Payden&Rygel

POINT of VIEW

SPRING 2016

Our Perspective on Issues Affecting Global Financial Markets

Human, Economy and Pet: How Pets Are Changing Humans and the Economy

More dogs live in San Francisco than children. Before you go fish-ing for the most cat-astrophic, dog-matic response, we invite you to share the bird-en of thinking through such a remarkable statistic with us. Indeed, the US Census Bureau reports that among the 805,000 people living in San Francisco, 108,000 are children; accompanying them in their households are 180,000 dogs.[1]

Beyond dogs and kids in San Francisco, pet ownership is on the rise. In the United States alone, from 2006 to 2014, the population of pet cats and dogs grew by 27.3 million, rising more than the human population, which grew a mere 20.2 million. Nearly 60% of households own a pet.[2]

Whether or not you worry that would-be parents are now pet owners instead, the trends are clear. Pets are here to stay and are growing in importance.

Much in contrast to past generations, many humans in the 21st century prefer to think of and treat pets like peers. Contemporary pet owners have a greater propensity to buy premium products for their furry friends. The impulse to humanize our pets, and the willingness to pay top dollar for these friends and their related services, we conjecture, will bring about more jobs, more pets, and more happy people.

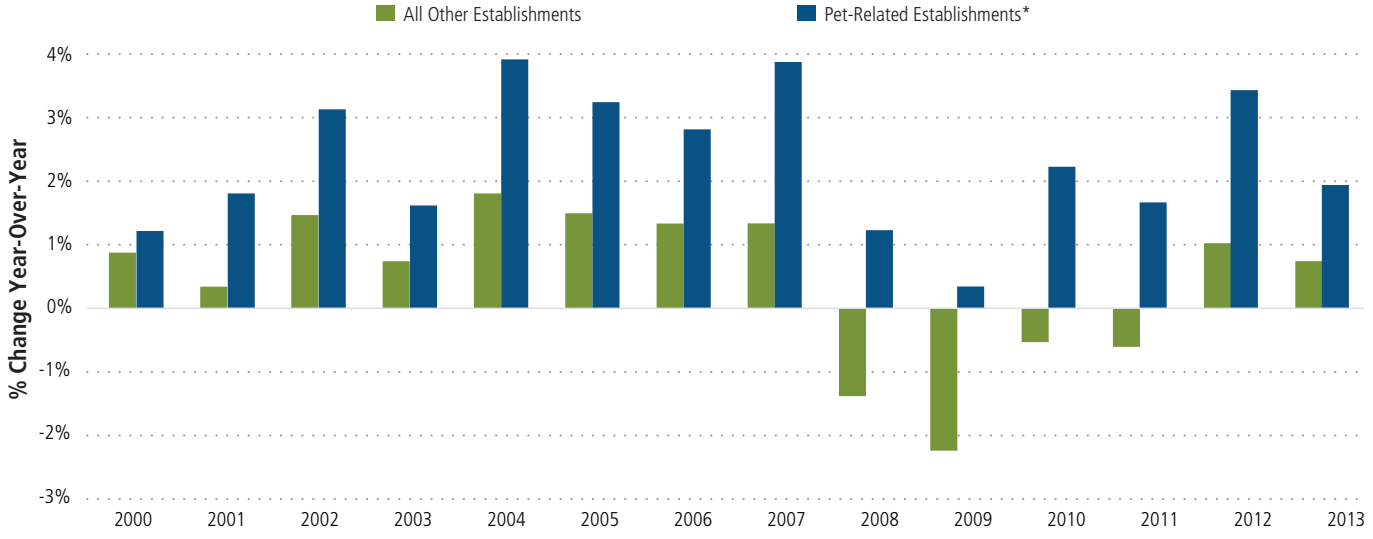
HUMAN, ALL TOO HUMAN?

In the 20th century, when referring to a cat or dog's parents, we'd first think of a mammal of the same species (i.e., its biological parent). Today, however, humans increasingly think of themselves as parents to their pet children. For better or for worse, there is no doubt that people humanize their pets and, as a result, spend freely on services once reserved only for humans.

As evidence that pets are no longer just animals that live in the back yard but integral parts of the family, according to Harris Poll data, 95% of owners consider their pets as members of the family, 71% reported allowing their pets to sleep with them in bed, and 45% of pet owners reported buying birthday presents for their furry, four-legged friends.[3]

No surprise, then, a cottage industry of pet services has blossomed. These pet services include everything from dog walking and teeth brushing to cat training, adoption clinics, and doggie yoga studios. US Census Bureau data reveals that since 1998 the number of pet related stores has jumped by 38%. The broad US economy has only added 8% more storefronts over the same time period (see *Figure 1*).

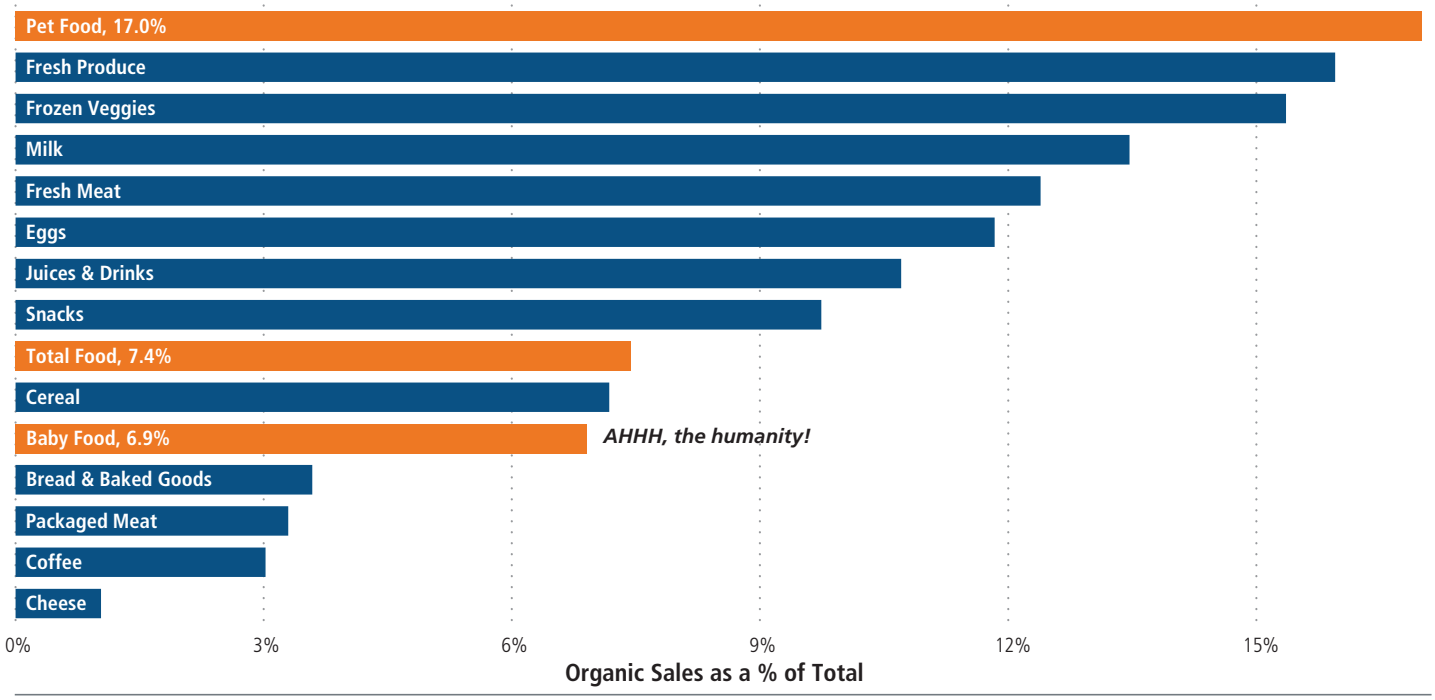
fig. 1 A CHICKEN IN EVERY POT AND A PET STORE ON EVERY CORNER: EVEN DURING THE RECESSION THE US ECONOMY ADDED NEW PET STORES



