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THE WALL STREET JOURNAL.

DOW JONES | News Corp *****

MONDAY, OCTOBER 16, 2017 ~ VOL. CCLXX NO. 90

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What's News

Business & Finance

Leaders of the world's largest central banks indicated that weak inflation could prolong the postcrisis era of easy money policies. A1

◆ Blackstone is targeting investors with \$5 million or less for its next leg of growth, pushing into products for retail investors. A1

◆ Weinstein was expelled from the Academy, and London authorities are investigating more allegations of sexual assault. B1

◆ Puerto Rico could lose between \$20 billion and \$40 billion in productivity output because of storm-related disruptions. A3

◆ Yellen predicts increases in short-term interest rates, but sounded a note of caution on weak inflation in the U.S. and abroad. A6

◆ Energy companies are trying to establish new markets for liquefied natural gas, promoting its use for industrial trucking and shipping. B2

◆ Oil prices jumped to \$51.45 a barrel due to bullish Chinese data. B7

◆ Rent the Runway is testing whether Middle America is willing to borrow rather than buy apparel. B3

◆ The trial of a lawyer accused of working with Shkreli to defraud a pharmaceutical company is under way. A2

World-Wide

◆ The Senate will grapple with Trump's decision to stop making subsidy payments to health insurers, as lawmakers seek a deal to keep the money flowing. A1

◆ Trump is looking to advance his tax overhaul, wooing key GOP senators in hopes of jump-starting a legislative agenda. A4

◆ Iraqi forces clashed with fighters from the Kurdish semiautonomous region near the oil-rich province of Kirkuk. A1

◆ Two bombings in Somalia's capital killed at least 231 and injured 275. A8

◆ Officials cited progress in the weeklong battle against deadly fires in Northern California. A3

◆ Agencies are monitoring a pipeline fracture that has spilled 9,350 barrels of oil into the Gulf of Mexico. A3

◆ Officials said Trump was decertifying the Iran nuclear accord because the country threatens global stability. A8

◆ Maduro claimed victory in Venezuela gubernatorial elections, as the opposition challenged the results. A10

◆ Austria's right-wing parties made strong gains in parliamentary elections. A11

◆ Kaepernick filed a grievance against the NFL for alleged collusion. A2

CONTENTS Outlook..... A2 Business News..... B3 Journal Report. RI-8 Crossword..... A16 Sports..... A16 Heard on Street..... B9 Technology..... B4 Life & Arts.... A13-15 U.S. News..... A2-6 Markets..... B8,10 Weather..... A16 Opinion..... A17-19 World News..... A8-11



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Twin Bombings in Somalia's Capital Leave More Than 200 Dead



TERROR'S DEVASTATION: Civilians on Sunday carried a body from the scene of one of two explosions in Mogadishu over the weekend. The death toll from the bombings rose to at least 231, in one of the deadliest attacks since an Islamist insurgency started a decade ago. A8

Bankers Uneasy on Inflation

BY DAVID HARRISON
AND HARRIET TORY

WASHINGTON—Leaders of the world's largest central banks indicated that weak inflation in advanced economies could prolong the postcrisis era of easy money policies.

Despite a broad-based improvement in the global economy, wages and consumer prices remain stubbornly low, making central bankers wary of removing their stimulus measures too quickly, they told a Group of 30 banking conference here on Sunday.

The U.S. Federal Reserve has been slowly raising short-term interest rates for almost two years, but the European Central Bank is just now nearing

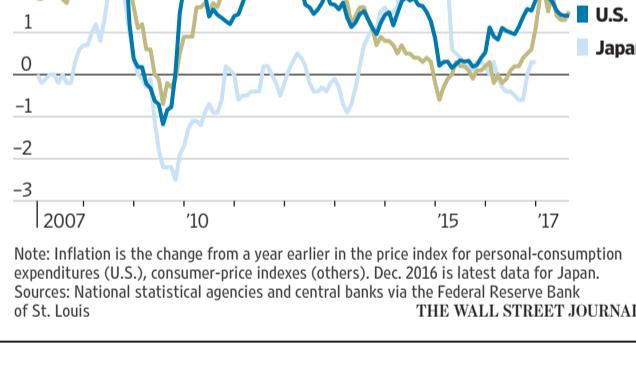
Please see BANKS page A6

◆ Fed choice rivets central bankers..... A6

◆ Yellen ties rate increases to economy's path..... A6

Weekly Reader

Despite a global upturn, persistently low inflation is making central bankers from advanced economies wary of removing their stimulus measures too quickly.



Note: Inflation is the change from a year earlier in the price index for personal-consumption expenditures (U.S.), consumer-price indexes (others). Dec. 2016 is latest data for Japan. Sources: National statistical agencies and central banks via the Federal Reserve Bank of St. Louis

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INSIDE



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Blackstone Targets Millionaire Next Door

BY MIRIAM GOTTFRIED

Blackstone Group LP, which has become a Wall Street juggernaut by catering to institutions and the ultrarich, is targeting investors with \$5 million or less for its next leg of growth.

The private-equity firm is pushing aggressively into products for retail investors, betting it can raise as much from them over the long term as it does from the pension funds and other institutions that form the main source of its \$371 billion of assets, Blackstone executives say.

Please see FUNDS page A2

Wildfire Victims Had Only Seconds to Make Choices

California's deadliest blazes advanced 100 yards every three seconds

UKIAH, Calif.—Hurtling down a mile-long dirt driveway, the wildfire closing in, Eli Monroe pulled to a stop at a crossroads. He sat for a moment with his girlfriend, his parents in the car behind them, deciding which way to turn on Tomki Road.

The fastest way out was to the right, toward Route 101, a freeway they had hoped

would take them to safety.

Flames licked the roadsides in

that direction.

A left turn would lead to creeks and backcountry dirt roads they hadn't traveled in months, a route that carried the risk of a deathtrap. They

Please see FIRES page A12

◆ Fire battle makes progress... A3

Gourmet Truck Drivers Put the Pedal to the Kettle

* * *

In-cab kitchen rigs yield Thai peanut pork; the pothole problem

BY JENNIFER SMITH

Long-haul truckers, who spend weeks at a time working and sleeping in spaces the size of a modest suburban bathroom, say life on the road does have its monastic charms.

Cooking dinner at 70 miles

an hour has never been one of them.

Yet in a bid to stay healthy,

save money or simply satisfy a discerning palate, some drivers are committed to making their own meals in an environment where nearly everything works against them.

In this culinary tradition,

truck-stop showers sometimes

function as dishwashers, engine blocks double as grills,

dashboard coffee pot.

While snowed in at a weigh station in Wyoming, trucker Micheal "Boomer" Welch, a Louisiana native based in Houston, was hit by a sudden craving for jambalaya. Digging through his truck pantry he found canned chicken and tomato sauce but no sausage.

He did, however, happen to

Please see CHEFS page A12

U.S. NEWS

California Firefighters Make Progress

Containment figures improve; Santa Rosa mayor says his city 'can take a breath'

SANTA ROSA, Calif.—A week into the battle against the deadly fires scorching Northern California, officials cited some progress Sunday as they continue trying to hem in the blazes.

By Erin Ailworth, Sara Randazzo and Jon Kamp

Containment figures have improved for the major fires, which have killed at least 40 people and forced the evacuation of more than 100,000 people. The containment efforts have allowed many to return home, and by Sunday morning, the evacuation tally stood at about 75,000.

"Yesterday, nearly 11,000 firefighters beat back the flames and made good progress towards the containment of now 15 large wildfires across California," Cal Fire, the state's firefighting agency, said in a news release.

Even as officials mark some progress, they also warned the fight continues and that it will take time to get people back in their homes.

A few fires are still "bucking us back," said Bret Gouvea, a Cal Fire incident commander. "They're not going down easy but we are getting them."

There are also fires in southern California, but the ones in the northern part of the state are the major concern, including blazes in Sonoma County that have killed at least 22 people there alone.

The Sonoma County Sheriff's Office identified four more of the deceased there, all seniors aged 71 to 82 years old. Missing-person cases have dropped to 174 active searches, according to Sonoma County Sheriff Rob Giordano.



A wildfire near Santa Rosa, Calif., on Saturday. Firefighters have made strides in containing several major blazes in Northern California.

Containment figures for the local fires have all improved, including the Tubbs Fire in Sonoma and Napa counties, which was 60% contained early Sunday. That fire ravaged the city of Santa Rosa early last week and has been blamed for destroying nearly 3,500 structures. Two other major fires in Sonoma County were only 25% contained by early Sunday, yet that marked improvements in the battles against both of them.

Santa Rosa "can take a breath" for the first time since the fire began and can look

ahead "instead of just worrying about the five minutes in front of our faces," Santa Rosa Mayor Chris Coursey said Sunday.

Still, some homes continued to be threatened in Santa Rosa's Northern Oakmont area, officials said, by a fire that sprouted midweek.

The number of evacuees in American Red Cross shelters across California dropped to 3,250 by Saturday night, Red Cross spokeswoman Monique Dugaw said.

Fire officials said Sunday that the Sonoma-area blazes were quiet overnight, and that

crews were getting a better handle on them. They are dealing with hot, dry weather as they battle the blazes, but the winds have eased in Northern California.

"Big thing today: your winds are subsiding," Don Watt, a fire-behavior specialist, told crews gathered for a morning briefing at the Sonoma County Fairgrounds. "You're going to get those fuel-driven and topography-driven runs."

Steve Crawford, operations section chief with Cal Fire, urged crews to stay focused on getting up more black line,

which is the map indication that shows the edge of a fire is no longer uncontrolled.

"Everything you guys are doing, wherever you're placed on the line is important to the overall picture," he said. "Getting black line on the map is really important."

The black lines continued to grow elsewhere, too. The large Redwood fire in Mendocino County, which has burned 35,000 acres, was 35% contained Sunday, up from 20% on Saturday. The smaller Sulphur Fire in Lake County was 75% contained, Cal Fire said.

The fire has killed eight people in Mendocino County. The local sheriff said utility crews would be flying low over many parts of the county Sunday to check power lines and re-establish service.

Mr. Gouvea, with Cal Fire, commended the firefighters Sunday, many of whom have been working for days to snuff the flames.

"I know a lot of you are hurting, bleeding; it's been a long road," he said. "We are getting around it—I told you we would—and we are going to get this thing done very shortly."

Agencies Monitoring Oil Spill Off Louisiana Coast

BY DAN MOLINSKI AND ALISON SIDER

An offshore pipeline fracture that has spilled as much as 9,350 barrels of oil into the Gulf of Mexico near Louisiana appeared to be contained, the company responsible said on Sunday.

LLOG Exploration Company LLC on Thursday morning discovered the spill, which stemmed from a fracture of some of its infrastructure in

4,463 feet of water, 40 miles southeast of Venice, La. The offshore oil producer estimated the spill had released between 7,950 and 9,350 barrels of oil and said it would be monitoring the area with authorities to clean up oil where possible.

The Bureau of Safety and

Environmental Enforcement, which regulates offshore oil activity, said no shoreline impacts have been reported and there were no reports of injuries. It is investigating the cause.

The spill appeared to be

one of the largest in the Gulf of Mexico since the 2010 Deepwater Horizon explosion and spill, which killed 11 people and released more than 4 million barrels of crude.

U.S. authorities said three

sheens of oil visible on the wa-

ter's surface Saturday morning during an observation flight dissipated as the weekend went on and there appeared to be no risk to shoreline impact.

"Four over flights were conducted throughout Saturday and have identified no additional visible oil," the U.S. Coast Guard said in a statement late Saturday. "Any surface oil is expected to move in a southwesterly direction and is not expected to impact the shoreline."

LLOG, based in Covington, La., said it was working alongside the Coast Guard to gauge the movement of any of the

spilled crude oil.

"There continues to be no detection of potentially related oil on the surface (six flights since Friday night)," the company said in an email. "Multi-

ple barriers are in place on either side of the fracture."

The spill was discovered by

workers who noticed volume

numbers from data collected at a well and numbers collected on a platform at the surface weren't adding up. LLOG said it is investigating the cause.

Spills of this size are relatively rare in the Gulf of Mexico, where federal authorities have tightened regulations following the Deepwater Horizon disaster. There were three reported offshore spills of over 50 barrels last year, according to federal data.

Mark Salvo with Defenders of Wildlife, a Washington-based environmental group, said the LLOG oil spill is another unfortunate reminder of

the inherent risks of drilling for fossil fuels.

"In addition to the immeasurable immediate effects from oil spills—including from bursted pipelines—the impacts on fish, wildlife and ecosystems could last for years," Mr. Salvo said.

The Coast Guard said two response vessels, one from Clean Gulf Associates and Marine Spill Response Corp., are on scene to help with the cleanup and it is coordinating with LLOG, the BSEE and the National Oceanic and Atmospheric Administration to locate and respond to any oil that reaches the surface.

Puerto Rico's Economy Is Back to Basics

BY DANIELA HERNANDEZ AND ARIAN CAMPO-FLORES

Weeks after Hurricane Maria struck Puerto Rico, Alejandra Fedato, owner of a clothing boutique in San Juan's Condado neighborhood, is having a hard time reopening.

Without power, she can't take customer credit cards. She is still waiting for an insurance adjuster to assess the costs of flood damage. Never mind that many of her clients, as well as her sole employee, have temporarily left Puerto Rico because of conditions on the island.

Ms. Fedato, 48 years old, said she is missing the fall clothing season and trying to sell the merchandise she salvaged at cost. Now she is weighing whether to buy new merchandise for winter—a decision she needs to make by the end of this month.

"People say Puerto Rico is coming back, but I don't know," she said.

Already deeply troubled with more than \$70 billion of debt, the island's economy is starting to emerge from the lashing of the Category 4 hurricane. But in the absence of power and internet connectivity, local commerce is crippled, relying on paper and cash. Hotels and car-rental agencies that are open have turned to written records to keep track of bookings. Consumers must



A worker eats lunch in a bar without power in San Isidro, weeks after Hurricane Maria caused extensive damage to Puerto Rico.

often pay in cash because most credit-card machines aren't working. Many ATMs aren't yet operational.

Between \$20 billion and \$40 billion could be lost in productivity output due to the storm-related disruptions, according to a September Moody's Analytics report. Insured losses from Maria could total \$28.4 billion due to damage to residential, commercial and industrial properties, as well as to vehicles, according to Karen Clark & Co.

Gov. Ricardo Rosselló said it could take \$95 billion to rebuild. That's nearly equivalent to the U.S. territory's total annual economic output.

"Without a doubt, Hurricane Maria has been a catastrophic event that's impacted

the entire island. Every single sector of the economy has been affected," said Manuel Laboy, Puerto Rico's secretary for economic development and commerce.

Many residents are considering leaving or have already left the island, fueling concerns that the economy will continue to shrink. Before the storm, the island's population had been declining for more than a decade as residents moved to the U.S. mainland in search of better jobs and economic stability.

Manufacturing accounts for nearly half of Puerto Rico's economy, according to Mr. Laboy, including operations for Honeywell International Inc., Medtronic PLC and Boston Scientific Corp. He said his

office is working closely with companies to manage productivity losses, which could eventually affect not just the local economy but "the global supply chain."

Another mainstay of the island's economy, tourism, is also taking a hit. In the normally bustling tourist area of Old San Juan, the storefronts of many colorful colonial buildings remain boarded up, and only a handful of businesses have reopened.

At Valor Souvenir, a shop that sells T-shirts and mementos near the waterfront where cruise ships anchor, Loretta Francis sat on a chair in the middle of the store. The store's owner, her brother-in-law, opened last week for four hours a day in hopes of generating some sales, she said. But foot traffic has been scant.

