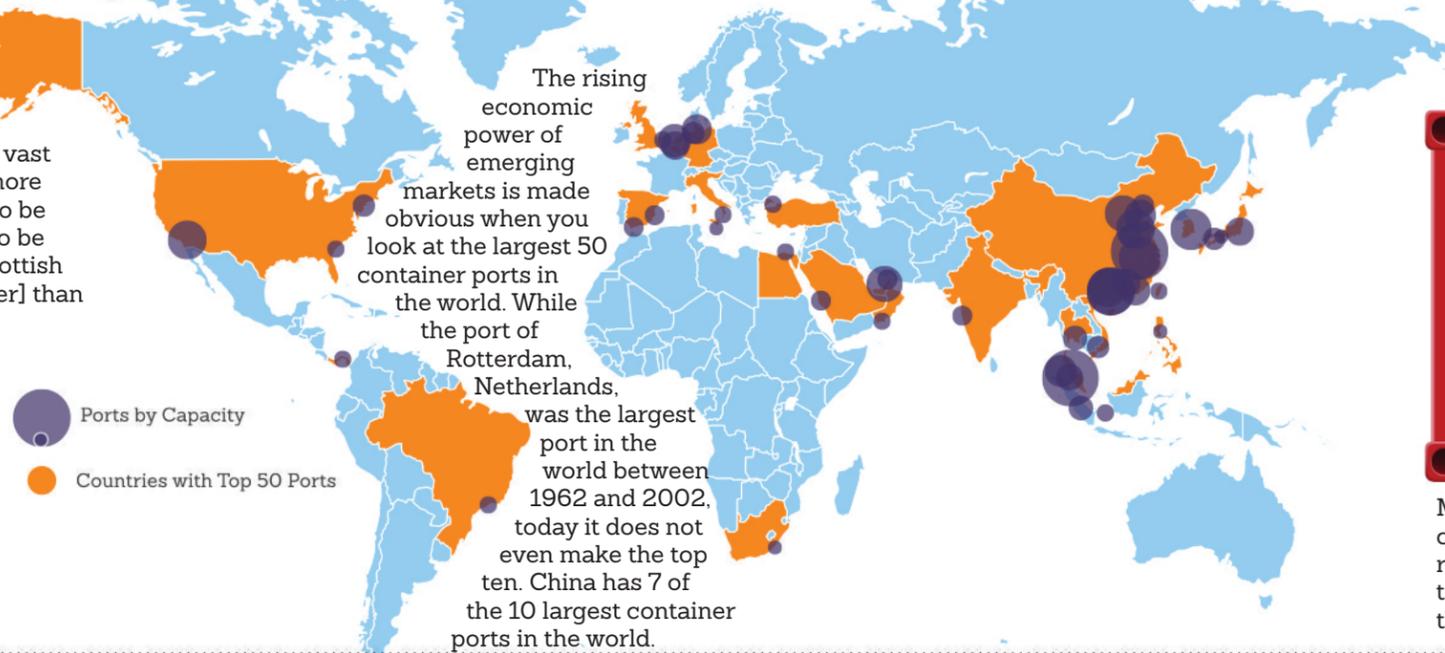
SOURCES

- 1 “So what is a Kilowatt Hour?” Duke Energy.
- 2 The Knowledge: How to Rebuild Our World from Scratch, Lewis Dartnel, Payden Calculations
- 3 P Hopkins. “Pipelines: Past, Present and Future.” Penspen Ltd. 8 March 2007
- 4 BP Statistical Review of Energy, 2015
- 5 Matt Ridley. “Fossil Fuels Will Save the World (Really).” Wall Street Journal. 13 March 2015.
- 6 Solar and Sustainable Energy- The Sun’s Energy.” University of Tennessee Institute of Agriculture. Retrieved 10 October 2015.
- 7 David Rotman. “Paying for Solar Power.” MIT Technology Review. 17 August 2015.
- 8 Jeffrey Ball. “China’s Solar-Panel Boom and Bust.” Stanford Graduate School of Business. 7 June 2013.
- 9 David Rotman. “Paying for Solar Power.” MIT Technology Review. 17 August 2015.
- 10 Alex Davies. “Elon Musk’s Grand Plan to Power the World With Batteries.” Wired. 01 May 2015.
- 11 Mark Z. Jacobson & Mark A. Delucchi. “A Path to Sustainable Energy by 2030.” Scientific American. November 2009.