Source: Bureau of Labor Statistics

*Includes pet store, pet care services and veterinary establishments

fig. 2 MANIC FOR ORGANIC? 17% OF ALL PET FOOD SOLD IS ORGANIC, COMPARED TO ONLY 7% OF ALL BABY FOOD



Sources: The Nielsen Company, Wells Fargo

Pet services? We can hear the sighs from our dear readers. Just as more children will require more schools or daycare centers, the need for pet training and boarding will rise in lockstep with pet ownership. Industry research suggests that of the $6.3 billion Americans spent on pet services (excluding veterinary work!), 38% of it was on boarding and pet sitting. Forget Holiday Inn—you can now bring Socks to one of PetSmart's 202 pet hotels.[4]

Plenty of tech startups have seized the opportunity. Companies like Rover and Dogvacay offer applications that connect pet parents with pet sitters. When the cat's away the mice will play, and these two companies alone have raised nearly $65 million in their few years of existence. A glance through the startup funding website AngelList shows 44 companies with 894 investors listed in the pet sitting/boarding/grooming industry (our favorite company name was "Meowtel").

PAY THE PREMIUM

When people conceive of their pets as little humans, the price they pay for any given good or service naturally jumps higher. For what self-respecting pet owner could stomach not giving their pet a better life than the life of the cat they had growing up, who ate kibble and slept alone on cold concrete in the backyard? Take pet food as the primary case study of how premium pricing will drive the pet industry to new heights.

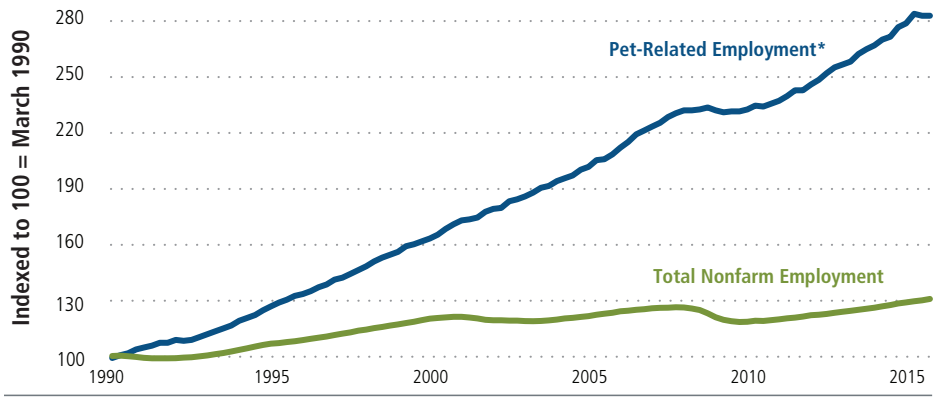
A huge catalyst behind the rise in premium pet food stemmed from dark days in 2007. In March 2007, the FDA discovered industrial chemicals, specifically melamine, in more than 150 brands of pet food. Although melamine had long been banned as an ingredient in animal or human food in the US, imported Chinese products (namely wheat gluten and rice protein concentrate) used to make pet food in the US led to the tragic passing of many cats and dogs. Since then, the US consumer has changed her thinking on how to nourish her pets.

Consumers now prefer more expensive brands of pet food that only use natural ingredients, don't have grains that cause pet allergies, and don't have poultry by-products to ensure the health of their pets. While we can debate the actual difference made in a pet's life by natural/organic food, consumers have spoken with their wallets. Natural pet food grew from 11% of total US pet food sales in 2011 to 17% in 2014.

If 17% natural/organic penetration of pet food does not sound impressive, consider that only 7% of domestic baby food sales are natural/organic (See *Figure 2*). That means we nourish our pets with more natural and fresher food than the grub we serve our children.

More than just buying better food for their pets than for their babies, some owners go even further in humanizing their pad-footed pals. Recent research from Mintel shows that 1/3 of millennials (those aged 18 to 29) are more inclined to prepare their pet's food from scratch than they are to purchase canned food.[5] Compare that to the rest of the population, where only 1/5 of respondents indicated a preference to cook up a meal for their little beast.

fig. 3 MAN'S BEST FRIEND IS ALSO THE LABOR MARKET'S BEST FRIEND



Source: Bureau of Labor Statistics

*Includes pet store, pet care services and veterinary employment

Furthermore, homemade artisanal pet treats, made by using raw pet food mixtures, are an evolving trend where passionate pet parents can make certain Fido eats only the very best. Pet treat sales grew at a 6% compound annual growth rate in the US during the 2010-2014 period and outpaced that of broader pet industry growth.

THE PET PROJECT GOES BIG

Consumers' newfound willingness to pay a premium for pet products isn't simply good news for the pet industry. Our four-legged (and two-legged/two-finned/two-winged) friends promise to leave a mark on the economy writ large.

Before you bark, Bureau of Labor Statistics data show that US consumers spend more annually on their pets ($1,151) than they do on car insurance ($1,112). What is more, "average household spending on pet food alone was $183 in 2011. This was more than the amount spent on … bread ($107), chicken ($124), [and] cereal ($175). Even when spending at restaurants dropped during the recent recession (December 2007–June 2009), spending on pet food stayed constant."[6] While eye-popping, the result is even more astounding on a broader level, as total US pet spending grew 13% from 2007 to 2009 but aggregate US retail sales contracted 9% during this period.

«SINCE 1998 THE NUMBER OF PET-RELATED STORES HAS JUMPED BY 38% »

And where the dollars go, so go the jobs. Not only do pets seem to make people happier, but man's best friend also seems to compel faster hiring. While only accounting for 0.08% of the 144 million nonfarm payroll jobs in the US, pet-related employment has jumped nearly 3x from 195,000 in 1990 to 553,000 in 2015 (see *Figure 3*). The broader labor market, meanwhile, grew from 110 million to 144 million over the same time period.

The future looks even brighter. Over the next ten years, Bureau of Labor Statistics forecasts have animal care and service employment up 11%. Veterinarian employment is expected to jump 9%. Add in a 19% expected growth rate in veterinary technologists and technicians, and the rapid growth we've seen in pet-related employment since 1990 looks set to continue.