"Nada, nothing," said Ms. Francis. "There are no tourists, no money. It's rough."

For many of the island's workers, the half-speed economy has led to shortened hours and smaller paychecks.

Raisa Tirado, who supervises the food shops in the San Juan airport's terminal C, had her work week cut by a full day. She said she is worried about being able to pay her bills. Some of her colleagues "lost everything," and others weren't able to come to work because of a lack of transportation, she said.

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U.S. NEWS

Trump Steps Up Pressure on GOP Congress

President Donald Trump is looking to advance his proposed tax overhaul this week, wooing key Republican senators in hopes of jump-starting a legislative agenda that has faltered despite the party's control of Washington.

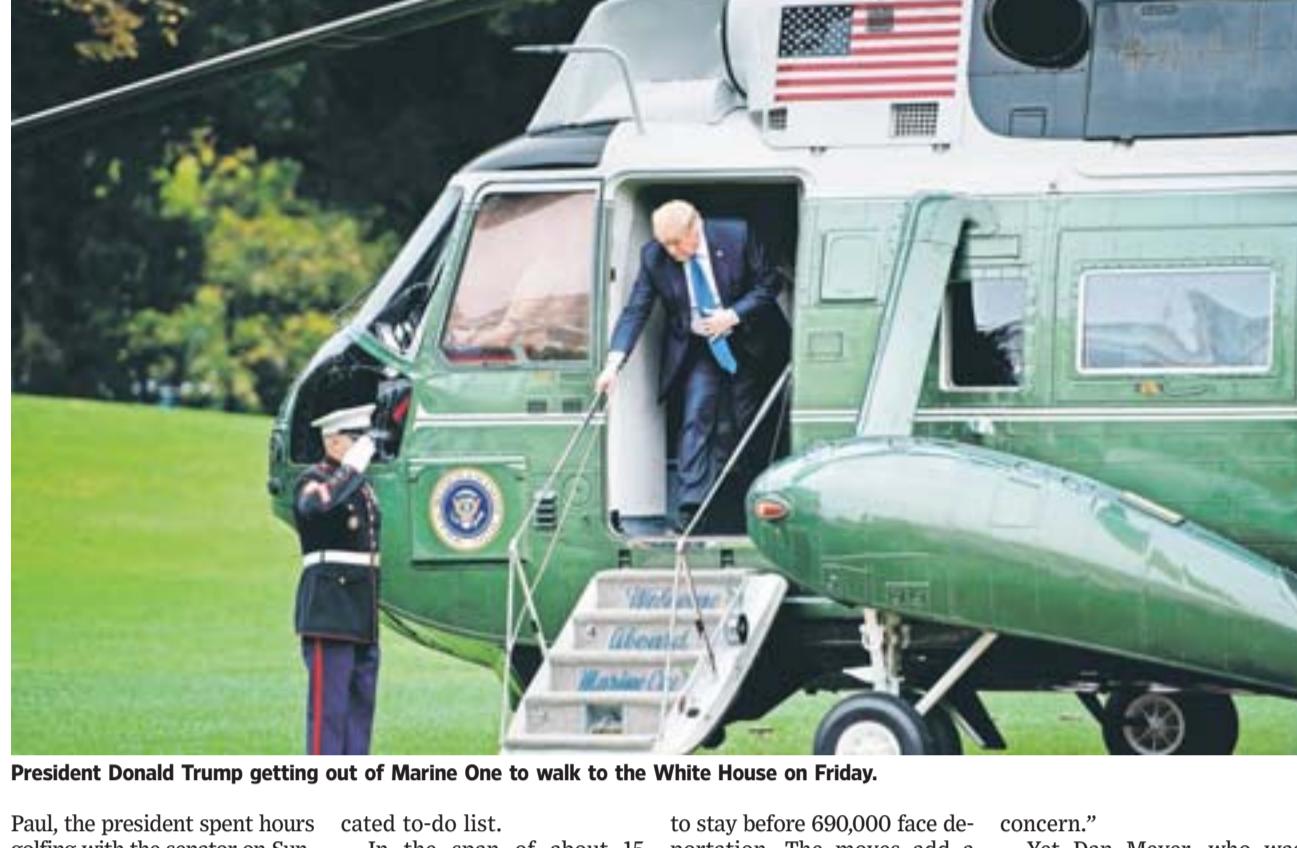
By Michael C. Bender,
Siobhan Hughes and
Kristina Peterson

An important test is likely to come Thursday, when the Senate begins voting on a budget resolution that will determine whether Republicans can pass the tax package without any Democratic support. It is part of a challenging agenda that Congress must tackle by year-end, an agenda Mr. Trump has added to with recent moves on health care and Iran.

Republicans hold a 52-48 Senate majority and can lose no more than two votes to pass the budget measure that would give Mr. Trump the clearest path toward enacting the tax package and notching the most consequential legislative victory of his presidency.

One potential holdout is Sen. Rand Paul (R., Ky.), who hasn't yet said how he would vote but has voiced concerns about "spending too much money." After speaking to the White House budget director, Mick Mulvaney, Mr. Paul said in an interview Friday: "He knows what our concerns are, and we're hoping they can fix those concerns."

With a sharp focus on Mr.



President Donald Trump getting out of Marine One to walk to the White House on Friday.

BRENDAN SMIALOWSKI/AGENCE FRANCE PRESSE/GTY IMAGES

Paul, the president spent hours golfing with the senator on Sunday at the Trump National Golf Club in Northern Virginia. Afterward, Mr. Paul spoke to reporters and voiced broad support for the goal of cutting taxes, though he didn't indicate how he would vote on the underlying budget measure that could determine the tax package's fate.

In recent days Mr. Trump has been ratcheting up pressure on Congress, adding to lawmakers' already compli-

cated to-do list.

In the span of about 15 hours from Thursday night to Friday afternoon, Mr. Trump canceled crucial payments under the Affordable Care Act and delivered a stiff blow to the agreement aimed at curtailing Iran's nuclear program. He put the onus on Congress to fix both.

Last month, he removed protection for immigrants brought to the country as children, and he told Congress to find a new way to allow them

to stay before 690,000 face deportation. The moves add a trio of contentious issues to a crowded legislative agenda.

"Trump is following through on being a disruptive force that his core base of support loves to see," said Ron Bonjean, a Republican strategist who has assisted the Trump White House. "Trump expects Republicans to follow through on tax reform and if adding to the workload creates more headaches for Congress, that probably won't be his top

concern."

Yet Dan Meyer, who was head of legislative affairs for former President George W. Bush, compared Mr. Trump's decisions to "passing the hot potato" and suggested the president needs to work more closely with GOP leaders.

"It's easy to disrupt. It's not as easy to put it back together again," he said. "You don't get the impression that they're working as a seamless team." Mr. Trump's actions last week move the Republican-

controlled Congress into new territory, beyond the divides created earlier this year when GOP lawmakers were caught off guard by the president's surprise actions on transgender people serving in the military or angry tweets aimed at Attorney General Jeff Sessions.

Now, lawmakers are in a position of having to respond not just with words but with legislative action, creating more serious pressures for congressional Republicans who already had problems advancing high-priority bills.

"It's not enough to simply dump everything in Congress's lap and say 'deal with it,'" said Brian Walsh, who spent years as a Republican strategist. He said Mr. Trump may be setting up fellow Republicans for failure. "What specifically is he advocating for?"

But Sam Geduldig, a lobbyist and former House GOP leadership aide, said Congress needs to get some practice at "doing important things."

"Congress has an opportunity to write legislation—they should take it," Mr. Geduldig said.

The president also has urged voters to oust lawmakers who don't support his tax overhaul plan this year; he phoned his former chief strategist, Steve Bannon, to offer encouragement after Mr. Bannon appeared on Fox News on Monday vowing to unseat sitting Republicans who don't actively support the president's agenda, said two people familiar with the call.

the payments might be discontinued, insurers in more than a dozen states filed rates that

didn't take into account the possibility. Some of those insurers are now saying they need to raise rates by 20% or more for next year, but the federal deadline for filing has already passed.

Democrats will have leverage in those talks because the spending bill, needed to avert a government shutdown, would need 60 votes to clear the Senate, where Republicans hold a 52-48 advantage.

For now, many in the health industry are reacting with alarm to the prospect of the subsidy payments ending. A diverse coalition representing health plans, doctors and businesses sent a letter to Congress Saturday asking lawmakers to "act immediately" to restore the payments.

In one example of the immediate impact of halting the payments, Oregon ordered insurers that sell on the ACA's exchanges to increase premium rates for 2018 for the most popular plans by 7.1%.

While some insurers had already filed rates for higher premiums with the expectation



CHIP SOMODEVILLA/GTY IMAGES

Sens. Patty Murray, left, and Lamar Alexander early this year.

ray plan, which the two senators have been discussing for months. In exchange for extending the insurer payments, the bill would give states permission to obtain waivers under the ACA, paving the way for more variation in insurance plans, according to people on Capitol Hill.

Mr. Johnson, for his part, is working on legislation that includes additional conservative measures, such as expanding the use of health-savings accounts and delaying the enforcement of the mandate that most employers provide insurance. Mr. Johnson said he rec-

ognized that many Republicans are hesitant to fund the payments. But ending them could result in higher premiums for consumers and more money spent by the government, which would have to provide larger subsidies to certain consumers, he said.

Conservative House Republicans have indicated any support for continuing the payments would depend upon significant concessions from Democrats on curbing the ACA.

If lawmakers reach a bipartisan deal on health care, it isn't clear whether it would be

power. Generator failures have forced recent evacuations at two hospitals. And others suffered storm damage that crippled operations, said Jaime Pla Cortes, executive president of the Puerto Rico Hospital Association, in an interview.

"Everybody has to improvise," Mr. Pla Cortes said. "The nurses and the doctors are tired, they are working full time."

The teams are helping relieve the strain on Puerto Rico hospitals.

The National Disaster Medical System entered the hurricane season understaffed, system director Ron Miller said, adding that the U.S. Office of Personnel Management recently authorized expedited hiring.

The prolonged response is a "huge anomaly" for the system, Mr. Miller said. Two-week rotations have occasionally stretched into a month, he said.

Some American health-care workers are traveling to Puerto Rico as volunteers, coordinating their efforts with those of HHS.

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Disaster Group Seeks More Medical Workers

By MELANIE EVANS

A U.S. government program that sends doctors and nurses to disaster zones says it needs more health-care workers, as relief efforts during this hurricane season are near the end of a second month with no end in sight in Puerto Rico and the U.S. Virgin Islands.

The National Disaster Medical System, which recently wrapped up big deployments to hurricane-ravaged areas in Texas and Florida, said it would start recruiting more medical professionals in the next few weeks.

"We're far from the recovery stage of this event," Robert Kadlec, a Department of Health and Human Services assistant secretary, said Thursday of Hurricane Maria's devastation. The storm largely destroyed Puerto Rico's power grid, leaving half the local hospitals without power, and downed its communications network. The federal health agency oversees the program that temporarily hires health-care workers for what are typically two-week rotations.

The teams, which set up temporary hospitals and clinics, are helping relieve the strain on Puerto Rico hospitals.

Nearly half of the local hospitals are depending on sometimes unreliable generators for

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WORLD NEWS

U.S. Officials Back Trump on Iran

Technical compliance with nuclear pact shouldn't preclude a better deal, they say

U.S. officials defended President Donald Trump's refusal to certify the 2015 Iran nuclear agreement, saying the country threatens global stability even while technically complying with the accord itself.

By Eric Morath
in Washington
and Asa Fitch
in Manama, Bahrain

Iran is "the No. 1 state sponsor of terrorism," Nikki Haley, the U.S. ambassador to the United Nations, said on Sunday on NBC. "You look at the ballistic-missile tests that they continue to do. You look at the arms sales. When you look at all the trouble they're causing around the world, what the president is saying is, 'It's not proportionate. We need to look at this.'"

Ms. Haley stopped short of saying Iran had violated the terms of the agreement, however. "No one is questioning...they are in compliance" with inspections to determine if they are developing a nuclear weapon, she said, but that shouldn't prevent Mr. Trump from seeking a better deal.

The comments by Ms. Haley and other senior officials on Sunday followed Mr. Trump's



Ambassador Nikki Haley, seen in September, said Sunday Iran is the leading 'state sponsor of terrorism.'

Friday speech at the White House where the president reiterated his fierce opposition to the terms of the deal—under which Iran agreed to put limits on its disputed nuclear program in exchange for relief from international sanctions—after denouncing what he called a "rogue regime" run by radicals.

Mr. Trump on Friday took Iran to task for a number of destabilizing behaviors, including its missile program.

He also cited Iran's history with America dating back to 1979, the year of the country's Islamic revolution, pointing to attacks on American diplo-

matic properties and targeting American service members, as well as Iran's support for extremist groups, alluding to al Qaeda and Hezbollah.

The president vowed to end U.S. participation in the nuclear accord unless Congress and American allies can deliver punitive measures targeting Tehran's missile program, its support for regional militant groups and any future nuclear activities.

As a first step, he declined to certify to Congress under a U.S. law that Iran was complying with its obligations under the agreement, setting off a

period of negotiations in Washington and European capitals over the future of the accord.

On Sunday, national security adviser H.R. McMaster said "the president is not walking away from the deal yet." He said the administration would want an agreement that would "lay alongside" the current one. "It is a weak deal that is being weakly monitored," he said on Fox News on Sunday. "We can't really say with confidence that they are complying....This is not a trustworthy regime, so much more comprehensive monitoring is in order."

Secretary of State Rex Tillerson, meanwhile, said Iran had violated the agreement in a number of technical ways but has remedied them. Iran is "walking right up to the line," he said on CNN, suggesting it was seeking to "test the limits."

Iranian leaders responded with anger and defiance to Mr. Trump's speech, saying the nuclear deal was a multilateral accord that the U.S. couldn't cancel on its own.

If the U.S. proceeds to undermine it, Iran will respond by fast-tracking its nuclear program, Ali Akbar Salehi, the head of Iran's Atomic Energy Organization, told state television on Sunday.

The Trump administration has been working with Sen. Bob Corker (R., Tenn.), the Foreign Relations Committee chairman, on legislation that would reimpose U.S. sanctions on Iran if Tehran ever engages in nuclear activities now prohibited under the agreement, or if Tehran hits other "trigger points," such as achieving a "breakout time" required for fielding a nuclear weapon of less than a year.

The legislation would also require a broader assessment of Iran's activities, including its ballistic-missile program. Mr. Corker has said he plans to introduce the bill as early as this week.

—Felicia Schwartz
in Washington
contributed to this article.

Freed Captive Discloses New Details

By PAUL VIEIRA

OTTAWA—The American-Canadian couple rescued by Pakistani military forces last week has begun to rebuild their family life in a small town southwest of the Canadian capital after five harrowing years in captivity in which they say an infant daughter was killed and her mother raped.

Joshua Boyle, a Canadian, Caitlan Coleman and their three surviving children are at the home of Mr. Boyle's parents in Smiths Falls, Ontario, after landing Friday night in Toronto. The couple was abducted in 2012 while backpacking in Afghanistan and then held by the Taliban-linked Haqqani network. They were expecting their first child when they were abducted; they now have three children.

Upon landing, Mr. Boyle made new allegations against his captors. He said the Haqqani network killed his infant daugh-



Joshua Boyle, left, and his wife, Caitlan Coleman, were taken captive in 2012.