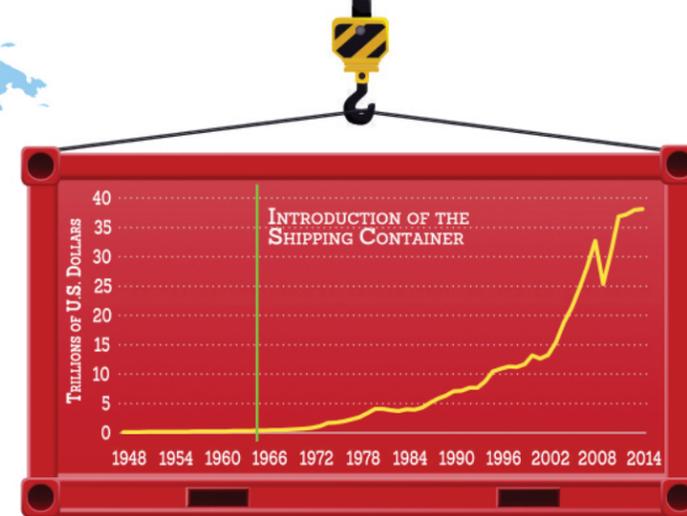
SEA IT TO BELIEVE IT: SHIPPING AND THE RISE OF GLOBAL TRADE

Your lifestyle would not be possible but for scores of silent giants slowly traversing the earth's oceans. Swollen ships, up to 1.5 times as long as the Titanic, are responsible for transporting 90% of everything that you use. The vast shipping networks make it more economic for "Scottish cod to be sent 10,000 miles to China to be filleted, then sent back to Scottish shops and restaurants, [rather] than to pay Scottish filleters."¹

ANCHOR! THE TOP 50 PORTS IN THE WORLD BY CONTAINER CAPACITY



THE GROWTH OF WORLD TRADE...IN A BOX



More than any other invention, the standardized shipping container deserves credit for the growth of world trade. By reducing loading/unloading times and making it easier to transfer goods along the supply chain, the introduction of the "box" has coincided with the pickup of world trade.

WHAT DO CONTAINER SHIPS DOCKING IN THE U.S. CARRY?

TOP TEN ANNUAL EXPORTS BY VALUE IN BILLIONS OF DOLLARS

- Autos
- Plastics
- Metal Parts
- Auto Parts
- Cotton
- Iron Waste
- Nuts
- Pork Meat
- Chemical Woodpulp
- Centrifuges



TOP TEN ANNUAL IMPORTS BY VALUE IN BILLIONS OF DOLLARS

- Printing Machines
- TVs
- Autos & Parts
- Clothing
- Furniture
- Video Games
- Medicine
- Computers
- Toys
- Shoes



Twenty Foot Equivalent Unit (TEU)
Standard Unit for describing ship's cargo capacity.

8ft 20ft
2 cars could fit per container

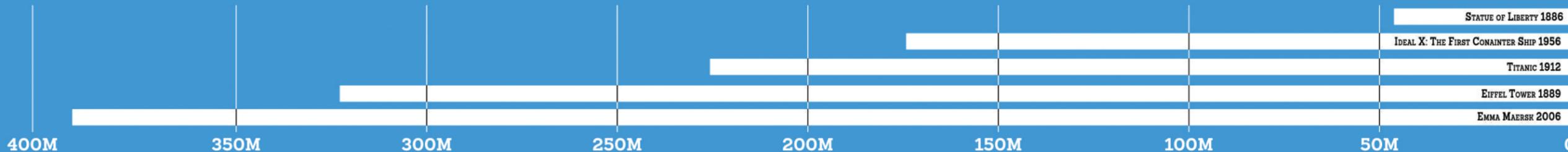
MSC OSCAR
395.4M
THE WORLD'S LARGEST CONTAINER SHIP