BET ON PETS

Weep though you may for the children of San Francisco, weep not for the pets. As we have shown, the 21st century may be the greatest time in history for domesticated animals. As households increasingly view their pets as part of the family, and so increasingly spend top dollar to keep the critters happy, we anticipate a booming pet industry for years to come.

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From Whale Oil to Oil Change: Productivity Trumps Everything

Were you to hazard a guess about the world's richest city on the eve of the American Civil War, chances are New Bedford, Massachusetts, the seaside city 60 miles south of Boston, nestled in the northern pocket of Buzzards Bay, wouldn't have made your list.

Boasting just over $1,600 of output per person in the mid-1840s, the whaling capital of the world was richer than the United Kingdom in 2015. In its Golden Age, "New Bedford . . . was perhaps the richest city per capita in the world."[1] Today, few outside of New England know the name.

A name more widely known is Detroit. The storied "Motor City," like New Bedford, was once the seat of a great economic renaissance. In 1960, Detroit had the highest per-capita income in the United States and was the country's fourth-largest city by population.[2] Though not riding a wave of whaling, it was the rise and fall of American automobile manufacturing that sketched Motown's trajectory.

For investors surveying the global landscape, both New Bedford and Detroit make for cautionary case studies. These geographies (and industries) for a time commanded unassailable market positions as a result of more productive capital stocks. But the good times would not last. The dominance of the New Bedford whalers and Detroit car manufacturers finally cracked under the burden of new, more productive production processes developed abroad and increasingly expensive labor at home. And if such stories seem remote from today's world, consider a certain valley located in the American west.

«IN THE 1840S THROUGH THE 1850S, US WHALERS ACCOUNTED FOR 70% OF THE TOTAL VALUE OF GLOBAL WHALE PRODUCTS»

MAKE IT, TAKE IT

Within their product markets, the dominance of these two industries in their time was complete. For context, whaling was the fifth largest industry in mid-19th century America—a position occupied today by education and health services. Yankee whaling wasn't just impressive in terms of its share of domestic output. Indeed, in the 1840s through the 1850s, US whalers accounted for 70% of the total value of global whale products.[3] In a world hungry for illuminants, lubricants, and supple-but-sturdy plastic-like material, the producers of whale oil and whalebone sat on the throne.

New Bedford was the whaling hub *par excellence*. So profitable and concentrated was the whaling industry that New Bedford local, Lady Hetty Green, "later called the Witch of Wall Street…inherit[ed] two whaling fortunes and became the wealthiest woman in America."[4]

«IN 1950, DETROIT WAS THE 18TH LARGEST CITY IN THE WORLD (NOW IT ISN'T IN THE TOP 100)»

Fast forward to the 20th century where Detroit improved upon New Bedford's rapid, rich ascent. In 1950, Detroit was the 18th largest city in the world (now it isn't in the top 100).[5] General Motors, Ford, and Chrysler all made their homes (and their cars) in the Detroit metropolitan area. And it showed. As early as 1930, "110,000 wage-earners in Detroit...representing half of total industrial workers [in the US] were in automobiles."[6] By 1955, Detroit cranked out 75% of all the motor vehicles produced around the world. It should come as no surprise that the same Big Three owned nearly 100% of the American car market in the decade after World War II.

HOW DID IT HAPPEN?

With the fruits of success now firmly established, the task at hand becomes explaining the dominance of these two industrial clusters. In both cases the answer lies with superior productivity. The New Bedford all-stars deployed better technology, had more abundant capital, and had cheaper labor compared to overseas competition. The secret to Detroit's dominance lay in the perfected mass production technique. But let us take each in turn.

Whaling was a capital intensive business. Ship owners (often called "Agents") and ship-owning syndicates underwrote and managed the entire voyage, arranging and paying for everything from disaster insurance to timber for repairing a damaged hull.

"The typical New Bedford whaling venture of the 1850s called for an investment of $20,000 to $30,000. The average American farm was worth $2,258 during the same time period.[7] In terms of capital at risk, funding a whaling venture in the 19th century would be comparable to bankrolling a $179 million venture today.

With the capital assembled, agents and boat owners devised an ingenious compensation structure to attract productive and talented labor. According to a contemporary account, "a whaleman [was] not paid by the day, week, or month. . . . Instead, his earnings consisted of a specified fractional share, known as a lay, of the total net proceeds of a voyage."[8] While the owners, captain and mates were entitled to a larger share of the net proceeds, with all hands' compensation depending heavily on the final net value of the catch, cost saving and fishing efficiency were top of mind.

Put together a cluster of talented, well-compensated laborers with an ample pool of local, knowledgeable capital, and you had the makings of an exceptional American whaling industry concentrated in New Bedford.

Density brought other benefits, including technological innovations such as a new harpoon known as the Temple Toggle. Where formerly, harpooned whales could dislodge a sharpened harpoon-tip by swimming quickly, Lewis Temple successfully "developed a simple but significant refinement to the harpoon" that deployed a second barbed piece, which would not come loose from a harpooned whale's blubber.[9] The improved harpoon meant fewer missed catches and more profit.

«IN TERMS OF CAPITAL AT RISK, FUNDING A WHALING VENTURE IN THE 19TH CENTURY WOULD BE COMPARABLE TO BANKROLLING A $179 MILLION VENTURE TODAY»

The entrepreneurial, nautical, and technological skills accumulated in New Bedford gave American whalers productivity advantages over their British and European competitors for most of the early 1800s. One measure of the difference: "on average an American vessel employed .08 people per metric ton, a British vessel, 0.14 [people per ton]", nearly double that of the Americans.[10]

CAR PRODUCTIVITY

Whalers though they were not, 20th century American car manufacturers harvested the same financial and industrial gains from productivity that their seafaring ancestors had a century earlier. This time, mass production, popularized by Henry Ford, and later perfected in the sharp mind of Alfred Sloan, pushed productivity to new heights.

"Mass production" conjures images of assembly lines and undifferentiated products. For our purposes, mass production was different and more productive both in that it wasn't craft production and also in that it evolved to most efficiently meet booming post-war car demand.

Two decades before the denizens of Detroit started shooting cars off assembly lines, the craft production style dominated automobile manufacturing. Highly skilled workers, radically decentralized supply chains and low production volumes characterized craft production. Some romanticize the craftsman elements of early automobiles, but

fig. 1 MINUTES OF EFFORT TO ASSEMBLE PARTS UNDER DIFFERENT PRODUCTION METHODS

	LATE CRAFT PRODUCTION	MASS PRODUCTION	% REDUCTION IN EFFORT
Engine	594	226	62%
Magneto (Ignition)	20	5	75%
Axle	150	26.5	82%
Major Components into a Complete Vehicle	750	93	88%

Source: Womack, J., Jones, D., and Daniel Roos (2007). The Machine That Changed The World

the lack of economies of scale (the 200th car cost as much to make as the 1st) and the long production cycle meant that none but the elite could travel via motor.

With its unskilled labor and car designs specifically tailored for a centralized conveyor assembly process, the mass production technique both shortened the production cycle and made the futuristic gasoline-powered automobile affordable for the common man (see *Figure 1* on previous page).