MIKE CARROZZETTO/AGENCE FRANCE PRESSE/GETTY IMAGES

ter, Margaret Boyle, for his refusal to heed unspecified requests. He also said his captors raped his wife. The events happened in 2014, he said. The birth of the fourth child wasn't publicly known until Mr. Boyle revealed it on Friday.

The Taliban on Sunday dismissed Mr. Boyle's allegations. "We strongly deny this false claim of the enemy," said the group's spokesman, Zabiullah Mujahid. He said the infant died shortly after birth due to limited medical care in the remote area where the family was located. Mr. Mujahid also denied the rape allegations and said Mr. Boyle was never separated from his wife during their captivity.

In a statement he issued via email to the Associated Press, Mr. Boyle said the family had "reached the first true 'home' that the children have ever known—after they spent most of Friday asking if each subsequent airport was our new house hopefully." Messages for Mr. Boyle and his parents weren't immediately returned.

A senior Afghan security official said the claims Mr. Boyle made about Taliban abuses weren't a surprise. "The Taliban behead, torture and rape hostages in their captivity all the time," the official said. "The Taliban have no value for human life or human dignity."

Representatives for Canada's Foreign Ministry didn't respond to a request for comment about Mr. Boyle's allegations. A U.S. State Department official declined to comment on Saturday.

Death Toll Tops 200 in Pair of Somalia Blasts

BY NICHOLAS BARIYO

The death toll from twin bombings in Somalia's capital, Mogadishu, climbed above 200 over the weekend, making it one of the deadliest attacks in the country since an Islamist insurgency started a decade ago.

A truck bomb exploded at a busy intersection on Saturday, ripping through several buildings, including hotels and government offices, the African Union Mission in Somalia said.

Hours later, a second explosion hit the suburb of Medina, setting dozens of vehicles on fire.

The two blasts killed at least 231 people, Abdirizak Mohamed, a member of Parliament and former minister of international security, said in a message on Twitter, citing the number of dead counted at two local hospitals he said he visited.

Officials said some 275 people had been injured in the attacks, which followed several months of relative calm in the capital. The attacks came amid a renewed push from the U.S. to rid Somalia of al Qaeda-affiliated al-Shabaab militants.

President Mohamed Abdulahi Farmajo declared three days of mourning and called for more international support to fight the militants.

Emergency workers and police were digging through the rubble of flattened buildings in search of more victims.



People in Somalia's capital, Mogadishu, on Sunday walked through the scene of the deadly explosion of a truck bomb the day before.

Hundreds of people waited in the hope of getting news about missing relatives, witnesses said.

At least five Red Crescent volunteers were among those killed in the blast. The International Federation of the Red Cross warned the death toll could rise.

The U.S., which has stepped up drone attacks in Somalia this year, condemned the attacks.

"Such cowardly attacks reinvigorate the commitment of the United States to assist our Somali and African Union partners to combat the scourge of terrorism to promote stability and prosperity

for the Somali people and their regional neighbors" the U.S. Embassy in Somalia said.

The attack came two days after the head of the U.S. Africa Command, Thomas Waldhauser, visited Mogadishu for a meeting with Mr. Farmajo over the country's security situation.

Al-Shabaab controlled Mog-

adishu and much of Somalia from 2007 until 2011, when its militants were driven out of the capital by African Union peacekeepers led by troops from Uganda and Burundi.

The militants have waged a guerrilla war from the countryside against Somalia's United Nations-backed government.

Office said he had ordered Iraqi forces to "impose security in Kirkuk in cooperation with residents of Kirkuk and the Peshmerga forces."

A senior Iraqi security official said troops from the regular Iraqi Army, the elite Counterterrorism Service and the Emergency Response Division were advancing from the south and west of Kirkuk with no intention to enter the city but rather surround it and assert control over major oil fields and air bases that Kurdish forces claimed after the upheaval of 2014, when Islamic State helped reshape the map of Iraq and Syria.

As of early Monday, Iraq time, the Pentagon said it had no operational updates on reports of clashes between Iraqi government-affiliated units and Peshmerga forces in and around Kirkuk, though said it opposed any further escalation in the country and urged all groups to focus on defeating Islamic State.

"We oppose violence from any party, and urge against destabilizing actions that distract from the fight against ISIS and further undermine Iraq's stability," Defense Department spokeswoman Laura Seal said.

IRAQ

Continued from Page One
he said. What caused the explosion wasn't immediately clear.

The clashes follow a referendum in which the Kurds, who run their own semiautonomous region in northern Iraq, voted overwhelmingly in favor of independence, defying Baghdad, regional powers and the U.S., which warned it would distract from the final battles to defeat Islamic State.

The fighting threatens to unravel the anti-Islamic State coalition, and poses risks to the viability of Iraq itself.

The Iraqi state is made up of Kurds, Sunni Arabs and Shiite Arabs but also has a hodge-podge of other ethnic groups, including those with connections to neighboring Turkey and a large number with ties to Iran, all of which are jockeying for dominance. Analysts warn those centrifugal forces risk pulling Iraq apart, increasing its vulnerability to a re-emergence of Islamic State or a successor group.

The one major fear of the U.S. is that it will be forced to be a referee of post-ISIS Iraq,



A member of the Iraqi forces on the outskirts of Kirkuk on Sunday

may come true," said Nicholas Heras, Middle East Security Fellow with Center for a New American Security, a Washington defense think tank. "If that's the case, it becomes a target more quickly."

While the U.S. has been reluctant to back any single party in Iraq, it now might have to pick a side, which could more likely then make it the other group's enemy.

If the U.S. backs the Kurds, it will draw the ire of the central Iraqi government and the Iranian-backed militias. If it backs Iraq, it loses the support of Kurds who have proved ca-

pable and often loyal. If it remains neutral, it might just be pushing a simmering fight into the future.

The U.S. is hoping for a decent, not perfect outcome that ends violence but leaves neither Erbil nor Baghdad satisfied, which is a recipe for future conflicts, Mr. Heras said. "In post-ISIS Iraq, the U.S. has to decide what flavor of poison it prefers."

In the wake of the referendum, Iraq's parliament authorized Mr. Abadi to deploy troops to retake areas outside the official boundary of the semiautonomous Kurdistan re-

gion that have come under Kurdish control during the battle against Islamic State. Kurds have expanded the territory they oversee by as much as 40% during the fight.

The Kurds say much of that territory now under their control is subject to negotiation as to its future.

Baghdad has turned to Iran to help squeeze the Kurds. Turkey has also ratcheted up pressure. Both countries have their own restive Kurdish populations.

Based on a request by the Iraqi government, Iran closed the official border crossings with Kurdistan, a spokesman for the Iraqi foreign ministry said.

Meanwhile, Kurds have said travelers crossing into Turkey in the past few days were warned by Turkish authorities that they might not be able to cross back over the same land border.

Late Sunday, Mr. Abadi chaired a meeting for the Ministerial Council for National Security and his office released a statement detailing grievances by the Iraqi state against the Kurdish semiautonomous region.

The council warned of "the serious escalation and provocations by forces belonging to

the Kurdistan region outside the borders of the region, which wants to drag the country into internal strife in order to achieve its goal of dismantling Iraq and the region in order to establish a state on an ethnic basis," according to a release after the meeting.

The council said the Kurds' decision to hold an independence referendum and lay claim to so-called disputed territories like Kirkuk showed the Kurdish government's "deliberate intention to resort to force and impose the status quo."

Bayan Sami Abdul Rahman, the Kurdish regional government's official representative to Washington, said, "We knew this was coming and this was imminent," adding, "It's still not too late to keep this from escalating."

She called on Mr. Abadi to consider the consequences of war and called on the White House to help mediate the matter, blaming much of this on Iranian influence over the Popular Mobilization Forces.

In the event of an all-out war, "Kurdistan will be hurt, but so will Iraq," she said. "No one can be a winner."

Early Monday, Mr. Abadi's

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WORLD NEWS

Maduro Claims Victory in Venezuela Vote

Government declares backers sweep state contests as opposition rejects the results

BY JUAN FORERO
AND ANATOLY KURMANAEV

Venezuelan President Nicolás Maduro's embattled government won at least 17 of the 23 states in Sunday's gubernatorial elections, results that prompted allegations of fraud from the opposition coalition.

Moments after the electoral council's televised announcement, state television carried images of Mr. Maduro, holding his wife's hand and flanked by several of the more powerful members of his government, walking down a narrow lane outside the presidential palace, smiling and waving.

"It's another victory!" Mr. Maduro said, holding a microphone. He said turnout reached 61%, "a record unimaginable" in Europe or in neighboring countries. He stressed that the Trump administration, which has called his government a dictatorship, needed to take note.

The opposition coalition, Democratic Unity, said it doesn't recognize the outcome and will in the coming days announce a strategy in response. "This is a very grave



Carlos Ocariz, center, an opposition candidate for governor of Miranda state, left a polling station in Caracas's Petare neighborhood on Sunday.

said.

Electoral authorities didn't immediately respond to a request for comment on the opposition's fraud allegations. Earlier Sunday, Mr. Maduro said Venezuela had the most secure and tamper-proof electoral system in the world.

Mr. Maduro said that pro-government candidates had taken 54% of the vote to 45%, with the electoral council still counting votes in the large eastern state of Bolívar, the only state where a clear winner had not been declared as of late Sunday. Sounding defiant, he warned that jail could await some of his opponents.

"Whoever passes the line, justice," he said. "I won't accept coup-planning governors."

Though there was no immediate comment from the U.S., both the Trump administration and the European Union have sharply criticized what diplomats call Mr. Maduro's increasing authoritarianism.

The European Union is working on a package of sanctions against the government here, a move that is favored by Spain, France and the U.K., officials say. The U.S. has already sanctioned a range of high-ranking Venezuelan officials for alleged corruption and human-rights violations.

—Sheyla Urdaneta in Maracaibo, Venezuela, contributed to this article.

moment for the republic," opposition spokesman Gerardo Clyde said.

The results were at odds with polls that showed the opposition could expand its hold on governorships from three to as many as 18 states if the participation rate reached 60%.

Polls have shown that Mr. Maduro is deeply unpopular, with Venezuela suffering a grinding economic meltdown marked by food shortages and the world's highest inflation. The International Monetary Fund released a recent report saying the country "remains in a full-blown economic, human-

itarian, and political crisis with no end in sight." By 2018, the IMF said, the country's economy will have contracted by 35% from 2014.

"With such high participation levels, the manipulation of results is too obvious," said Eugenio Martínez, an electoral system expert at Caracas's

Catholic University. "Now the challenge for the opposition will be to prove it."

Nicolas Toledo, pollster at Caracas-based Consultores 21, said the results verged on the statistically impossible. "Every single political poll done by anyone in the last three years would have to be wrong," he

WORLD WATCH

CHINA

Producer Prices' Rise Fastest in Six Months

Producer price inflation accelerated to a six-month high in September as a construction boom showed no signs of abating and a government crackdown on air pollution triggered fears of winter shortages and jumps in commodity prices. PPI rose 6.9% in September from a year earlier, compared with a 6.3% rise in August, the statistics bureau said.

Consumer inflation rose 1.6% in September from a year earlier, compared with a 1.8% gain in August, the National Bureau of Statistics said, on renewed weakness in food prices.

Food prices declined 1.4%, after dropping 0.2% in August. Nonfood prices grew 2.4%, compared with 2.3% growth in August.

The reading matched a 1.6% gain forecast by economists polled by The Wall Street Journal.

China's economy is expected to grow 7% in the second half of 2017, the central bank governor

said, defying economists' expectations for a slowdown.

—A WSJ Roundup

KYRGYZSTAN

Ex-Prime Minister Seen Leading Ballot

Former Prime Minister Sooronbai Jeenbekov appeared set for a surprise outright victory in Sunday's presidential election, preliminary results showed.

According to data published by the central election commis-

sion, Mr. Jeenbekov had secured about 55% of the vote based on 1.6 million ballots counted.

Mr. Jeenbekov's main opponent, oil tycoon Omurbek Babanov, was well behind with 34% of the votes counted, according to the same preliminary data. Both men are considered pro-Russian.

Citing pre-election polls, observers had expected that none of the candidates would clear the 50% threshold needed for outright victory, and had predicted that a runoff would be necessary.

—Reuters



Voters cast ballots in the Kyrgyz village of Kyzyl-Birdik Sunday.

VLADIMIR PROGOV/REUTERS

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WORLD NEWS

Austrians Put Faith In the Right

BY MARCUS WALKER

Austria's right-wing parties made strong gains in parliamentary elections on Sunday, after a campaign in which the main contenders competed with tough stances on immigration.

The conservative People's Party, led by the country's rising political star, 31-year-old Sebastian Kurz, won 31.6% of the vote, according to the preliminary official results, which exclude postal votes. The far-right Freedom Party won 26%, close to the party's best result ever in 1999.

The left-leaning Social Democrats, who led the departing Austrian government in a coalition with conservatives, were set to win 27.1%, putting them in second place. Two other parties cleared the 4% threshold for winning seats in parliament, according to the projection, while the Greens were hovering around the threshold.

Mr. Kurz, who ran promising a crackdown on immigr-

ation and a shake-up of Austria's political establishment, is now the favorite to form the next government, possibly in coalition with the Freedom Party.

Mr. Kurz wants to cut social benefits for refugees, to restrict access to the welfare state for workers from other European Union countries, and for the EU to send migrants rescued while crossing the Mediterranean to asylum-seeker processing camps in North Africa.

"Today is a strong mandate for us to change this country,"

Mr. Kurz told supporters on Sunday evening. He said it was too early to discuss coalitions.

The contest has displayed some of the main trends of Europe's elections in 2017, including fear of large-scale immigration from Muslim countries, disillusion with longtime political incumbents, the decline of established center-left parties, and the efforts by traditional parties to deflate public support for populist radicals.

Right Rising

Right-wing parties made gains in Austria's election amid immigration angst

Party	Results	4% needed to enter parliament	Pct. pt.	Change
People's Party (ÖVP)	2017 Center-right	31.6%	7.6	
Social Democrats (SPÖ)	2017 Center-left	26.9	24.0%	-2.9
Freedom Party (FPÖ)	2017 Far-right	26.0	20.5	+5.5
New Austria (NEOS)	2017 Center-left	5.1	5.0	-0.1
Pilz List*	2017 Left	4.3	4.3	0.0
Greens	2017 Left	3.9	12.4	-8.5
Team Stronach	2017 Right	5.7	5.7	-5.7

Source: Austrian National Council (2013); ORF.at (2017) THE WALL STREET JOURNAL.

Refugees Strain German Towns

Communities with large migrant populations ask 'Who is integrating whom?'

By ANDREA THOMAS

SALZGITTER, Germany—Late this summer, Nadine Langer took her six-year old to her first day at school. The girl was one of two Germans in her class, she said, amid 20, mostly Syrian, refugees.

"I am not against foreigners," said Ms. Langer, 41. "But there is a point where we have to wonder who is integrating whom."

Germany's 2015 refugee crisis has largely disappeared from the headlines. But in this and other midsize towns, it is continuing to unfold, putting communities under stress, pressuring local coffers and feeding concern about safety, jobs and the quality of education.

Some 140,000 asylum seekers have entered Germany this year—a sharp drop from the 1.2 million who arrived in the past two years. But in places such as Salzgitter there is a sense that the government, having housed and fed the newcomers, is failing in the longer-term effort to integrate them into German society.

Conservatives for years have said that refugees, a majority of whom settle permanently in the country, must learn German values, a concept known as Leitkultur.