38,448 CARS CAN CARRY

YOU WOULD NEED 1,100 BOEING 747s TO TRANSPORT THE CAPACITY OF THE MSC OSCAR

A CONTAINER SHIP ENGINE CAN HAVE THE SAME AMOUNT OF POWER AS 88 FORMULA 1 CARS

19M SANTA MARIA



Source: Review of Maritime Transport - UNCTAD, Maersk, MSC, ABB, Bureau of Transportation Statistics, The Economist, 1 NYTimes Book Review, Ninety Percent of Everything by Rose George

Indexing the World

What do Play-Doh and the Dow Jones Industrial Average have in common? Both were inventions whose original purpose had little to do with their most famous applications. In the case of Play-Doh, the ubiquitous children’s play putty, Cleo McVicker originally thought he’d stumbled upon an ingenious wallpaper cleaner. Only after a family member suggested that the product might appeal to young children did Mr. McVicker wise up, “shape” his vision, and begin to sell his now globally famous play product.

For his part, Charles Dow wasn’t dreaming up a benchmark for billions of dollars worth of institutional assets in 1896 when he created the Dow Jones Industrial Average. Instead, the stock index was a journalistic novelty meant to feed his ever hungry financial news media consumer base. In his 7 October edition of the Customer’s Afternoon Letter, Dow computed the average share price of twelve companies, only one of which we know today: General Electric.

The use of today’s indices, whether for stocks, bonds, volatility, credit default swaps, or commodities, is a far cry from the basic purpose Dow envisioned for his average. In what follows, we explore the rise of the market index. From the early days of hand calculations on the stained marble floor of the New York Stock Exchange, through the brilliant back-room tinkering of an engineer at 40 Wall Street, all the way to the grizzled but still-sharp neurons of John Bogle: information technology and the evolution of financial markets have waltzed through the decades, each benefitting and transforming the other. Like any good waltz, it is difficult to recognize who is leading and who is following.

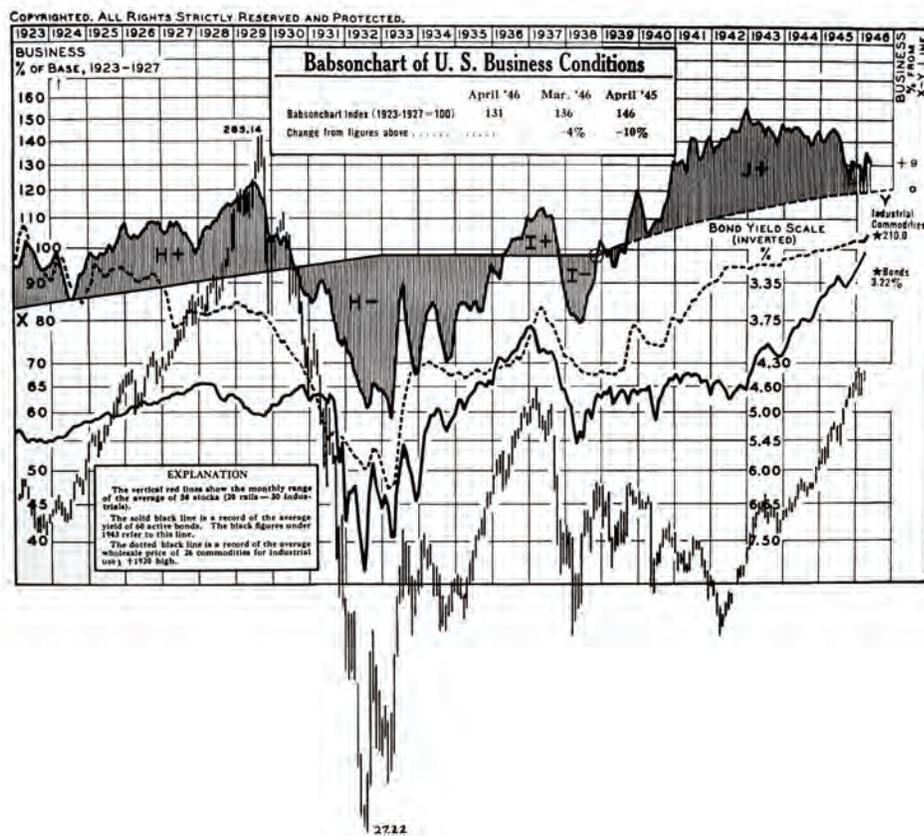
THE EARLY DAYS OF INDICES

Indices were born as the brainchild of information peddlers, not as the chief product of a financial institution. One of the most recognizable indices through the 20th century, the Dow Jones Industrial Average, was Charles Dow’s best attempt to answer the perennial question, “How did the market do today?” His success brought fame and fortune. News outlets could scarcely hope for more than to be nearly synonymous with the ever exciting US stock market.