Where Henry Ford perfected the production of the vehicle, it was Alfred Sloan of General Motors who coordinated the corporate ecosystem that would most profitably design, market, sell, and service cars for the public. It was Sloan who conceived of a five-model car product range (Ford sold only Model Ts), created separate corporate divisions to manage the sprawling GM corporation, standardized component pieces, and "annually altered the external appearance of each car" to induce consumers to buy new cars every year.[11]

«SOME ROMANTICIZE THE CRAFTSMAN ELEMENTS OF EARLY AUTOMOBILES, BUT THE LACK OF ECONOMIES OF SCALE (THE 200TH CAR COST AS MUCH TO MAKE AS THE 1ST) AND THE LONG PRODUCTION CYCLE MEANT THAT NONE BUT THE ELITE COULD TRAVEL VIA MOTOR»

Mass production expanded the idea of a car market and ratcheted American automakers' productivity off the chart. Assembly line work and tailored design shortened the time needed to produce a car, making autos affordable. The final elements, standardization of component parts and the spawning of a car consumer culture with a real product cycle, not only accelerated the productivity of the producers, but also built a domestic market for its products. More than 7 million autos were sold in the US in 1955 (by contrast, in 2015, 17 million were sold even though the US population was nearly two times larger than in 1955) and the Big Three auto companies accounted for 95% of all sales.

WHAT GOES UP MUST COME DOWN

Surely the furthest thing from mind in the opulent office towers of Detroit in 1955 or the regal stone mansions of New Bedford in 1845 was decline. However little attention it was paid, the productivity push in each industry eventually plateaued. "At the turn of the [20th] century, New Bedford had relinquished its premier standing to San Francisco, but by then the tonnage of the US whaling fleet had fallen by almost 95%."[12] Once again, a century later, the automakers found themselves in decline as a share of total production. From the towering heights of 95% market share in 1955, by 2016, the Big Three sold only 46% of all the vehicles purchased in the US.[13] So why did these two industrial clusters see decline, and how did it happen so quickly?

A necessarily simplified answer for both New Bedford and Detroit is that both cities lost their productive edge over new entrants in their respective markets. On the supply side of the high seas, a Norwegian invention and, perhaps ironically in our narrative, the rise of onshore labor competition from the nascent US manufacturing industry betrayed the profitable blubber of New Bedford. In Detroit, despite booming auto demand, competitors proved more productive.

No story of the waning of American whaling would be complete without a mention of demand. As the use of kerosene (to be burned in lamps), petroleum, and rubber became widespread, the demand for whale products dropped rapidly at the onset of the 20th century.

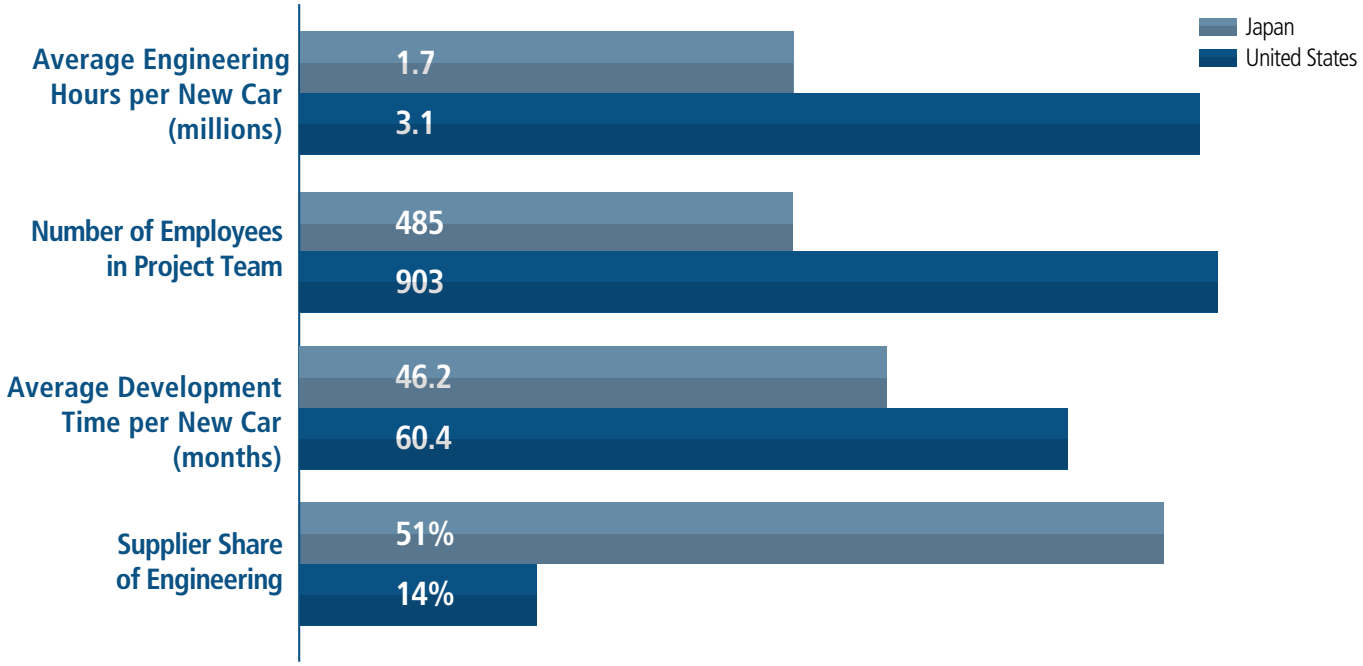
That said, our focus here is on the degradation of the American whalers' supply side advantages—specifically their superior productivity. By 1900, Norwegian whaling fleets had overtaken their American competitors, rising on the back of lower production costs as a result of vastly improved technology.

Norwegian whaling wunderkind Svend Foyn mounted explosive harpoon cannons on smaller and more agile boats, attached them to five-inch thick steel cables and anchored the cables deep in the ship's hull.[14] "When the whale swam off, it was played like a fish on a line; the mast and the hold springs (the accumulator) acted in the place of the fishing pole, allowing enough give that the cable would not break."[15]

«IN THE 30 YEARS FROM 1955 TO 1985, THE JAPANESE SHARE OF WORLD MOTOR VEHICLE PRODUCTION SKYROCKETED FROM 2% TO JUST SHY OF 30%»

Changes in watercraft design and in the technology of killing and retrieving whales depressed the value of much of the American whaling

fig. 2 PRODUCT DEVELOPMENT PERFORMANCE BY REGIONAL AUTO INDUSTRIES, MID-1980s



Source: Womack, J., Jones, D., and Daniel Roos (2007). The Machine That Changed The World

capital stock. The boats docked in New Bedford were now too large, and were increasingly losing workers to higher paying manufacturing jobs inland. As textile manufacturing grew in importance, the former American labor cost advantage soon disappeared. Agents and captains found their share of the catch diminished as prices rose for the most talented harpooners and coopers.

A CONGESTED ROAD

Alas, American whaling wasn't the first—and certainly won't be the last—industry wounded by high wages and more productive competitors. Though circumstances were slightly different, paradoxically, the mass production process on whose legs the Big Three had once galloped formed the blinders worn by American automobile manufacturers. It was the rise of lean production methods developed by the Japanese that unraveled America's midcentury vice-grip on the global automobile market.