Many here say they are proud of their town's tradition as a refugee haven. But as their numbers rose sharply last year Salzgitter took the unusual step of requesting a moratorium on new arrivals.

"The established parties lived in a bubble. They said everything was fine, closed their eyes to reality and didn't see people's concern," said mayor Frank Klingebiel.

Mr. Klingebiel hails from the conservative Christian Democratic Union. But his concerns transcend political lines. It was Stephan Weil,



Andrea Bernhof works with Syrian refugees Eva, center, and Deliana, right, at a Salzgitter kindergarten.

ANDREA THOMAS/THE WALL STREET JOURNAL

the left-leaning state premier who sought re-election on Sunday, who greenlighted the ban on further refugees moving to Salzgitter, which took effect this past week.

With about 5,700 mainly Syrian refugees among 106,000 residents, the highest proportion in the country, Salzgitter is an outlier. But several other communities, from Wilhelmshaven in the north to Hof in the south are also struggling.

In Salzgitter, a pre-existing Syrian community and a glut of affordable housing drew over 2,000 refugees last year and nearly 1,000 this year, leaving a clear imprint on the town's district of Lebenstedt.

Nour Alwadi, a 25-year-old from Damascus, arrived last year with his brother and his wife, Asma. They now have a 9-month-old baby. His parents joined him in Salzgitter five months ago.

"We moved to Salzgitter because there are already many Arab and Turkish migrants here; we have friends here," said Mr. Alwadi. "The people here are nice. We can attend mosques here."

Conservatives' Loss Is Blow to Merkel

BERLIN—Angela Merkel's conservative party lost in state elections Sunday, marking a setback for the German chancellor ahead of this week's coalition-formation talks, according to early estimates.

Ms. Merkel's Christian Democrats won 34.3% in the western state of Lower Saxony, placing second behind the left-leaning Social Democrats, which won 37.1%, according to estimates by public-sector broadcaster ZDF based on exit

polls and initial results.

National polls published by Emnid institute earlier Sunday put the conservatives at 31% support nationally, the lowest in six years. The institute had polled 1,960 people between Oct. 5 and Oct. 11 for the Bild am Sonntag newspaper.

"The migration crisis is the reason," said Tilmann Mayer, professor of political science at Bonn University. "Ms. Merkel is no longer undisputed...people get nervous about her future."

The Social Democrats' win was partly due to the popularity of incumbent State Premier Stephan Weil, Mr. Mayer said.

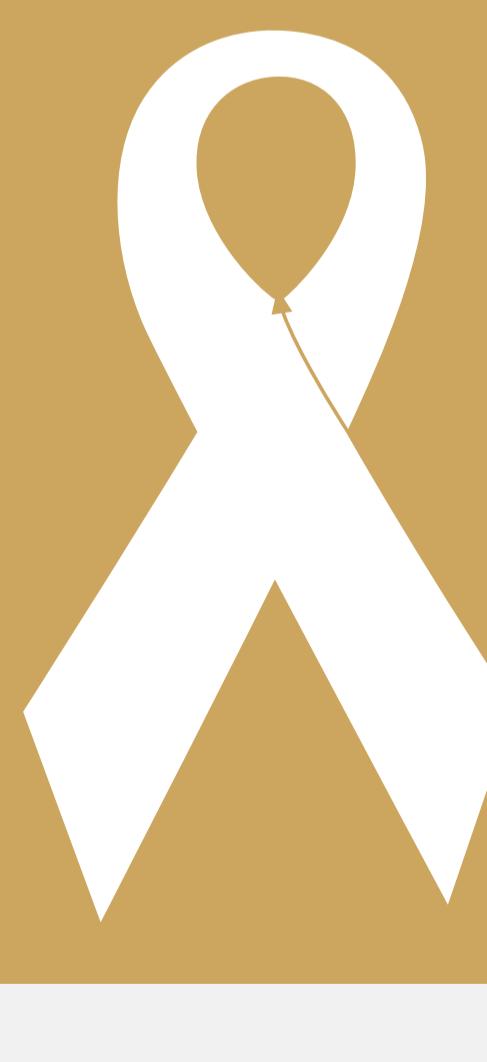
—Andrea Thomas

correlation between rising numbers of migrant schoolchildren and a deterioration in academic performance. In 2016, the share of foreign fourth-graders rose by one-third to 34% from 2011, according to the education ministry, while the number of children who passed standard writing requirements dropped to 55% against 65% five years earlier.

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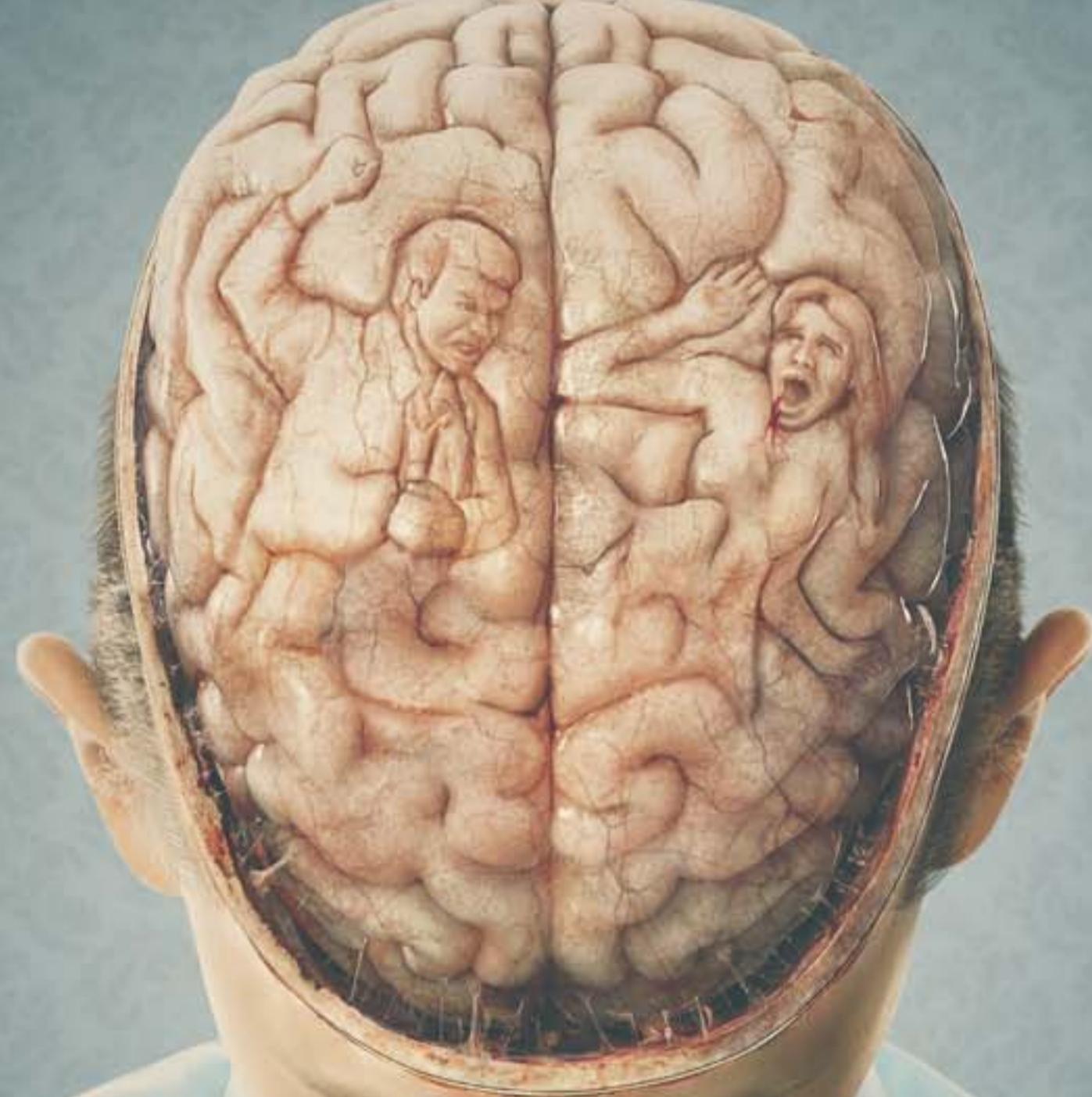
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GREATER NEW YORK

AIDS Nonprofits Expand Reach As Infections Ebb

BY MELANIE GRAYCE WEST

Organizations working with AIDS and HIV patients are a well-established presence in New York City. But as infection rates have dropped and improved medicines have enabled people with the virus to live longer, some groups are adapting their service models and expanding their reach, taking on new health issues from heart disease to heroin addiction.

Until recently, Manhattan-based nonprofit Alliance for Positive Change was known as the AIDS Service Center NYC, with a mission to provide New Yorkers with HIV prevention, treatment and support services.

panded it to address other chronic conditions."

Ms. Duke says the organization, which has an annual budget of \$22 million, decided to broaden its offerings after looking at the direction of health-care finance and delivery after New York's recent redesign of Medicaid, which focuses on care coordination instead of fee for service.

The move is part of a larger shift among New York City nonprofits "to look at the whole person," says Allison Sesso, executive director of the Human Services Council of New York, an advocacy organization for nonprofits.

The Staten Island AIDS Task Force changed its name in 2004 to the Community Health Action of Staten Island and widened its offerings to include services such as insurance enrollment and health screenings. In 2013, CitiWide Harm Reduction and Bronx AIDS Services merged to become BOOM!Health, adding a variety of social services for low-income residents in the Bronx.

Jeffrey Reynolds, vice chairman of the New York State AIDS Advisory Council, noted that this follows a statewide trend. As new infection rates dropped, legacy HIV and AIDS organizations have been changing their names and broadening their operations, transitioning into licensed primary-care centers or mental-health and substance-abuse clinics.

Even as organizations have evolved, many practitioners say they see parallels between the AIDS crisis of the 1980s and the current surge in heroin use and related deaths.

"Part of it is that if you lived through that epidemic the first time, you promise yourself 'Never again,'" says Mr. Reynolds. "Well, 'Never again' is now."

Voters will head to the polls Nov. 7 to fill term-limited Councilman Daniel Garodnick's seat, offering candidates a chance to represent New York's central business district and some of its most iconic neighborhoods, including Times Square.

"When most people think of things in New York City, they are thinking of things in District Four," said Rachel Honig, a businesswoman running a third-party race for the seat after losing the Democratic primary.

The outcome won't change control of the 51-member council, which currently has three GOP members. But Republicans hope the seat is a chance to pick up power, and Democrats hope it reaffirms their dominance.

The GOP candidate, Rebecca Harary, a 54-year-old founder of two nonprofit schools for students with learning disabilities,



Council candidates, from left, Democrat Keith Powers, Rachel Honig running on the Liberal Party line, and Republican Rebecca Harary.

City's Center Up for Grabs in Race

BY MIKE VILENSKY

An open City Council seat representing the heart of New York City will test the politics of one of Manhattan's few centrist areas.

Many neighborhoods in the Fourth District, which hugs Manhattan's east flank from 14th to 98th streets and stretches into Midtown, chose Republican Joseph Lhota over Democrat Bill de Blasio for mayor in 2013, then Democrat Hillary Clinton over Republican Donald Trump for president in 2016.

"The district's voters really prize independence," said Eva Moskowitz, the area's former Democratic councilwoman who now runs Success Academy Charter Schools. She pointed to her work as a councilwoman holding hearings on teachers-union contracts: "In virtually any other district in the city, I would have...become roadkill for that."

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Winner to Inherit A Packed Agenda

Whoever wins the open City Council race representing Midtown Manhattan will take on on Councilman Daniel Garodnick's work in the area.

His portfolio includes shepherding a plan that passed the council earlier this year to rezone the East Midtown business district, clearing the way for 13.4 million square feet of new and redeveloped office space while tapping developers to pay for public improvements.

Mr. Garodnick's agenda also includes a push to partially

repeal a city tax on commercial rents throughout Manhattan to help buoy the struggling retail sector. And he has been navigating the logistics of new crowds, congestion and security around Trump Tower since President Donald Trump's election.

Democrat Keith Powers said he is running partly to carry on Mr. Garodnick's legacy. He supports the rezoning legislation and the tax-repeal plan. He wants to push forward with a proposal to create a dedicated team of city officials to manage transit and security around Trump Tower.

Republican candidate Re-

becca Harary has been more skeptical of Mr. Garodnick's legacy. She said she wants more commitments to public improvement from the developers involved in the rezoning deal. She also said she wants a total repeal of the tax on commercial rents over three years instead of a partial repeal, and she said the federal government should pay for all Trump Tower security.

A Liberal Party candidate, Rachel Honig, said she largely is supportive of the rezoning plan but wants to monitor it carefully, and supports Mr. Garodnick's tax-repeal plan.

—Mike Vilensky

ties, has styled herself a socially liberal problem-solver.

The Democrat is Keith Powers, a 33-year-old former state legislative aide and lobbyist who won a nine-person primary and has touted his deep roots in the area.

Ms. Honig is running on the Liberal Party line, saying she will be a check on the mayor and the president.

As in the rest of Manhattan, Democrats have a vast registration advantage. Mr. Powers is the front-runner, aided by the backing of New York's labor unions and an endorsement from Mr. Garodnick, a Democrat.

Republicans are hoping Upper East Side voters will turn out against the mayor, while Democrats are hoping the district will turn out against the president.

Deborah Coughlin, a conservative activist who runs a Republican club on the Upper East Side, said residents remember a late city response in the neighborhood to a 2014 blizzard.

"That did not go unnoticed," she said.

Town-Peter Cooper Village, the 25,000-person residential development where both of them live.

Many people already knew them from the neighborhood, which has maintained a working-class population and several generations of families thanks partly to rent-control laws governing some of the units.

"It's familiar territory to me," Mr. Powers said in an interview at a local bagel shop.

Though the district used to be home to Republican representatives including state legislator Roy Goodman, Democrats have increased their numbers here, even as the district largely supported Mayor Michael Bloomberg, who ran as a Republican and then an independent.

Mr. Powers said Mr. Trump's presidency will boost support for Democrats, both because of the liberal sentiments in New York City and the logistical stresses around Trump Tower, which is in the Fourth District.

"New York City has to be at the forefront of the fight against him," he said.



An intake and assessment coordinator, left, and an intern at Alliance for Positive Change at its Lower East Side facility.

Psst, Spy Attraction Headed to NYC

BY CHARLES PASSY

New York is getting a spy attraction of its own.

Spyscape, which bills itself as a spy museum and experience, is slated to open in December, said officials with the project. It will be located in Midtown Manhattan at 55th Street and Eighth Avenue.

Archimedia, a British-based private investment group, is developing the 60,000-square-foot project, which will be spread over two floors. The attraction will feature seven main galleries devoted to different key aspects of espionage, such as deception, hacking and cyberwarfare.

But just as important to Spyscape's concept, say officials, is the participatory aspect. Visitors will get to play James Bond through such activities as encoding and decoding messages.

"It's truly experiential and personalized in a way no other museum is," said Shelby Prichard, Spyscape's chief of staff.

Ms. Prichard wouldn't



A rendering of a gallery at Spyscape, which is opening in Midtown later this year.

ton, which opened last year.

The spy attraction isn't staking entirely new ground. In Washington, the International Spy Museum has established itself as a major draw.

ADIAVE ASSOCIATES

specify the exact cost of creating the attraction, but said the budget was in the "tens of millions of dollars."

Also behind the project is Adjaye Associates, the firm that designed the National Museum of African American History & Culture in Washington.

Spies are hoping the attraction will be a chance to pick up power, and Democrats hope it reaffirms their dominance.