“JACK BOGLE OF VANGUARD FAME MAY HAVE MADE INDEXING FAMOUS, BUT HE DIDN’T INVENT IT. THE EARLIEST HISTORY OF SO-CALLED PASSIVE INVESTING ACTUALLY PLAYED OUT IN THE MIND OF ANOTHER ENGINEER, JOHN ANDREW “MAC” MCQUOWN”

After Dow’s untimely death in 1902, the calculation business lived on in the person of Arthur “Pop” Harris. According to Dow Jones lore, until 1946, “Pop calculated the Dow Jones average every hour on the hour for the Dow Jones News Service. On busy trading days, he sometimes bloodied his hands pulling out the ticker tape. Through all those years, the financial world would hold its breath for seven minutes after the New York Stock Exchange’s closing bell, waiting for Pop, who was a small, skinny man, to finish his official calculations on a piece of newsprint.”¹

fig.1 BABSON’S ALL-INCLUSIVE ECONOMIC INDEX: WHO CARES IF IT’S RIGHT! IT LOOKED IMPRESSIVE



Source: Roger W. Babson Virtual Museum, Babson College

And it wasn't just the stock market indices which carried the imagination of market participants. Roger Babson, founder of the entrepreneurially-focused Babson College, made a fortune creating an economic index called the Babsonchart, or Compositplot (see figure 1). Based (very) loosely on Newton's third law of action and reaction, the chart displayed everything from stock prices to railroad haulings in one place.

The scientific veil apparently was enough to seduce clients into buying up Babson's graphic gumbo. By 1920, the "Babson Statistical Organization had about 12,000 subscribers, bringing in revenue of about \$1.35 million."² In 2015 dollars, Babson's annual haul would be more than \$16 million in revenue, from a newsletter service alone!

So the newspaper and newsletter crowd invented and maintained early versions of economic and financial market indices. But, for the most part, these were self-contained entities, meant to inform or entice readers to subscribe. In the next step of the evolution of the market index, the advent of modern computing wrought special and wide-reaching changes on the business of market watching.

COMPUTING THE UNIVERSE

Where indices began as a moneymaking proposition for journalists, the introduction of computers into the world of finance caused a shift in the locus of indexing power. Especially in fixed income, computers

made it possible to calculate and track more indices than ever and to sell or license such indices across the financial world. The once unassuming market trackers transformed into essential infrastructure.