Lean production was a process invented and refined by Japanese carmaker Toyota. From the moment rolled steel arrived at the factory, all the way through to their dealer showrooms, Toyota's new method allowed them to cut costs and outcompete the American carmakers on price, thus earning market share.

The hallmark of the lean production process was its emphasis on reducing waste (or *muda*): wasted time on the part of unmotivated assembly line workers, wasted raw materials on defective manufactured parts, and wasted money on the part of consumers who'd purchased defective vehicles.

The production mentality was flexible and helped reduce costs (see *Figure 2* above). The result? In the 30 years from 1955 to 1985, the Japanese share of world motor vehicle production skyrocketed from 2% to just shy of 30%. Lean production enabled greater product variety and lower costs, all before Detroit could sputter, "Slow down!"

«POLITICAL HANDWRINGING AND ESTABLISHED INTERESTS ASIDE, IN A GLOBAL MARKET IT IS THOSE PRODUCERS ABLE TO MORE CHEAPLY AND EFFICIENTLY CONVEY THEIR GOODS AND SERVICES TO THE WORLD WHO ULTIMATELY PREVAIL»

JUNKYARD AND BONEYARD

In both American whaling and car manufacturing, industrial clusters sprang up, dominated the world market, and receded rapidly, all within a century. Even though the American auto manufacturers have

fared considerably better than their now non-existent whaling counterparts, we might read that more as a reflection of enduring growth in demand, rather than extraordinary adaptation in supply.

Both stories share an underlying driver. As productivity goes, so goes profit. Political handwringing and established interests aside, in a global market it is those producers able to more cheaply and efficiently convey their goods and services to the world who ultimately prevail.

More provocatively, with inspiration from Clayton Christensen's *The Innovator's Dilemma*, the risks facing the productivity of an established industry are as much unseen as they are seen. Neither the American whalers nor the Big Three auto manufacturers lost out to competing industrial clusters playing their same game.

Norwegian whalers won out by developing an entirely new production system, based on better technology and a different vision. Much of the same could be said for the Japanese. Toyota could never compete with Alfred Sloan's corporate kingdom. But Toyota never had to. The alternative lean production process was enough to fell the once indomitable Detroit. Which city or industry is next? We leave you, dear reader, to ponder.

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Anatomy of the Smartphone: A User Manual for its Role in the Global Economy

Most people can't imagine life without their smartphones. But, in many parts of the world, smartphones are far more than mere luxury items. For users in developing nations, where most of the future smartphones will be sold, the "mobile internet" *is* the internet. The availability of mobile web and computing will continue to revolutionize world commerce more than any other technology in history.

THE APPS AVAILABLE FOR SMARTPHONES ARE MORE VALUABLE THAN THE ENTERTAINMENT INDUSTRY

Global app revenues in 2015 were $41.1 billion. That's more than global box office revenues. In fact, for the first time ever, Americans spent more time on mobile apps than on TV in 2015.

WARNING! DEVICE MAY CAUSE SHOPPING SPREES

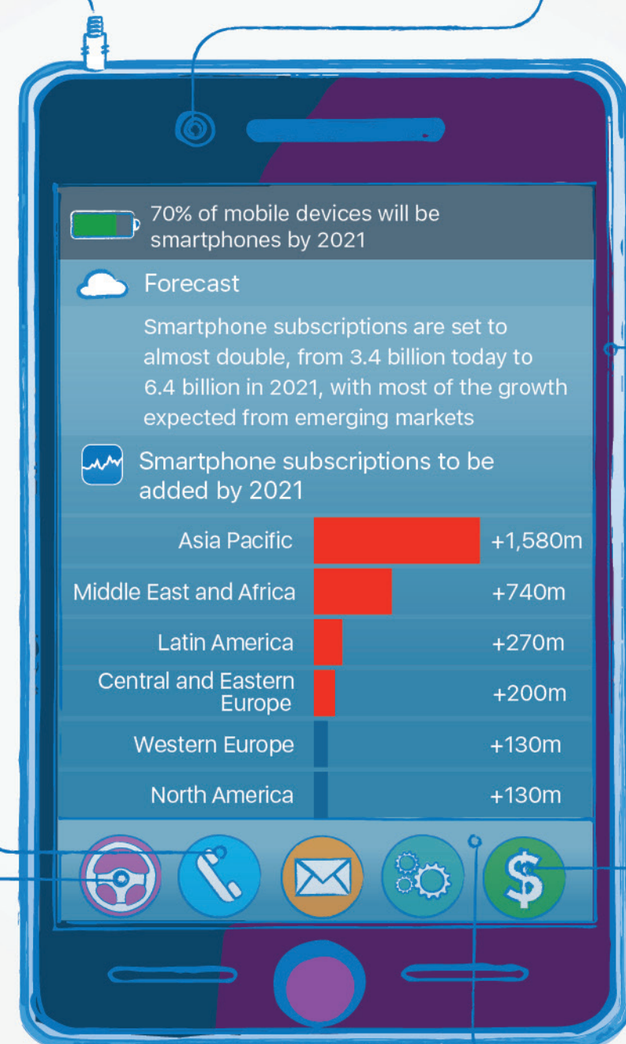
On "Singles Day", the biggest shopping day in the China, smartphone-based buying accounted for 70% of sales.

PRESS HERE TO MAKE A CALL

Only 5% of the time spent on smartphones in the US was for voice calls, which used to be the only feature of a "phone."

TAP A FEW TIMES FOR YOUR OWN DRIVER

Ridesharing services like Uber, which is valued at $50 billion, would not exist without the Global Positioning Satellite (GPS) technology and data connection capability of the smartphone.



FRONT FACING CAMERA

More photos were taken on smartphones in 2015 than were *ever* taken on film cameras. A company valued at $16 billion (Snapchat) would likely not exist without the ability to take "selfies."

CARDHOLDER NOT INCLUDED (OR NEEDED)

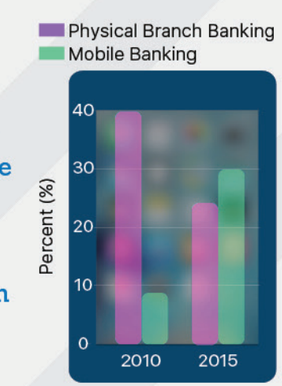
Smartphones allow you to wirelessly transfer money via apps like Venmo. In the quarter of 2015, Venmo alone processed $2.5 billion in transactions.

CAUTION: DEVICE IS NOT EDIBLE

Sales of iPhones alone generated more revenue than Coca-Cola and McDonald's combined in 2015.

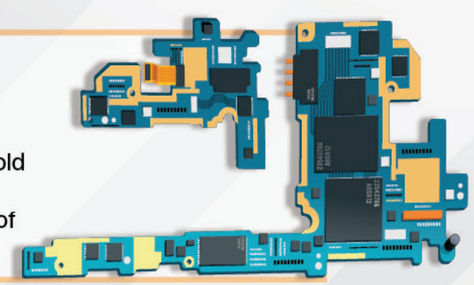
PRESS HERE TO AVOID A TRIP TO THE BANK

Banking is quickly going mobile. Since 2010, the share of American bank account holders doing at least one transaction via mobile banking has more than tripled, from 9% to 30%.