The GOP candidate, Rebecca Harary, a 54-year-old founder of two nonprofit schools for students with learning disabilities,

attracting more than nine million visitors since its opening in 2002. To meet demand, the museum is planning on moving to a new space in the district that is more than double the size of its 65,000-square-foot home.

The Washington museum's success and the rise of the New York attraction speak to the fact that espionage is a topic of great relevance and fascination, say museum-industry insiders.

Spies "certainly has the cool factor," said Susie Wilkening, a Seattle-based museum consultant.

But if Spyscape faces any challenge, it may be in terms of pricing. Unlike most museums, the attraction will be run as a for-profit institution, and it plans to charge \$39 for a standard adult admission.

That would put Spyscape in a far pricier category than many New York museums, including some that have a pay-what-you-wish policy.

Ms. Prichard said she didn't think the cost would be a deterrent for visitors. "We think it's a fair value for this experience," she said.

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GREATER NEW YORK



Once-Exclusive Office Lobbies Open Up

BY KEIKO MORRIS

For the past century, Manhattan office lobbies have served as little more than sterile passageways between the sidewalk and the desks above, with building attendants shooing people along to discourage loitering.

Now some landlords are embracing it.

A proposal by Silverstein Properties Inc. to restore and upgrade its 102-year-old Equitable Building in the Financial District includes opening up the lobby space of the full-block beaux-arts skyscraper to the public. Guests will be able to walk through an enclosed streetscape from block to block, taking in the architecture and new dining venues in the skyscraper at 120 Broadway.

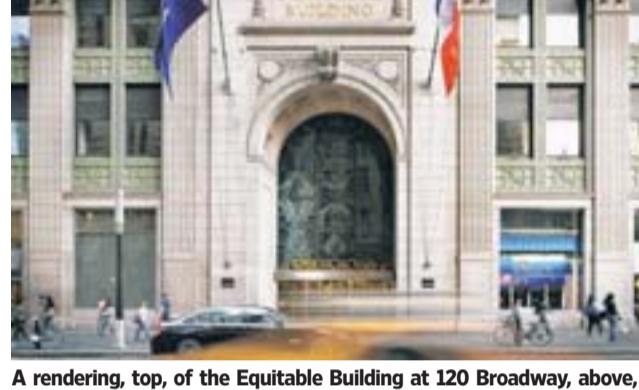
"There's a different mindset of what lobbies can be," said Carlos J. Cardoso, a part-

ner at Beyer Blinder Belle Architects & Planners LLP, which is designing the restoration and improvement project. "The question is, how do you engage the public and how do you bring the outside in?"

While Manhattan landlords are only beginning to explore new functions for entrances and lobby spaces, with some adding a cafe or tenant-only lounge space, owners in other cities such as Minneapolis, Milwaukee and Oklahoma City have gone further, turning private ground-floor spaces into public gathering spots.

Some of these ground-floor and lobby designs include couches and cushioned chairs with throw pillows, fireplaces, cafes and cafe seating. They have become work destinations not only for employees in the building but those in surrounding buildings.

"There is the old-world view that these things should be exclusive only to tenants,"



A rendering, top, of the Equitable Building at 120 Broadway, above, after a renovation that would make it more accessible to the public.

said Tony Layne, principal at architecture and design firm Perkins+Will. "But exclusivity is trumped by vibrancy and access and hipness that comes with this."

Competition in the office market has spurred owners to differentiate buildings with amenities and new approaches to creating social spaces, ar-

chitects and real-estate executives said.

At the same time, compa-

nies are placing an emphasis on the workplace experience to attract and keep employees, offering internal settings such as living-room areas as well as outdoor gathering spaces.

A few years ago, Per-

kins+Will redesigned the first-

and second-floor lobbies and underused retail space in the 1.5 million-square-foot Capella Tower in Minneapolis. Now the space offers a variety of meeting nooks with big couches, reading chairs, bar stools and long tables. The space draws tenant employees and workers in nearby buildings, Mr. Layne said.

Architecture firm Pickard Chilton has designed headquarters buildings for companies such as Milwaukee's Northwestern Mutual Life Insurance Co., making public space within the buildings a priority, said William Chilton, a principal of Pickard Chilton.

"They want the public to be in the building because it just gives it an energy," Mr. Chilton said. He pointed to New York's Grand Central Terminal. "One of the most magnificent things about Grand Central other than the magnificence of the space are the people walking through it."

GREATER NEW YORK WATCH

NEW JERSEY

Bear Kill Fell Sharply In This Year's Hunt

Far fewer black bears were culled during this year's hunt compared with last year's, New Jersey wildlife officials said.

Preliminary data show 241 bruins were killed during the six-day hunt that concluded Saturday. Hunters killed 562 bears during last year's hunt.

The just-completed hunt took place in eight counties, but more than half of the overall kills occurred in Sussex County.

The number of bears culled could increase slightly because some hunters may not have been able to bring their bears to the check-in stations before they closed Saturday night.

Officials say the annual hunts help control the black bear population and minimize run-ins with humans. Opponents say the hunts are inhumane and unnecessary.

—Associated Press

NEW YORK

Schumer Presses FDA on E-Cigarettes

Sen. Chuck Schumer called on the federal government to reverse a decision to delay the regulation of e-cigarettes.

The Democrat said Sunday that the Food and Drug Administration should reconsider its decision announced earlier this year to put regulating electronic cigarettes on hold. FDA Commissioner Scott Gottlieb's delay would give the agency time to determine how e-cigarettes fit into its overall strategy for tobacco regulation.

According to the surgeon general, in 2015 more than three million middle- and high-school students said they had used e-cigarettes in the past month.

—Associated Press

Freed Ex-Lawmaker Counts on Staten Island in His Comeback Attempt

BY MARA GAY

Michael Grimm, a former congressman from Staten Island who recently served time in prison for tax fraud, faces a tough battle to retake his old seat.

Mr. Donovan said he had served Staten Island for two decades as a district attorney, prosecutor and deputy borough president, helping close the Fresh Kills landfill, which was unpopular in the borough, and recover from the Sept. 11 terrorist attacks. "I think the choice is between that person and someone who has lied to the community," he said.

Though Mr. Donovan has

locked up most of the establishment support among Republicans in New York, Mr. Grimm, who served in the Marines and used to be an FBI agent, has long had a strong

base of support on Staten Island. During his last campaign in 2014, voters sometimes rushed out of their homes to thank Mr. Grimm for helping family members out of their flooded homes during super-storm Sandy.

Mr. Grimm has styled himself an avid Trump supporter and a firebrand.

Where Mr. Donovan is a consensus-builder, Mr. Grimm, who first won office in 2010 amid the fervor of the tea-party movement, has styled himself an avid Trump supporter and a firebrand. He

went to prison in 2015 after pleading guilty to tax fraud. Mr. Grimm admitted to under-reporting income from a restaurant he owned and paying workers off the books. He was sentenced to eight months.

Some in Staten Island politics, including several of Mr. Donovan's supporters, say they fear he may not be able to hold on to the seat amid a wave of Trump support that has swept over the borough.

Mr. Grimm has drawn sup-

port from former Trump strategist Steve Bannon, and hired Michael Caputo, a former Trump campaign aide, to work on his campaign. But even before Mr. Trump burst onto the stage as a presidential candidate, Mr. Grimm had cultivated a reputation for making bombastic remarks that thrilled supporters and made detrac-



Former Rep. Michael Grimm is running for his old seat.

been indicted. Mr. Grimm sees parallels between himself and the president. "I was laughed at when I first ran," he said. "They said I wouldn't raise any money. They said I had no chance of winning. They said all those things about President Trump, too."

Jessica Proud, Mr. Donovan's campaign spokeswoman, said Mr. Grimm's congressional record wasn't aligned with the president's agenda. She said he was trying to "ride on Trump's coattails." And she noted that Mr. Bannon hadn't formally endorsed Mr. Grimm.

Mr. Grimm said he felt confident about the relationship with Mr. Bannon. "He shook my hand, looked in my eyes and said, 'I'm going to support you.' How exactly he decides to express that is his business."

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LIFE & ARTS



CLOCKWISE FROM TOP LEFT: ABC/EVERETT COLLECTION; ABC; KENDRICK BRUNSON FOR THE WALL STREET JOURNAL

TELEVISION

The Sleeper Hit Behind TV's New Direction

'The Middle' is a model as networks add working-class characters in push for economic diversity

BY JOHN JURGENSEN

ON THE ABC COMEDY "The Middle," a dad who works at a quarry explains why he won't go to career day at school to one of his three children.

"If I don't clock in," Mike Heck says, "I don't get paid. And if I don't get paid, you guys are wiping your butts with junk mail again."

The Hecks are a sitcom family that struggles to pay bills and juggle work, school and everyday obligations in Orson, Ind. They arrived on TV eight years ago when a recession had millions of real American families reeling. Now "The Middle" has entered its ninth and final season with renewed relevance, as broadcasters try to reach audiences divided along sharp economic, political and cultural lines.

"We've been chugging along with the same template while the world around us has changed," says Eileen Heisler, co-creator of "The Middle" with DeAnn Heline, who adds, "People are paying attention now."

In recent years ABC broadened the range of families represented in its comedies, including "blackish," "Fresh Off the Boat" and "Speechless," featuring a character with cerebral palsy who can't communicate verbally.

However, while prioritizing racial and other types of diversity in the network's drama lineup, "we



'The Middle,' top and right, starring Patricia Heaton and Neil Flynn, has renewed relevance in its last season. It was created by DeAnn Heline, above left, and Eileen Heisler who met at Indiana University. Below, ABC is reviving 'Roseanne,' starring John Goodman and Roseanne Barr, to represent 'people who feel frustrated because they've been left behind.'

might not have done the best job in terms of the economic differences," says Channing Dungey, president of ABC Entertainment.

Now the network is introducing more working-class characters.

New dramas will feature fewer people "striding down corridors in high heels and carrying Prada bags," Ms. Dungey says, referring to the milieu of hit series "Scandal." For example, a coming "Grey's Anatomy" spinoff will be set in a fire house. And in early 2018, ABC is bringing back a show famous for mining humor at the lower end of the income scale,

"Roseanne."

The eight-episode reboot, starring Roseanne Barr, John Goodman

and other original cast members, aims to represent "people who feel frustrated because they've been left behind," Ms. Dungey says. The show, which taped its first episode last week, will be "a little more



and strident" in tone than "The Middle," Ms. Dungey says.

The sweetness of "The Middle," however, contributed to the show's low-key success as much as its setting. On a typical episode, dental assistant mom Frankie (Patricia Heaton) tries to meet the standards of a model family, but gets hamstrung by her own shortcomings and those of skeptical husband Mike (Neil Flynn) and their children: loafer Axl (Charlie McDermott), eternal optimist Sue (Eden Sher) and odd-duck Brick (Atticus Shaffer).

They go to church on Sunday but, like the Simpsons, mostly as a matter of obligation. Teen quandaries like drinking and sex don't

come up. The family is strapped with money problems and unreliable appliances, but they improvise fixes. Occasionally true crises hit, as when Sue botched her financial aid forms for college last season.

It's a show set in the present that is somehow tinged with nostalgia. The avocado green walls and outdated furniture in the Hecks's home initially led some viewers to think the show was set in the 1970s.

That look reflects the Midwest memories of Ms. Heisler and Ms. Heline, who grew up in Illinois and Ohio, respectively. They teamed up as writers after meeting at Indiana University. They worked on a variety of shows, including the original "Roseanne," before selling "The Middle." They pitched it as an ode to "those places you fly over on your way from somewhere to somewhere else," as Frankie narrates in the first episode.

In 2006, ABC rejected a pilot episode they shot with a different set of actors. After the recession hit, however, the network gave the producers a second chance, and picked up the sitcom starring the current cast.

The show is shot at the Warner Bros. studio in Burbank, Calif. Near the facade of the modest blue Heck home is the office that Ms. Heisler and Ms. Heline have shared throughout the show's run. It's decorated with mementos such as a yellowing newspaper article introducing the series, and a collage of images—high-school football, a community barbecue and other Americana—once used to give ABC a sample of the show's look.

The show's creators say they chose to end the show while its following is still strong. Announcing the finale in advance gives them time to wrap "The Middle" up on their own terms and revisit favorite characters, such as an unseen single mom played by Brooke Shields, and guest stars including Norm Macdonald. The finale will stay true to the show's steady nature, says Ms. Heisler: "The Hecks are not going to win the lottery."

"Modern Family," which also launched in 2009, is the more celebrated ABC comedy by far. The multi-family sitcom has accumulated 80 Emmy nominations and 22 wins, including being crowned Outstanding Comedy Series five years in a row. "The Middle" has been nominated one time—in 2012, for the makeup in an episode involving a community production of "The Wizard of Oz."

Though it doesn't have a minivan full of trophies, "The Middle" has been a steady provider for ABC. It averaged 6.7 million total viewers in its first season, and 7 million viewers in its eighth season.

"The Middle" has long aired at 8 p.m., kicking off ABC's prime-time lineup, first on Wednesdays and now on Tuesdays. With no lead-in series and relatively little promotion, "We've been a cactus, a self-sufficient little organism," Ms. Heisler says.

Occupying a slot after "Wheel of Fortune" isn't necessarily sexy, but it's where "The Middle" is at home. "Kids can watch it with their grandmas," says Ms. Heline.

Adds Ms. Heisler, "Because cable and [streaming TV] are grabbing other parts of the audience, broadcast television is trying to be that hearth it once was."

ANATOMY OF A SONG | By Marc Myers

HOW CHARLIE DANIELS MADE 'THE DEVIL' A HIT

AFTER THE CHARLIE DANIELS BAND released "The Devil Went Down to Georgia" in May 1979, the #1 country single reached #3 on Billboard's pop chart and won a Grammy. Recently, Mr. Daniels, 80, the band's founder, guitarist, fiddler and lead vocalist—and the song's co-writer—looked back on the group's biggest hit. His memoir, "Never Look at the Empty Seats" (Thomas Nelson), will be published Oct. 24. Edited from an interview.

Charlie Daniels: In late 1978, we were pretty far along recording songs for our 10th album, "Million Mile Reflections." We were at Nashville's Woodland Sound Studios, and our producer John Boylan had brought along an ingenious Los Angeles engineer named Paul Grupp. He mixed us in a way that cleanly captured all our energy and sound.

John was big on the details. In November '78, just as we finished recording most of the new album, John noticed we were missing a fiddle song. We traditionally included

at least one on each album.

So our road crew moved our gear out of Woodland and into rehearsal space at Nashville's Studio Instrument Rentals.

Fiddle songs were important to me and our fans. They were a bridge from hard rock to our bluegrass roots.

I never took fiddle lessons as a child. In fact, I never took lessons on anything. I learned to play by ear.

When I began my career as a professional fiddler and guitarist in North Carolina in the early 1950s, I played country music, like everyone else down there.

Then one day in 1955, a steel-guitar player came to Gulf N.C., and asked to play with the

band I was in. He didn't have an amplifier, so I took him down to our local music store and cosigned one for him.

A few months later, he skipped town and left me with the amp and a bunch of payments. I had nothing to play on the amp, so I decided to buy a Gibson electric guitar and

Please see ANATOMY page A14



Charlie Daniels performed with his band in December 2013 at the Orleans Arena in Las Vegas.

LIFE & ARTS

WHAT'S YOUR WORKOUT?