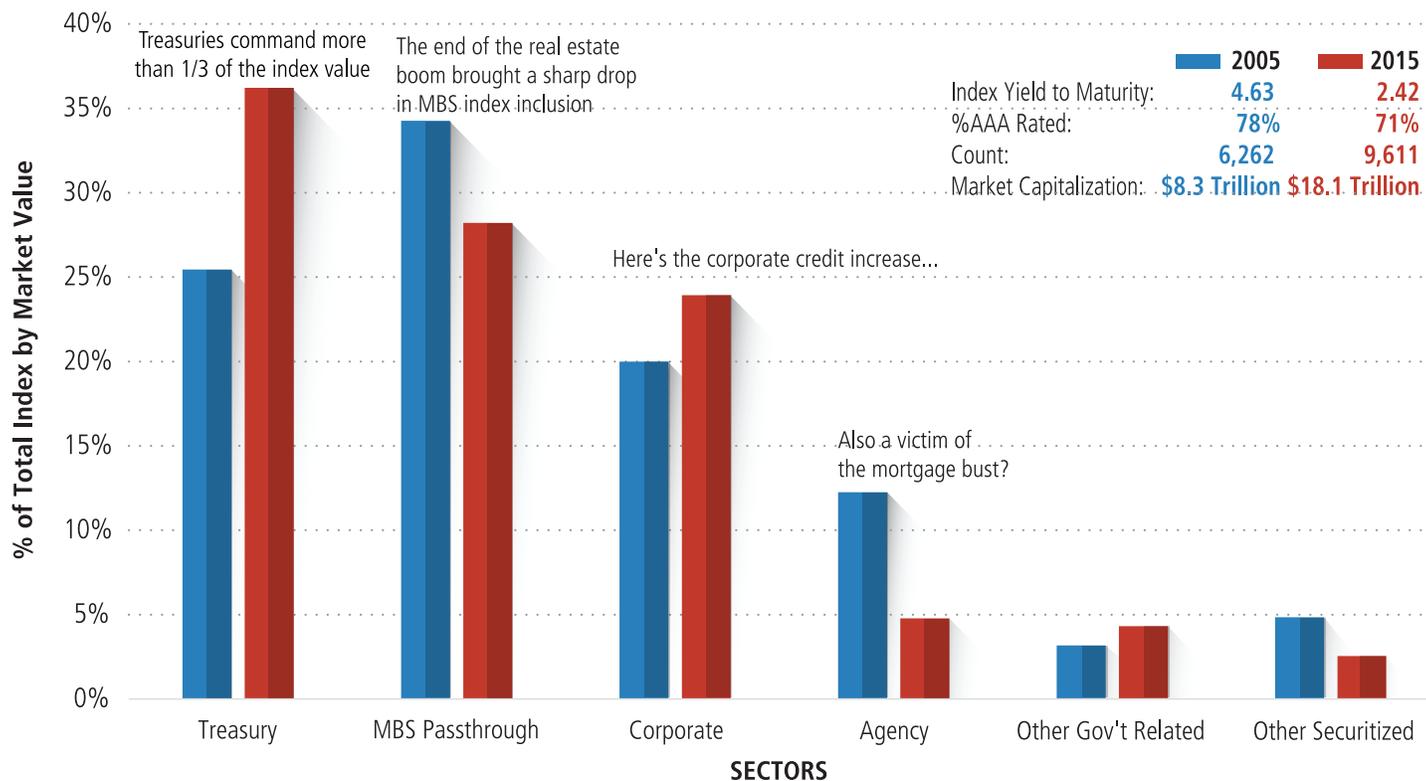
Perhaps the most notable progeny of indices and computers were index funds. Jack Bogle of Vanguard fame may have made indexing famous, but he didn't invent it. The earliest history of so-called passive investing actually played out in the mind of another engineer, John Andrew "Mac" McQuown. McQuown (employed and working on a math PhD) coordinated a group of professors at MIT and the University of Chicago who were testing hypotheses about the behavior of equity prices over time.³ His ingenious work and prodigious work ethic would soon be in demand in finer environs.

These researchers were intent on discovering whether or not active investment managers could consistently and reliably outperform the market. It was out of this group—Nobel Prize winners Eugene Fama and Harry Markowitz among them—that the famous "efficient market hypothesis" would eventually emerge.

THE BIRTH OF THE INDEX FUND

As a result of his study, the former Navy man Mac McQuown went to work inventing a way to passively track common stocks "on the IBM 7090 in the service center in the basement of the Time-Life Building for \$300 a weekend. The program took so long to run, and produced

fig.2 REBALANCING? CHANGES IN THE COMPOSITION OF THE US BARCLAYS BOND AGGREGATE



Source: Barclays

so many reams of uninterpretable data, that McQuown often crawled into his sleeping bag on the floor and slept while the program was running.”

From the scuffed linoleum floors of the Time-Life Building, McQuown soon found himself in San Francisco, running Wells Fargo’s Management Sciences division. In those primitive days, Wells Fargo lacked the computing power necessary to perform McQuown’s index fund related analysis. Even after renting computing time from Standard Oil (who had a larger computer), McQuown’s project needed still more binary brawn: only the University of California at Los Angeles had sufficient power to host and search McQuown’s database.