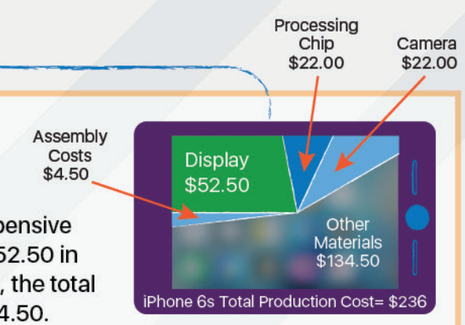
CAUTION: YOU HAVE A SUPERCOMPUTER IN YOUR POCKET

On iPhone 6 launch weekend, Apple sold the equivalent of 25 times more CPU transistors than the computing power of all PCs on Earth in 1995.



FRAGILE! BE CAREFUL, SCREEN IS BREAKABLE

The screen is the most expensive part of the smartphone ($52.50 in the iPhone 6s). In contrast, the total assembly costs are only $4.50.



Sources: Javelin Strategy, Fortune Magazine, Benedict Evans – Andreesen Horowitz, Financial Times, WSJ, Statista, Flurry Analytics, 10-K Filings (Apple, McDonalds, Coca-Cola), Ericsson Mobility Report

Monetary Policy Unmasked: Our Take on Negative Interest Rates

Investors feel like Alice when she tumbled down the rabbit hole into Wonderland. Except instead of encountering talking rabbits, incorporeal cats, and time that can run backwards, investors find themselves in a land where they must pay a bank for the right to hold a deposit and the bank pays them to take out a loan.

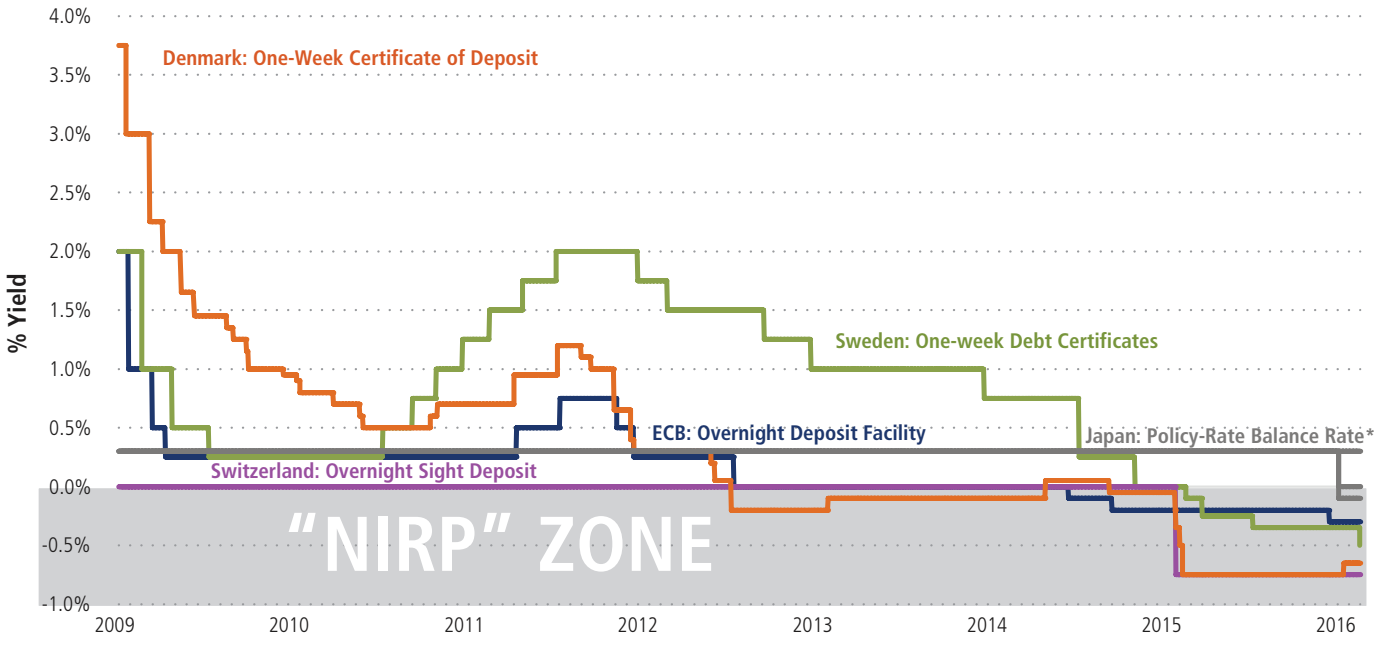
At least that's how it seems in our world where five global central banks have imposed *negative* interest rate policy (NIRP) (see *Figure 1* below). The NIRP brigade includes the European Central Bank (ECB), the Swiss National Bank (SNB), Sweden's Riksbank, Denmark's NationalBank, and, most recently, the Bank of Japan (BoJ). Unlike Alice, you may not soon wake from this bad dream. It's reality.

Worse, we were told by our professors that negative interest rates were impossible, sort of like how it's impossible to exceed the speed of light in space travel (see *Did You Know* on the next page). Since "zero" appears to no longer bind, how can we make sense of this new world?

As we will argue, upon closer inspection, the innovative policy is not all that innovative. The effective lower bound may just be a little lower than previously assumed due to financial frictions. Central banks, meantime, are still pursuing the same strategies as before: attempting to induce spending and investment by lowering interest rates.

«INSTEAD OF ENCOUNTERING TALKING RABBITS, INCORPOREAL CATS, AND TIME THAT CAN RUN BACKWARDS, INVESTORS FIND THEMSELVES IN A LAND WHERE THEY MUST PAY A BANK FOR THE RIGHT TO HOLD A DEPOSIT AND THE BANK PAYS THEM TO TAKE OUT A LOAN»

fig. 1 WELCOME TO THE NEGATIVE INTEREST RATE POLICY (NIRP) ZONE: FIVE GLOBAL CENTRAL BANK POLICY RATES ARE NOW BELOW THE ZERO LOWER BOUND (ZLB)



Source: Bank for International Settlements

*On Jan. 29, 2016 the Bank of Japan put in place a three tiered structure of rates, with one of their policy rates being negative (-0.10%)

The thing is, when operating below the zero lower bound, monetary policy is laid bare: it "works" by eroding your purchasing power in a more direct way than ever before. In the end, we doubt NIRP will help boost the economy.

TEXTBOOK THEORY: THE LOGIC OF POSITIVE INTEREST RATES

Here's a challenge for you: go down to the nearest town square, pub, or Starbucks and offer $10 bills in exchange for just a $1 bill. Try it; we dare you.

At first, each passerby might think you're crazy or a purveyor of counterfeit bills. But, soon, they may take you up on the lucrative offer, as $1 gets them $10—a guaranteed return for little risk/effort.

Then, on a subsequent day, try the opposite: ask for $10 in return for $1. The only taker would have to be as crazy as you.