Training Continues After the Storm

A pro baseball scout prepares for the Marine Corps Marathon after long days on the road and a hurricane hit his Texas home

BY RACHEL BACHMAN

AS A TRAVELING SCOUT for the Toronto Blue Jays, Chuck LaMar already faced hurdles to training for his first marathon. Then in late August, Hurricane Harvey hit his coastal hometown of Rockport, Texas.

Mr. LaMar's family evacuated inland and their home suffered significant damage, though it wasn't destroyed. They returned to it a month later.

"I almost feel guilty at times to be training for a marathon when there's so many people in Rockport who don't even know where to begin to start their life over," he says.

Mr. LaMar, 61, isn't a lifelong runner, but always wanted to run a marathon. About two years ago his daughter Emily pushed him to try a half-marathon. He did. Then, inspired by his son, Charlie, a Marine, Mr. LaMar aimed for the Marine Corps Marathon on Oct. 22 in Washington, D.C.

Training has helped burn off nervous energy, says Mr. LaMar, who was the Tampa Bay Rays' first general manager, working with the team from 1995 to 2005. From this summer through early fall he has run in 13 states, found humor in early-morning workouts and kindness from strangers in a running community he calls as tightknit as baseball.

The baseball games he scouted—both in the minors and the big leagues—often kept him up until 11 p.m. or later. He woke as early as 3:30 a.m. to avoid running in the heat. He napped in the afternoon.

When Mr. LaMar was in Gulf Breeze, Fla., near Pensacola, he ran into retired Navy pilot Joe Costello, who helps his wife coach the girls lacrosse team at Gulf Breeze High School. Mr. Costello agreed to open the high school track at 5:30 a.m. for Mr. LaMar's speed workouts.

"As an airline pilot, I'm always looking for safe and reliable places to run overseas," says Mr. Costello, now a first officer for United Airlines. The men discovered their sons were both Marines aiming to be pilots.

In Fort Myers, Fla., Mr. LaMar started a run on an elevated sidewalk flanked by deep puddles from recent storms. About a mile into his 7-mile run, he came upon a family of feral hogs.

He could either "take the Marine Corps way" and go straight ahead, or avoid the animals and run 6 miles in wet shoes and socks, he recalls. "I was smart enough to know that sow's going to protect her piglets, so I ran in the ankle-deep water."

One day at White Rock Lake



Chuck LaMar, a scout for the Toronto Blue Jays, trains in Rockport, Texas. He draws inspiration from his son, Charlie, below, who is in the Marines.



Park in Dallas, after Mr. LaMar had finished his first-ever 18-mile run, he lay down, happily spent, on a patch of grass. A woman happened upon him and poked him with a walking stick.

"She thought I was dead," Mr. LaMar recalls, laughing. "And when I woke up, it scared her half to death."

The Workout

Mr. LaMar followed a training program designed by Sarah Whipple,



a fitness instructor in Scottsdale, Ariz., and former distance runner at the University of Oregon, and got counseling and advice from his sister-in-law, Julie Gregory, who has run multiple marathons.

He did one long run a week, typically on Monday, with a day off before and after to rest and recuperate from travel. Twice a week he did speed workouts that included faster-paced 200- to 800-meter runs, often on a track. He often did a 2-mile warm-up and

cool-down to keep up his mileage.

Twice a week, he did three sets each of a one-minute plank, 100 sit-ups and 25 push-ups. About six weeks ago, he started doing that workout three or four days a week.

The Diet

Mr. LaMar hit the grocery store when he got to each town for bottled water, bananas and milk, and requested a hotel room with a fridge. He ate a banana before runs.

Afterward he made a shake with

These Runs Are All Hits for This Scout

From spring to early fall, Chuck LaMar ran in 13 states while traveling for his work as a Toronto Blue Jays scout and preparing for a marathon. Some of his top training spots:

Karl Boyes Multi-Purpose National Recreation Trail, Presque Isle State Park, Erie, Pa.: This 13.5-mile paved route runs the circumference of the park, a 3,200-acre sandy peninsula that juts into Lake Erie.

Ann and Roy Butler Hike and Bike Trail, Austin, Texas: This traces the reservoirs of the Colorado River and is abuzz with runners, walkers and cyclists.

Pensacola Beach Trail, Pensacola Beach, Fla.: "You literally are running through two sets of sand dunes," Mr. LaMar says. From the Pensacola Beach Bridge to the Portofino Island Resort and back it's a little more than 9 miles.

Fulton Beach Road, Rockport, Texas: Hurricane Harvey devastated much of the area along this route in Mr. LaMar's hometown. "It's one of the prettiest 6-mile runs, easily, on the Texas coast," he says.

protein powder, 2% milk and fruit and mixed it in a blender he brings on the road. Then he had another breakfast of fruit, a bagel with peanut butter and eggs.

Lunch was chicken or fish with vegetables. Dinner in the ballpark press room was salad, chicken or fish, and sometimes pasta. Mr. LaMar vowed not to eat at a concession stand all summer—he loves hot dogs—and says he succeeded. He munched on Quest protein bars instead.

He always had a cookie or a little ice cream after dinner. "My reward for the day!" he says.

The Gear & Cost

Mr. LaMar wears New Balance 1260v6 shoes, which cost \$150. On early-morning runs he ran with a headlamp, which costs about \$40.

He uses a Garmin 235 watch, which retails for about \$330. Its key feature for Mr. LaMar is that it lights up each time he's run a mile. That's important, because he can't see the watch's smaller displays without his reading glasses.

"The sign of old age is not that you can't run a marathon," Mr. LaMar says. "It's that you can't read your watch while you're training for it."

ANATOMY

Continued from page A13
start a rock 'n' roll band. I quit playing fiddle, since it didn't really fit in.

By 1971, I began recording my own songs and incorporating a little bit of everything. When we began playing hard rock, I added the fiddle back in where we had the guitar stuff.

In late '78, once our gear was moved out of Woodland and into our rehearsal space, we all just started jamming to come up with a song. We didn't have a title yet.

The song's inspiration had nothing to do with Vassar Clements's "Lonesome Fiddle Blues" (1972), as some people have claimed. The music for "Devil" was all stuff we came up with totally on our own. Vassar is one of my favorite fiddle players, but there was no correlation between the two songs.

As soon as we knew what we wanted to do with the music, we moved back to Woodland and recorded the basic instrumental track.

Then I went home and wrote the song's words. I like to write late at night or early in the morning, when everything is quiet.

The phrase "the devil went down to Georgia" just popped into my head for the opening line.

The inspiration for my lyric was Stephen Vincent Benét's 1925 poem, "The Mountain Whippoorwill." I first read the poem in high school and it stuck with me.

It's about a boy who grows up in

Georgia's mountains playing his fiddle as free as a whippoorwill's call. He winds up in a fiddle contest and wins by playing from the heart.

Fired up by Benét's poem, I wrote a lyric about a kid named Johnny who was a great fiddler. But I needed something more exciting than an ordinary contest. The stakes had to be higher.

So I had the Devil go down to Georgia to challenge Johnny. If Johnny won, he'd get the Devil's gold fiddle. But if he lost, the Devil would get his soul. Johnny accepts the challenge.

After my verse explaining all of that, I wrote a chorus lyric: "Fire on the mountain, run boys run / the

Devil's in the house of the rising sun / Chicken in the bread pan pickin' out dough / 'Granny does your dog bite?' 'No, child, no.' Those are old square-dance refrains. I used to play square dances when I started out in North Carolina.

In my lyric, Johnny wins the contest, and the Devil bows his head and puts his golden fiddle on the ground at Johnny's feet.

The next day, I brought in my lyric sheet to Woodland and overdubbed my vocal with the band singing the harmony parts. Then I had to record the two fiddle solos.

For the Devil's solo, I played all kinds of junk to illustrate his soullessness. I made the fiddle solo all fury and noise, without melody or poetry.

After I finished, Paul, our engi-



Charlie Daniels, in red shirt, and members of his band after being honored at the 1980 Grammy Awards in Los Angeles.

neer, had me put on headphones and overdub six more fiddle tracks to illustrate the Devil's "band of demons."

Then Paul and John brought all seven tracks together as one cohesive solo. When they mixed it, the Devil's solo had a wider, angrier sound. I was amazed. I had never worked like that before in the studio.

We also overdubbed an evil, devilish hiss. That was keyboardist Joel "Taz" DiGregorio's idea. He finished by

running a guitar pick across the strings of the studio's acoustic piano.

Next, I recorded Johnny's fiddle solo, which is earthier and more melodic than the Devil's—more like those hoedowns in North Carolina.

After "Devil" was released and became a big hit, someone told me that classical violinist Itzhak Perlman was trying to reach me.

When I called him back, Mr.

Perlman said, "I just want you to know that my children and myself are fans of yours." He finished by

saying, "I'd like to do something with you sometime."

When I got off the phone, I stood there as if someone had hit me in the face with a cold mullet. I just assumed he would have said to himself, "My gosh, listen to this guy. He's horrible."

We run in different circles, so we never got a chance to do that. But the fact that he even knew who I was shocked me to the bone. As far as I'm concerned, Mr. Perlman is the best fiddle player there is.

LIFE & ARTS



FROM LEFT: NATIONAL GALLERY OF ART, WASHINGTON; AFP/GETTY IMAGES; PARIS/RMN-GRAND PALAIS/ART RESOURCE, NY

ART REVIEW

Another Side Of Fragonard

Portraits that serve as compelling displays of the artist's mythic powers of invention rather than as identifiable likenesses

BY MARY TOMPKINS LEWIS

THE RAVISHING portraits de fantaisie of the French painter Jean Honoré Fragonard (1732-1806) challenged his century's conventions of portraiture as powerfully as they showcased the artist's extravagant, painterly technique. His elegantly coiffed and costumed figures, posed theatrically in the fashionable masquerade dress known as à l'espagnole (or Spanish style) and realized in dazzling, sketchlike strokes, have long been revered as compelling displays of the artist's

mythic powers of invention rather than as identifiable likenesses. Among his most beloved works, they have engendered endless speculation as to their inscrutable subjects, origins and larger role in Fragonard's art.

A previously unknown sheet of sketches from the artist's hand, which recently appeared on the art market, has shed new light on these enigmatic paintings. The drawing, which features ordered, symmetrical rows of thumbnail sketches of 18 portraits (including a few canvases yet to be discovered) and annotations by the artist revealing many of

the sitters' names, has removed some of the mystery surrounding such works. It has also raised questions as to the painter's creative process, and even the professional stature he may have sought as an artist. In the intimate and exquisite "Fragonard: The Fantasy Figures," an exhibition of 14 paintings and the newly discovered sheet of sketches on which many of them appear, Yuriko Jackall, an assistant curator at the National Gallery of Art, Washington, draws on groundbreaking art historical and technical research to argue anew the special place of these en-

chanting images in Fragonard's art.

The National Gallery's breathtaking "Young Girl Reading" (c. 1769) hangs deservedly as the centerpiece of the show. The painting, a subject of recent scrutiny by the museum's imaging scientist John K. Delaney and the conservator Michael Swicklik, establishes the documentary significance of the drawing now known as his "Sketches of Portraits" for the fantasy images as a whole.

For example, in the Gallery's painting the demure adolescent is shown sitting in profile with upswept locks and in an elaborately ruffled gown while absorbed in reading the volume she holds. The dominant yellow pigment (also known as Fragonard yellow) that describes her jacket is tempered with delicate touches of red; along with roseate tones on her cheeks they render the image an indescribably eloquent evocation of blushing, youthful beauty. In the corresponding sketch, however, the subject sports simpler attire and, notably, turns outward to openly peer at the viewer. This surprising discrepancy prompted an X-ray of the canvas that revealed the presence of an earlier version of the motif hidden beneath the present painted figure, one that conforms to the drawing in its full-face pose. Executed in a more measured, readable style, the painting would have made the sitter's identity far more discernible. The finding suggests that Fragonard altered a previous (perhaps rejected?) portrait into a more loosely painted genre figure that would have had a broader commercial appeal, a status enjoyed by many of the works here on view.

The fantasy paintings share a number of pictorial characteristics that allow us to consider them a cohesive ensemble, a notion the sheet of sketches and the exhibition underscore. In each composition, light streams in conspicuously from the left to reveal a half-length figure (or, in the case of the so-called Cavalier, a full-length subject) that dramatically fills the canvas's generous space. Almost all figures pose above a wooden ledge or railing in the foreground, and were executed quickly in a bold, wet-on-wet technique that highlights the painter's presence over that of the subject he portrays. Many canvases share the same costumes or studio props, which lend them a formal and coloristic harmony as a group. The lus-



Jean Honoré Fragonard's 'M. de La Bretèche' (c. 1769), above, and 'Young Girl Reading' (c. 1769), left

trous yellow jacket with an elaborate ruff worn by the figure we can now identify as the financier Louis de La Bretèche, for example, appears in at least two of the other male portraits on view, its radiant tones, like those in the "Young Girl Reading," illuminated by sunlight pouring in. Finally, Fragonard's use of standard-size canvases, rather than the made-to-measure supports his commissioned portraits often demanded, again suggests that he must have envisioned these unique works as a deliberate and purposeful series.

Fragonard's fantasy paintings were greeted with adulation and awe by a handful of his vanguard contemporaries, and are believed to have been forged in a burst of creative prowess in the years surrounding 1769, an important juncture in the painter's career. By then the 37-year-old artist had retreated from the brutally competitive atmosphere of the Parisian art world and its murderous critics. Paint-

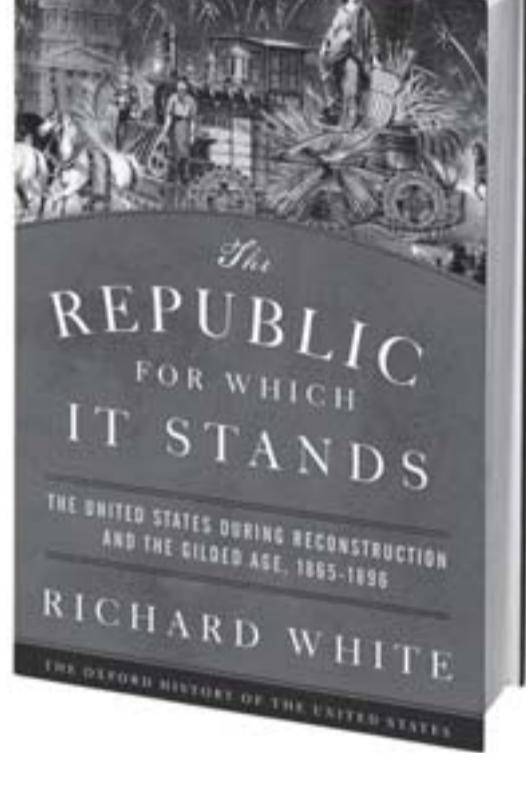
ing now not for the official Salon but for sophisticated private collectors who valued his bold, virtuoso technique and images as vivid expressions of his brilliance, the fantasy paintings may well represent, as the exhibition argues, Fragonard's liberating path and future away from the strictures of the academy. And while fans of his art may be disconcerted by the identities we can now firmly attach to some works (it is particularly painful to give up Denis Diderot, the great critic and philosopher of the Enlightenment, as the subject of the Louvre's enthralling "Portrait of a Man"), such discoveries do little to lessen our appreciation of the portrait they now offer us of Fragonard as a genius.

Fragonard: The Fantasy Figures

National Gallery of Art, through Dec. 3

Ms. Lewis teaches art history at Trinity College, Hartford, Conn.