«INDEED, WORKING ON THE BACK OF MASSIVE COMPUTING POWER, THE BARCLAYS GLOBAL AGGREGATE INDEX NOW INCLUDES 17,000 ISSUERS (AND EVEN MORE CUSIPS) WORTH A STAGGERING TOTAL OF \$43.3 TRILLION»

Unbeknownst to the researchers, around the same time, the Samsonite Luggage corporate pension fund was getting antsy about having such a disjointed stock portfolio. In what can only be described as cosmic luck, just as the Wells Fargo Management Sciences group had worked through the gnarliest of the technical problems in tracking the equity market, Samsonite approached the bank and “asked if [Wells Fargo] could design a diversified portfolio that spanned the market.” And so was born the first equity market index portfolio.

Among the other pioneers of computer indexing were a pair of young investment bankers employed at Kuhn Loeb & Co. These two were furiously developing a way to track the bond market. In a Wall Street Journal profile, Art Lipson reflected on his early work, “develop[ing] a database-management program to keep information on ...[a list of] 254 government bonds and 3,355 corporate bonds—which allowed for calculations of a total return.” Although it may be seemingly pedestrian in today’s world, the \$221 billion total return bond index that Mr. Lipson calculated would ultimately become what we know now as the Barclays US Aggregate Bond Index, the S&P 500 equivalent for bond investors.

THE FUTURE IS NOW

Where once Wells Fargo executives had to travel to Los Angeles to find sufficient computing power to run their indexing operation, today the integration of electronic information and finance is nearly pure. At

the center of the swirling world of price quotes and trading remain the once innocent indices. Except that today, they are big business.

Indeed, working on the back of massive computing power, the Barclays Global Aggregate Index now includes 17,000 issuers (and even more CUSIPs) worth a staggering total of \$43.3 trillion. Data from investment bank Barclays shows that more than \$4 trillion worth of hard-won investment funds are benchmarked against their US Aggregate Index (see figure 2) alone.

In the equity markets, the growth of indices and strategies built off of them is also astounding. Mutual funds rely on indices as a raw material for their financial products. At the start of 1985, there were only three index funds available to investors who wished to track the performance of the S&P 500. Now, “funds indexed to the S&P 500 hold 33 percent of index mutual fund assets,” roughly some \$700 billion. In total, passively managed equity mutual funds account for 20% of all equity mutual fund assets.

Who calculates all of these? Excluding the banks, three companies dominate the market. The indices of S&P, Dow Jones, FTSE Russell and MSCI are the benchmark bosses for over \$9.4 trillion worth of investor assets. The S&P 500 alone has in excess of \$7.5 trillion benchmarked to it. But it takes work. Reporting from the Financial Times suggests that “S&P Dow Jones, the biggest indexing company, alone calculates more than 1 [million] indices each day.” When asked why the company calculates so many indices, “Alex Matturri, chief executive of S&P Dow Jones Indices, [said]...’Because there’s a demand for that.”

INDEXING THE WORLD

Economist Friedrich Hayek mused, “The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design.” We draw the same lesson from securities indices.

From the dusty desks of newspaper men and academics, to center stage in the global financial markets, indices have become essential creatures of our modern investment landscape. And recent trends, especially with regard to passive investment mandates, do not indicate that the future will be much different. As the demand for ever-more nuanced investment strategy grows, so too will the number of indices. 

SOURCES

- 1 Dow Jones
- 2 Friedman, W. (2014). *Fortune tellers: The story of America's first economic forecasters*. Princeton: Princeton University Press, pp. 38.
- 3 Ancell, Kate (2012). "The Origin of the First Index Fund." www.chicagobooth.edu
- 4 Ibid
- 5 Ibid
- 6 Cui, Carolyn. "Barclays Agg Had Modest Origin." *Wall Street Journal*, April 2, 2013. Accessed September 9, 2015
- 7 Barclays' POINT risk and index program.
- 8 Gruber, M. (1996). Another Puzzle: The Growth in Actively Managed Mutual Funds. *The Journal of Finance*, 51 (3)
- 9 Investment Company Institute
- 10 Authers, John. "Investing: The index factor." *Financial Times*, August 16, 2015. Accessed August 16, 2015.



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