Nobody wants to give up *more* today for *less* in the future.

The same intuition governs interest rates everywhere in the known universe. Since nobody is going to lend money at a negative rate when they can hold money at zero interest (in the form dollar bills, for example), interest rates could never go below zero.

Don't trust us? Take it from the pen of the godfather of modern economics, John Hicks, writing in 1937, "If the cost of holding money can be neglected, it will always be profitable to hold money rather than lend it out, if the rate of interest is not greater than zero. Consequently the rate of interest must always be positive."[1]

REALITY IS MESSY

Well, as it turns out, how low interest rates can go depends on the key assumption from our friend Hicks that depositors, will in fact, pull money out of the bank in the form of notes and coins that pay a zero nominal rate rather than save in investments that yield less than zero or lend money at a negative rate. But this assumption fails for two reasons.

First, as recently observed by the Bank for International Settlements, the actual implementation of NIRP equates to a tax or fee on a certain type of central bank deposit. At the BoJ, for example, a three-tiered system has been used, with only one rate a (barely) negative one, and it applies to just 1-2% of bank reserves (See *Figure 1 on previous page*).

In Europe, the SNB originally instituted an exchange rate floor to stem the cross-border capital tide from euros to Swiss francs in 2011. In 2015, when the ECB renewed its easing program, the SNB abandoned the currency peg and opted for a new strategy to fend off unwanted currency flows: a negative deposit rate instead.

But the SNB's move wasn't all that new. In 1973 the SNB also instituted a "deposit fee" of 2% per quarter on deposits by non-residents to stem the flow of capital into Switzerland that put upward pressure on the exchange rate. The Swiss later upped the fee to 3% per quarter in 1978. More broadly, for centuries central banks have raised or lowered discount rates to encourage or discourage capital inflows and outflows.

And that provides a good way of thinking about how negative rates have been implemented thus far: as a tax or a fee on certain types of deposits, namely those held at central banks. In short, the negative rates are charged to deposits that one must hold—they couldn't get around it even if they tried by selling them to someone else.

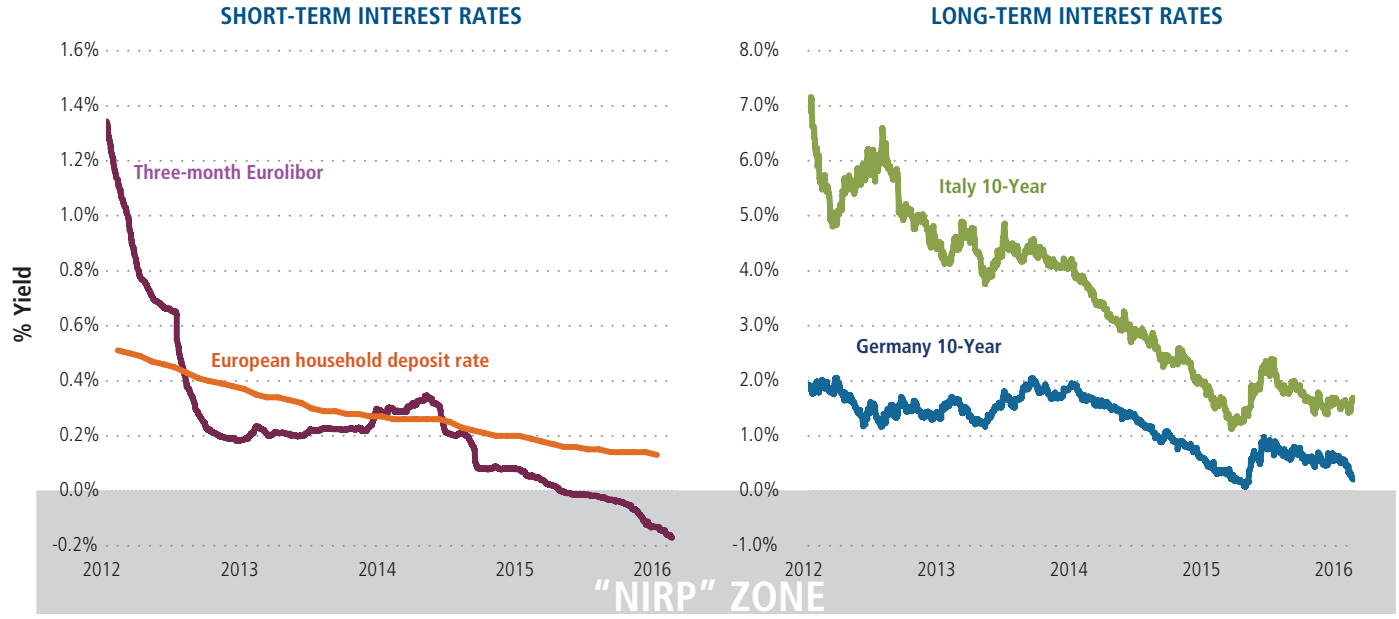
You might wonder though about negative yields on government bonds in Europe and Japan. Once again, these assets are "safe assets"—assets that must be used for capital requirements, liquidity, regulatory and collaterals purposes. As a study of US Treasury bonds reminded us, investors holding such bonds do so not for the juicy yields, but "because safe asset investors have nowhere else to go but invest in US government bonds."[2] This was true when rates were at just above zero and it remains true below the zero bound. There are no alternatives.

DID YOU KNOW?

The Textbooks Got It Wrong

We surveyed the top-selling macroeconomic textbooks. In fact, the top-sellers are woefully out-of-date. The most widely read introductory economics textbook in college, Greg Mankiw's *Principles of Economics*, discusses the zero-lower bound of nominal interest rates. The textbook declares that "nominal interest rates cannot fall below zero: Rather than making a loan at a negative nominal interest rate, a person would just hold cash." Another popular text by Paul Krugman and Robin Wells, entitled *Economics*, states that an interest rate below zero "isn't possible" and "nobody would ever buy a bond yielding an interest rate less than zero because holding cash would be a better alternative." Hopefully the new editions of these textbooks will fix these glaring errors. Until then, use those college economics books you keep as doorstops.

fig. 2 STILL FLOATING ABOVE? BOTH LONG-TERM AND SHORT-TERM RATES HAVE FALLEN IN THE EUROZONE, BUT HOUSEHOLD DEPOSIT RATES ARE STILL ABOVE ZERO



Source: Bank for International Settlements

Second, beyond central bank deposits and "safe assets," in the euro area, for example, household deposit rates are low but still positive (see *Figure 2* above), meaning NIRP has yet to hit retail investors and savers. When it does, we think savers will respond and seek out alternatives.