FROM TWO-TIME PULITZER PRIZE FINALIST RICHARD WHITE



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—The New York Times Book Review

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OPINION

REVIEW & OUTLOOK

Trump's Nafta Threat

Donald Trump is threatening again to terminate the North American Free Trade Agreement if Canada and Mexico don't agree to his ultimatums. If this is a negotiating tactic of making extreme demands only to settle for much less and claim victory, maybe it will work. Otherwise Mr. Trump is playing a game of chicken he can't win.

Mr. Trump's obsession with undoing Nafta threatens the economy he has so far managed rather well. The roaring stock market, rising GDP and tight job market are signs that deregulation and the promise of tax reform are restoring business and consumer confidence. Blowing up Nafta would blow up all that too. It could be the worst economic mistake by a U.S. President since Richard Nixon trashed Bretton-Woods and imposed wage and price controls.

U.S. demands in the Nafta renegotiations—which returned to Washington last week—are growing more bizarre. U.S. Trade Representative Robert Lighthizer now wants to add a sunset clause, which would automatically kill it in five years unless all three governments agree to keep it. In other words, the U.S. proposes to increase economic uncertainty and raise the incentive for businesses to deploy capital to more reliable investment climates.

The U.S. also wants to change Nafta's "rules of origin" for autos. Cars now made in North America can cross all three borders duty-free if 62.5% of their content is Nafta-made. Mr. Lighthizer wants to raise that to 85% and add a sub-clause requiring 50% be made in the U.S.

Mr. Lighthizer needs to get out more. Nafta's current rules-of-origin for autos are already the highest of any trade agreement in the world, says John Murphy of the U.S. Chamber of Commerce. Raising them would give car makers an incentive to source components from Asia and pay America's low 2.5% most-favored-nation tariff. A higher-content rule would hurt Mexico, but it won't bring jobs to the U.S.

It's hard to overstate the damage that ending Nafta would inflict on the U.S. auto industry. Under Nafta, companies tap the comparative advantages of all three markets and have created an intricate web of supply chains to maximize

Ending the pact would be the worst economic blunder since Nixon.

returns. As Charles Uthus at the American Automotive Policy Council said last week, Nafta "brings scale, it brings competitiveness, it brings efficiencies [and] synergies between all three countries, and it brings duty-free trade." Its demise would be "basically a \$10 billion tax on the auto industry in America."

Last week the Boston Consulting Group also released a study sponsored by the Motor & Equipment Manufacturers Association that found ending Nafta could mean the loss of 50,000 American jobs in the auto-parts industry as Mexico and Canada revert to pre-Nafta tariffs.

Mexico has elections next year and no party that bows to unreasonable demands by Mr. Trump can win. The Mexican political class appears willing to call his bluff, which is making American business very nervous. More than 300 state and local chambers of commerce signed an Oct. 10 letter to Mr. Trump imploring him to "first 'do no harm' in the Nafta negotiations."

It noted that 14 million American jobs rely on North American daily trade of more than \$3.3 billion. "The U.S. last year recorded a trade surplus of \$11.9 billion with its NAFTA partners when manufactured goods and services are combined," the letter said. "Among the biggest beneficiaries of this commerce are America's small and medium-sized businesses, 125,000 of which sell their goods and services to Mexico and Canada."

Ending Nafta would be even more painful for U.S. agriculture, whose exports to Canada and Mexico have quadrupled under Nafta to \$38 billion in 2016. Reverting to Mexico's pre-Nafta tariff schedule, duties would rise to 75% on American chicken and high-fructose corn syrup; 45% on turkey, potatoes and various dairy products; and 15% on wheat. Mexico doesn't have to buy American, and last week it made its first wheat purchase from Argentina—30,000 tons for December delivery.

Canada and Mexico know that ending Nafta will hurt them, but reverting to pre-Nafta tariff levels could hurt the U.S. more. Mr. Trump can hurt our neighbors if he wants, but the biggest victims will be Mr. Trump's voters.

The Antidote to Steve Bannon

One irony of Washington these days is that a press corps that claims to loathe right-wing political operative Steve Bannon can't get enough of him. The media broadcast his every utterance, cheering on his declaration of "civil war" against Republicans in Congress.

Republican Senator Lindsey Graham (S.C.) captured that reality on CBS's "Face the Nation" Sunday when he said, "You're going to ask me about Bannon, so I'll just go and ask myself." And he replied by giving Republicans good advice on how to defeat Mr. Bannon, his Mercer family financiers and Breitbart campaign operation.

"Yes, so, what is going on?" Mr. Graham asked. "It's a symptom of a greater problem. If we don't cut taxes and we don't eventually repeal and replace ObamaCare, then we're going to lose across the board in the House in 2018. And all of my colleagues running in primaries in 2018

Lindsey Graham has good advice for Senate Republicans.

will probably get beat. It will be the end of [Majority Leader] Mitch McConnell as we know it."

The host teed up Mr. McConnell, but Mr. Graham elaborated: "Mitch McConnell is not our problem. Our problem is that we promised to repeal and replace ObamaCare, and we failed. We promised to cut taxes, and we've yet to do it.

If we're successful, Mitch McConnell is fine. If we're not, we're all in trouble, we lose our majority, and I think President Trump will not get re-elected."

That's exactly right. Mr. Bannon is recruiting carpetbaggers or multiple-race losers, but they'll have a chance if Republicans can't deliver on their campaign promises. Mr. Bannon's best enablers are the GOP Senators who killed health reform: Susan Collins, John McCain, Rand Paul and Lisa Murkowski. If they want to make Mr. Bannon a kingmaker, they'll do the same on tax reform.

Justice shouldn't protect the FBI and Fusion GPS from House subpoenas.

a month ago but has been stonewalled. There is no plausible reason that senior leaders of Congress—who have top-level security clearance—can't see files directly relevant to the question of Russian election interference.

Justice Department excuses about interfering with Mr. Mueller's investigation don't wash. Mr. Mueller is conducting a criminal probe, while Congress has a duty to oversee the executive branch. Both investigations can proceed simultaneously. Deputy Attorney General Rod Rosenstein, who supervises Mr. Mueller, needs to deputize specific Justice officials to handle Congress's requests.

The media attacks on Mr. Nunes for issuing the subpoenas are a sign that he is onto something. He recused himself in April after complaints about his role bringing to light Obama Administration officials who "unmasked" and leaked the names of secretly wiretapped Trump officials. Mr. Nunes has since been vindicated, as we've learned that former National Security Adviser Susan Rice and former U.N. Ambassador Samantha Power did the unmasking. Yet Democrats on the House Ethics Committee have refused to clear Mr. Nunes—trying to keep him sidelined from the Russia probe.

Senate Judiciary Chairman Chuck Grassley has also pursued the Fusion GPS trail, but he could use House backup. Speaker Paul Ryan needs to call on the Ethics Committee to render a quick decision on Mr. Nunes or allow him to resume his Russia investigation. Mr. Ryan should also prepare to have the House vote on a contempt citation if the Justice Department doesn't supply subpoenaed documents.

Mr. Mueller will grind away at the Trump-Russia angle, but the story of Democrats, the Steele dossier and James Comey's FBI also needs telling. Americans don't need a Justice Department coverup abetted by Glenn Simpson's media buddies.

LETTERS TO THE EDITOR

Burns's 'Vietnam': a Fair and True Account?

Mark Moyar's insightful "Ken Burns's 'Vietnam' Is Fair to the Troops, but Not the Cause" (op-ed, Oct. 7) on Ken Burns's "The Vietnam War" series is right on. The segment on the Tet Offensive, in its focus on Hue, showed groups of troops dashing from place to place and firing in an undisciplined way at unseen targets. The impression projected to the audience was one of no coherence. Combat is confusing, but this depiction seems to be disparate clips pieced together with no clear focus or goal. I had elements of my unit in Hue, and we were not that confused. We owned all nine Army tanks in Hue, so I don't know where all the clips of tanks firing at nothing came from. The mythology is perpetuated one more time by veterans who later turned against the war, which may well have colored their memories, aided and abetted by selective film shots.

COL. MICHAEL D. MAHLER, USA (RET.)
Bozeman, Mont.

I subscribe to Ken Burns's version without hesitation or qualification. I was drafted out of graduate school in 1969 and sent to Vietnam, where I served for a year in the First and Ninth Infantry Divisions. My unit, the 6th/31st Infantry, participated in the "Cambodian incursion" in 1970. I recognized what Ken Burns portrayed, having lived it. I could not relate to Mr. Moyar's view. His statement that 69% of Vietnam combat veterans enjoyed the war is especially hard to accept.

When I arrived back in the States, I was told by my first boss that "we won't hold it against you that you were in Vietnam." Numerous people asked me if I had killed any babies during the war, or if I was a drug addict.

I had absolutely no idea if friends in my platoon were pro-war or anti-war. We had responsibilities which took all of our time and energy. We were consumed with a desire to get our job done, with never a thought about politics or whether this was a just war or if the Army was handling things correctly.

ALBERT S. CAIN
Naperville, Ill.

As a Vietnam veteran and former combat officer during that war, I think Mr. Moyar's review is spot on. I am one of the 90% of veterans who was glad I served and has no regrets. Many of my contemporaries who didn't go to Vietnam have told me often how they regret not doing so, but

this side is never mentioned by Mr. Burns, who restates the same old leftist view of the war and truly misses a great opportunity to provide a balanced documentary.

BRUCE CRAIG
Denver

President Eisenhower and Secretary of State John Foster Dulles agreed that if free elections were held in Vietnam, perhaps 80% of the people would have voted for Ho Chi Minh. By going to war against the known will of the Vietnamese people, we violated our own first principles.

MICHAEL DALY
Gallup, N.M.

Mr. Burns's creation is an insult to the military personnel who, in good faith, obeyed their orders and performed a mission they thought to be for a noble cause: to give the South Vietnamese people an opportunity to choose their form of government. Although we were angered when, years after the fact, we learned our national leaders had given up long before they stopped sending us there, that doesn't change the commitment nor the sacrifices we had made years earlier.

MARK MACHINA, RVN 1967-'68
Sahuarita, Ariz.

The main takeaway from the series is how the U.S. leadership knew from the outset that the war was unwinnable, but that the political environment made it impossible to acknowledge it publicly. The notion that we could have indefinitely upheld the South Vietnamese government if only our leaders "let them win" is laughable. It is the same misguided thinking that has kept us in Afghanistan for 16 years. A military advantage is necessary but insufficient for lasting peace in a foreign nation. Without political legitimacy, the foreign government is doomed to failure no matter the military strength of the protector.

The documentary represented all points of view fairly and helped me understand the psyche of my parent's generation.

PHIL POTTER
Laguna Niguel, Calif.

If there was any chance for a free democratic Vietnam, it came and went in 1945 with the State Department's support of France's colonial ambitions. America lost its credibility with the Vietnamese people then.

CHARLES PLUSHNICK
Brooklyn, N.Y.

Time to Hold Cuba to Account for Its Crimes

Your editorial "Cuba's Sonic Attacks" (Sept. 26) quotes Secretary of State Rex Tillerson, "It's a very serious issue with respect to the harm that certain individuals have suffered."

Cuba is a totalitarian state and very little happens on the island that escapes Raúl Castro's security police. International law requires governments to provide protection to foreign diplomats. Unquestionably Cuba failed to protect U.S. diplomats.

The White House has now ordered

We're Saying 'Vale' to High Standards and Prosperity

The educational establishment has found a new way to decrease incentives for educational attainment, to lower U.S. test scores and ultimately to diminish labor productivity and wages ("You're All No. 1! High Schools Say 'Vale' to the Valedictorian," page one, Oct. 7). It will soon be asking for more funding to reverse these self-inflicted trends.

JAMES FACKLER
Lexington, Ky.

If the administration of a high school abandons the title of valedictorian for the top academic performer because of "unhealthy competition," then any playoff or postseason appearances for all teams and athletes pursuing a state championship should be eliminated also. Unhealthy competition is unhealthy competition.

ERIC J. LITTLETON
Sevierville, Tenn.

I have always believed that in America everyone has an equal opportunity to be as unequal as they can be. The notion of young people getting their feelings hurt because they didn't put forth the effort that others did isn't healthy or productive. Based on this logic, everyone should be able to be a brain surgeon just because they want to be. Liberal thinking in liberal schools has created a recipe for disaster for our future adults.

R.B. DELOIAN
Parker, Colo.

Letters intended for publication should be addressed to: The Editor, 1211 Avenue of the Americas, New York, NY 10036, or emailed to wsj.ltrs@wsj.com. Please include your city and state. All letters are subject to editing, and unpublished letters can be neither acknowledged nor returned.

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THE WALL STREET JOURNAL.



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THE WALL STREET JOURNAL.

Monday, October 16, 2017 | B1

Pentagon Pits Traders vs. Hackers

By ALEXANDER OSIPOVICH

Dozens of high-speed traders and others from Wall Street are helping the Pentagon study how hackers could unleash chaos in the U.S. financial system.

The Department of Defense's research arm over the past year and a half has consulted executives at high-frequency trading firms and quantitative hedge funds, and people from exchanges and other financial companies, participants in the discussions said. Officials described the effort as an early-stage pilot

project aimed at identifying market vulnerabilities.

The Defense Advanced Research Projects Agency, or Darpa, began the initiative before the revelations of attacks on Equifax Inc. and the Securities and Exchange Commission brought public scrutiny of risks to U.S. market infrastructure.

Participants described meetings as informal sessions in which attendees brainstorm about how hackers might try to bring down U.S. markets, then rank the ideas by feasibility.

Among the potential scenarios: Hackers could cripple a widely used payroll system;

they could inject false information into stock-data feeds, sending trading algorithms out of whack; or they could

Among the potential scenarios: Hackers could cripple a widely used payroll system.

flood the stock market with fake sell orders and trigger a market crash.

High-speed traders and

quant-fund managers, who use sophisticated computer programs to buy and sell stocks, sometimes in fractions of a second, form the core of the group. Such traders tend to have deep expertise in the inner workings of financial markets and the automated systems that account for huge swaths of trading activity today.

Darpa officials confirmed the effort, which is unclassified but hasn't been previously reported. The Wall Street Journal spoke with several traders who participated in the initiative, called the Finan-

cial Markets Vulnerabilities Project.

"We started thinking a couple years ago what it would be like if a malicious actor wanted to cause havoc on our financial markets," said Wade Shen, who researched artificial intelligence at the Massachusetts Institute of Technology before joining Darpa as a program manager in 2014.

Darpa famously developed the technology behind the internet and stealth bombers. It recruits experts from academia and industry in a bid to keep its thinking fresh. The

Please see DARPA page B2

Fallout Grows for Harvey Weinstein

By ERICH SCHWARTZEL

LOS ANGELES—Harvey Weinstein saw fallout from sexual-assault allegations increase over the weekend, including fresh investigations in London, as the Oscar-winning producer was expelled from the Academy of Motion Picture Arts and Sciences.

Mr. Weinstein was immediately expelled after a majority of the Academy's board of governors voted to dismiss him, the board said Saturday.

The Academy's board of governors said it wanted to "send a message that the era of willful ignorance and shameful complicity in sexually predatory behavior and workplace harassment in our industry is over."

Mr. Weinstein has seen his company, career and reputation crater in just over a week, since the New York Times published a report detailing alleged financial settlements he paid to women who accused him of sexual harassment.

Since then, allegations of rape have emerged against the producer, who was fired by the board of his independent movie and television studio, Weinstein Co., and is now the subject of investigations by police in New York and London.

London Metropolitan Police said it was pursuing three more allegations of sexual assault, in addition to a case from the late 1980s that it said it was investigating last week. U.K. media identified the suspect as Mr. Weinstein, but police wouldn't identify the man accused of the assault.