HOW LOW CAN THEY GO? IT'S UNKNOWN

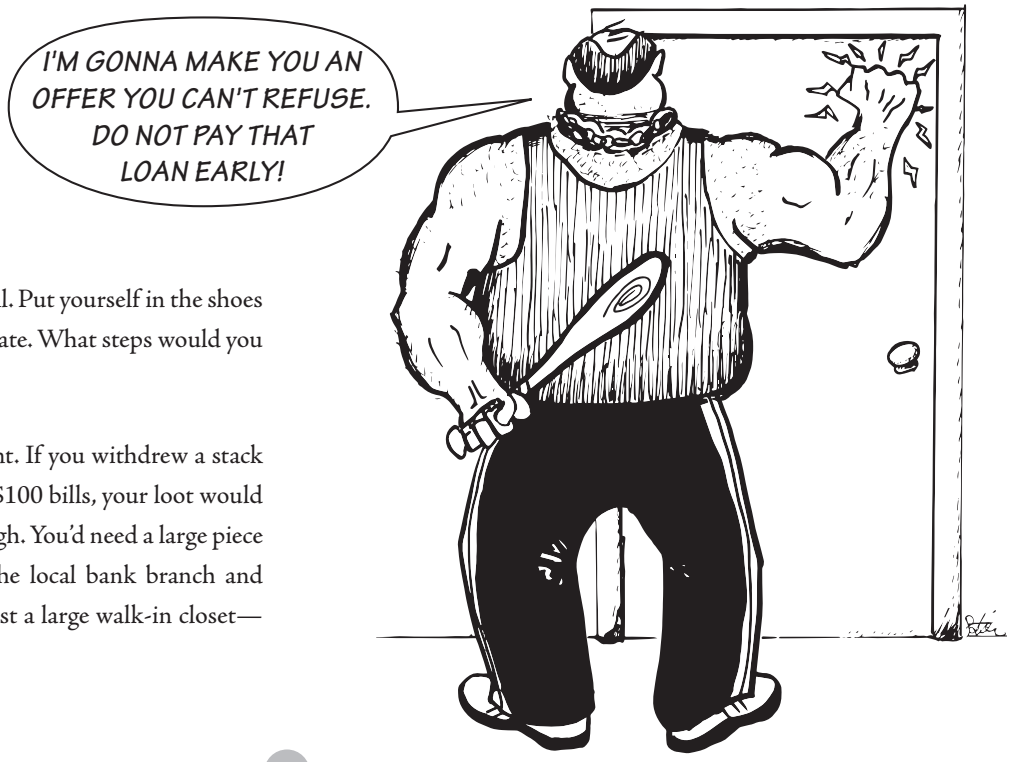
So how low can *nominal* interest rates go? It's unknown. Federal Reserve staff concluded in 2010 that negative rates below -0.35% would trigger currency hoarding among the American population. Both the Swedish Riksbank and SNB's negative rate regimes have exceeded that rate for sometime. The ECB's deposit rate just dipped to -0.4%.

In the short run, NIRP could go further still. Put yourself in the shoes of a saver facing the prospect of a negative rate. What steps would you take?

First, you could liquidate your bank account. If you withdrew a stack of 1 million US dollars comprised of only $100 bills, your loot would weigh 22 pounds and tower nearly 4 feet high. You'd need a large piece of luggage to haul the cash home from the local bank branch and probably require an entire room—or at least a large walk-in closet—in your house for storage.

But, your problems wouldn't end there. You'd have to hire someone to keep an eye on the cash, count it, organize it, and insure it. It would be subject to fire, flooding, environmental degradation. For the average person's wealth, this wouldn't be much of a hassle. For anyone with a substantial stash of cash, the problems would mount.

Not quite vault-ready with the size of your savings? You could purchase gift cards as a way to "store value" (but then you are an unsecured creditor to a retailer). You could store value in non-cash, non-



bank assets (real estate), gold, jewelry, and Bitcoin. You could prepay your taxes—or overpay—and expect a refund (at a zero interest rate) when the tax day arrives. You could prepay your rent.

«IF YOU WITHDREW A STACK OF 1 MILLION US DOLLARS COMPRISED OF ONLY $100 BILLS, YOUR LOOT WOULD WEIGH 22 POUNDS AND TOWER NEARLY 4 FEET HIGH»

Think these activities are merely hypothetical? Think again. In January 2016, the Canton of Zug (a state in Switzerland) requested that taxpayers delay paying their tax bills. In fact, the interest rate that was charged on late payments was abolished. In the Canton of Lucerne, there used to be 0.3% interest paid on early payments, which was also abolished last year. These cantons are obviously finding that holding cash when interest rates are negative impacts their finances adversely.[3] In Japan, a chain of stores named Simachu ran out of a safe that cost $700 and saw sales of safes soar by 2.5 times in a year.[4] Presumably, Japanese savers are stuffing them full of yen notes.

Here's the important lesson: under NIRP, instead of boosting economic activity by saving and investing through the financial system, people waste precious time and resources circumventing the tax on their savings.

NIRP UNMASKS MONETARY POLICY

Oddly, the above horror story has done little to deter fervor for NIRP among monetary theorists. No, these folks, when faced with one obstacle, quickly find a novel solution. In this case, if the barrier to further negative rates is the ability of depositors to shift into cash (a 0% yielding asset), then why not just eliminate the asset? In Europe, talk of eliminating the EUR500 bill has emerged. In the US some economists have advocated the elimination of $100 bills.[5]

But, importantly, NIRP unmasks monetary policy. When nominal rates are above zero, central banks can use inflation to surreptitiously erode the value of money, lowering the real return earned and thus prompting consumers to spend and businesses to invest—or else lose purchasing power. Since inflation's effects are not spread uniformly across consumers and businesses, the effects are masked, less straightforward and perhaps less real.

By contrast, with low inflation and zero nominal interest rates, the NIRP tool is a full-frontal assault on purchasing power. Taxing or charging interest to currency holders or charging negative rates on deposits would be uniformly-experienced. In short, it makes the central bank's strategy plain: erode purchasing power to encourage consumption and investment rather than hoarding.

CONCLUSION

Seen in this light, negative rates are hardly an Alice in Wonderland-type oddity. Instead, it's better to think of negative rates like taxes or fees on specific types of deposit accounts. By "raising the fee" (lowering the rate of interest into negative territory), the central bank seeks to achieve its ends. Investors will tolerate a certain "fee" or "tax" before seeking alternatives to preserve purchasing power.

In the end, we think NIRP will prove counterproductive. Since all monetary policy works through the financial system, central banks need the banks and financial markets to create and distribute credit. Forcing investors, savers and depositors to divert liquid assets elsewhere will not support credit creation.

Finally, it is instructive to think about what monetary policy seeks to achieve: a boost to spending and investment by a carefully-crafted erosion of money's purchasing power. You may not like it, but that's the simple truth. The big question we're asking: will it work? We think not.

A rising portion of institutional investors and maybe soon retail savers will be forced to pay for safety and liquidity. We doubt they will willingly comply—unless they have no alternative. What innovations will such negative rates breed?

While you ponder that question we hope we will soon be awakened and find that all the while we, like Alice before us, had just been slumbering in a bed of leaves in the English countryside.

SOURCES

1 Morten Linnemann Bech and Aytek Malkhozov. "How Have Central Banks Implemented Negative Policy Rates?" *BIS Quarterly Review*, March 2016.

2 "What makes US government bonds safe assets?" Zhiguo He, Arvind Krishnamurthy and Konstantin Milbradt, January 28, 2016

3 *Financial Times*

4 *The Wall Street Journal*

5 *Financial Times*