The additional cases were said to have occurred in Please see FALLOUT page B2

INSIDE



PRODUCERS TRY TO IGNITE LNG DEMAND

THE WEEK AHEAD, B2

Aramark Bites Off Big Deals

By ANNIE GASPARRO AND HEATHER HADDON

Food-service giant Aramark Corp. plans to acquire two closely held companies for a total of \$2.35 billion, in its largest deals since going public nearly four years ago.

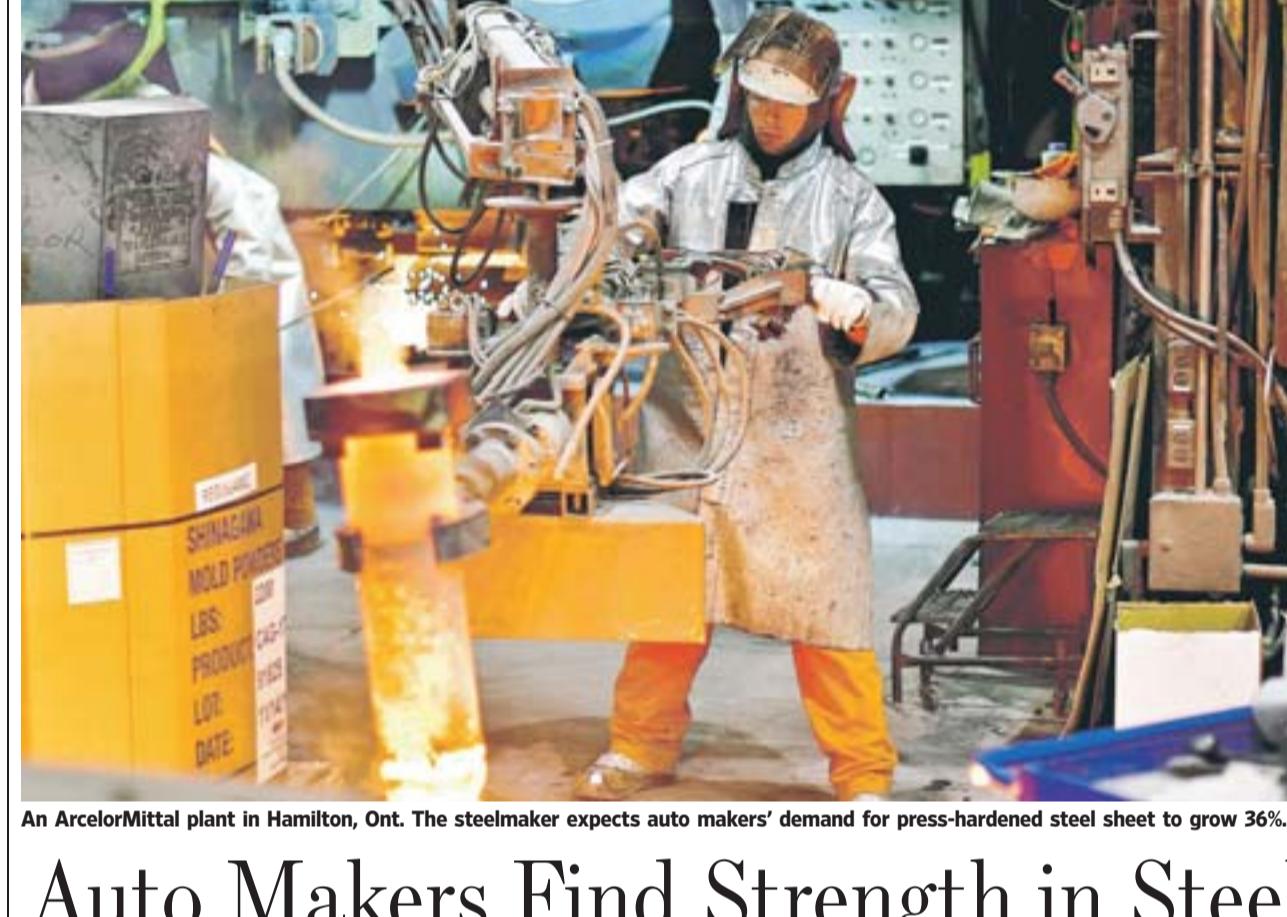
The company is buying Avendra LLC, which procures food, supplies and services such as landscaping for hotels and other institutions, for \$1.35 billion; and AmeriPride Services Inc., a supplier of uniforms and towels, for \$1 billion, officials said Sunday.

Buying Avendra, which manages \$5 billion in purchasing, "will allow us to leverage our scale to procure food at a lower cost," Aramark Chief Executive Eric Foss said in an interview. AmeriPride, which has annual sales of \$600 million, "will improve our competitive position," by allowing the company to offer more services to customers, particularly in Canada, he said.

Based in Philadelphia, Aramark provides food, facilities and uniform services to universities, hospitals, jails and other institutions globally.

The company has more than 200,000 employees and a market capitalization of some \$10 billion. Last year, it booked \$14.4 billion in revenue. It's been in and out of public ownership over the years, with its most recent IPO in 2013.

The food-service industry, with other major players such as Compass Group PLC and Sodexo SA, has come under pressure as consumers push for healthier options and as college students enjoy more higher-end fast-food and delivery options.



Auto Makers Find Strength in Steel

Fiat Chrysler, Honda and Audi are using lighter, harder versions as aluminum fades

By BOB TITA

Auto makers are rediscovering steel.

Varieties of lighter, stronger steel are being used in Fiat Chrysler Automobiles NV's Pacifica van, Honda Motor Co.'s Ridgeline pickup truck and General Motors Co.'s Chevrolet Malibu sedan. Audi AG, which switched to an all-aluminum body for its A8 sedan more than 20 years ago, is using steel again on the latest model.

"It's the strongest and most rigid A8 we've built," said Audi spokesman Mark Clothier.

Steel has always been cheaper and stronger than aluminum. But conventional steel is heavy. Many car makers seeking to comply with tougher fuel-economy requirements have shifted in recent years to aluminum and other light materials such as carbon fiber.

Now, steelmakers have figured out how to make steel lighter without compromising its strength or versatility. "Everything is moving to thinner and lighter," said Mark Bula, chief commercial officer at Big River Steel, a mill that opened in Arkansas last year. "The steel industry

is moving that way as well."

On next year's Audi A8, steel will make up 40% of the metal in the passenger-compartment frame, up from 8% eight years ago.

By 2025, the amount of lightweight, high-strength steel in a car or light truck in North America is projected to rise to an average of 483 pounds, 76% above the 2015 average, according to industry consultancy Ducker Worldwide.

ArcelorMittal NV expects auto makers' global demand for press-hardened steel sheet, which is strong and malleable

Please see STEEL page B2

KEYWORDS | By Christopher Mims

Homes Tap In to Battery Power

In the near future, your home could be battery-operated.

This is especially true if you live in New York, California, Massachusetts, Hawaii, Vermont, Arizona or a growing roster of other states and municipalities experimenting with revamping their electrical grids for the 21st century.

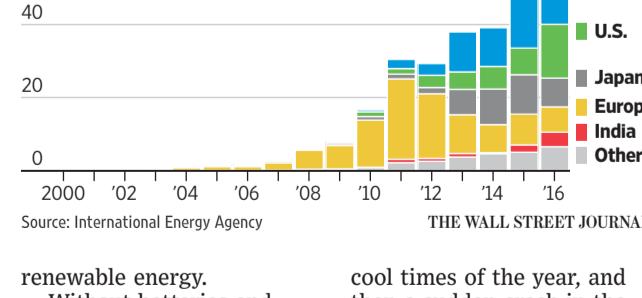
You might not even know your lights are being kept on by the same chemical process that powers your smartphone, since the batteries could be tucked into what looks like a neighborhood junction box, or behind a fence in a substation. But now, thanks to efforts by startups and the utility companies they sell to (and sometimes battle), you might get one right inside your home.

The rise of these home batteries isn't just a product of our collective obsession with new tech. Their adoption is being driven by a powerful need, says Ravi Manghani, of GTM Research:

Solar Power Takes Off

Annual net additions to global solar panels capacity

80 gigawatts



renewable energy.

Without batteries and other means of energy storage, the ability of utility companies to deliver power could eventually be threatened.

Solar power, especially, tends to generate electricity only at certain times—and it's rarely in sync with a home's needs. In some states, such as California and Arizona, there's an overabundance of solar power in the middle of the day during

cool times of the year, and then a sudden crash in the evenings, when people get home and energy use spikes.

For utilities, it's a headache. The price of electricity on interstate markets can go negative at certain times, forcing them to dump excess electricity or pay others to take it.

"This is not a long-term theoretical issue that might happen—this is now," says Marc Romito, director of

Please see MIMS page B4

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BUSINESS NEWS

Buyer Wheels Off Cart Maker

By RYAN DEZEMBER

Smarte Carte International Holdings Inc., whose luggage carts, lockers and massage chairs are ubiquitous in U.S. airports, has been acquired by 3i Group PLC, a British buyout firm that is pushing into North American infrastructure, said people familiar with the matter.

The firm paid \$385 million for Smarte Carte, a sum that includes the company's debt, one of the people said. The firm plans to eventually refinance the deal with new debt, the people said.

Management of closely held Smarte Carte will retain a stake in the 50-year-old St. Paul, Minn., company alongside 3i, the people said.

The purchase comes at a time when many investment firms around the world are flush with cash and are scouring the U.S. for infrastructure deals. Despite the Trump ad-

ministration's pledges to boost private investment in roads, airports and utilities, the firms are finding limited opportunities to put their cash to work.

The Smarte Carte deal shows how these firms remain somewhat restricted to the types of infrastructure assets and services in which they have long traded rather than pursuing new privatizations and public-works projects.

Investors committed \$60 billion to private infrastructure funds last year and have added more than \$40 billion this year, according to data provider Preqin. They have been drawn by fairly reliable returns that often outperform private-equity funds that tend to make riskier bets, such as on corporate buyouts, Preqin data show.

Meanwhile, deals are down in both number and dollar volume, according to the data provider. It says higher prices are resulting from more firms



Buyout firm 3i has purchased Smarte Carte International Holdings.

angling in a smaller pool of opportunities.

London-based 3i hasn't yet raised an infrastructure fund. In March, it hired Rob Collins, who once ran Morgan Stanley's infrastructure business, to hunt for investments in

North America using its own balance sheet.

Smarte Carte is well-trod territory for private-equity firms. 3i will be the seventh firm to take over the company since its founder first sold a controlling interest to a New

York buyout shop in 1993.

That firm, Castle Harlan Inc., sold Smarte Carte to a Dallas investment firm three years later for \$113.5 million, a deal in which the seller said it made 25 times its cash investment. It was sold again in 1998 to Blum Capital Partners.

Smarte Carte buckled under nearly \$200 million of buyout debt, though, and filed for bankruptcy protection in 2005. The company's creditors took it over and sold it to Macquarie Bank Ltd. the next year for \$270 million. The Australian bank then flipped the company in 2014 to Fortress Investment Group LLC, which has sold it to 3i.

3i approached Fortress to head off a competitive auction, according to a person familiar with the latest sale. Smarte Carte's luggage trolleys, phone chargers, lockers, massage chairs and strollers are in all but one of the 50 largest U.S. airports.

Mylan Hits Patent Sale To Tribe

By JONATHAN D. ROCKOFF

Generic-drug company Mylan NV has fired back at rival Allergan PLC's attempt to shield its top-selling eye drug from competition by transferring the patents to an Indian tribe.

Allergan last month sold patents for its Restasis dry-eye drug to the St. Regis Mohawk Tribe in upstate New York. Allergan said its aim was to avoid the "double jeopardy" of defending Restasis patents in both federal court and the U.S. Patent and Trademark Office. The tribe's sovereign status would exempt it from cases before the patent office.

Mylan on Friday asked a federal judge in Marshall, Texas, to rule that the patent transfer is a "sham" and prevent the Indian tribe from joining Allergan's patent litigation before the court.

In its brief, Mylan argued Allergan sold the patents to preserve Restasis sales. "There has been no real change in ownership—just a maneuver to derail" the patent office's review, Mylan's brief said.

Also Friday, Allergan filed a brief arguing for adding the tribe to the patent-litigation proceeding in the federal court. Allergan said a "legitimate arm's-length transaction" transferred ownership of the patents to the tribe.

A ruling for Mylan could bolster its efforts to persuade the patent office to reschedule the hearing on the validity of the Restasis patents.

Such a ruling might also affect whether other drug and technology companies follow Allergan's lead in joining with Indian tribes to take advantage of their special legal status as sovereign governments to avoid patent challenges.

Michael Shore, a lawyer for the tribe, said there was "zero chance" Mylan would prevail on its allegation of a sham patent transfer.

Rent the Runway Puts Fashion on a Budget

By KHADEEJA SAFDAR
AND SUZANNE KAPNER

Rent the Runway, a fashion rental service popular in big U.S. cities, is set to launch a new plan to test whether women in Middle America are willing to borrow apparel rather than buy it.

The New York-based company on Monday is introducing a subscription priced at \$89 a month, 36% less than the \$139 monthly subscription plan the company launched last year. The lower-priced plan limits customers to four items a month and excludes some high-end designers.

Jennifer Hyman, chief executive and co-founder of Rent the Runway, said the new plan is aimed at price-sensitive shoppers. "It's unrealistic to assume that at a price point of over \$100 a month that you're ever going to touch people

To Buy or Not to Buy

Here's how many dresses a shopper could rent in a year, at a cost of \$1,068, from Rent the Runway's lower-priced plan versus how many she could buy at selected retailers.



Source: MarketTrack

who are making less than \$100,000 a year," she said.

Under the new model, customers can rent as many as four pieces a month, including dresses, coats or handbags, from labels such as Tory Burch, Vince and Diane von Furstenberg. The items arrive dry-cleaned and in a garment

bag with a prepaid postage label; the customer must return them by the end of a month to obtain four more items.

With the new price tier, Rent the Runway is hoping to compete with fast-fashion and discount retailers such as T.J. Maxx, Zara and H&M, which have bucked many of the prob-

lems dragging down traditional clothing chains by luring shoppers with low prices.

The \$89 plan offers access to over 200 brands; subscribers keep the four items for the month. The regular monthly plan offers higher-end labels such as Proenza Schouler and Oscar de la Renta and unlim-

ited exchanges throughout the month; it is set to go from three items at a time to four, and to increase in cost to \$159 a month for new customers.

The price will remain \$139 a month for existing customers. Under both plans, more items can be rented for an additional charge.

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What Is the Future Of Banking?

By Tim Phillips

In 1978, 300 bankers traveled to Brussels for SIBOS, a banking operations seminar organised by SWIFT, an emerging cooperative of banks which wanted to be able to exchange secure electronic transactions. Thirty-nine years later, banks are still meeting at SWIFT's annual conference, but SIBOS 2017 will host 8,000 executives from more than 200 member countries in Toronto, Oct. 16-19.

The focus on innovation, however, doesn't change. This year the checklist is an intimidating "ABCD": artificial intelligence, blockchain, cyber-security and data. Banking is often called out for its sluggish adoption of this type of technology, but it's not easy to combine interoperability between banks (the reason that SWIFT was created) and adapt services for local economies.

Vinod Madhavan, head of trade for Standard Bank Group, which operates throughout Africa, explains: "We are in 20 markets and we see the full spectrum of infrastructure development. In a market like South Africa, the banking infrastructure is fairly mature, but the situation is very different in countries like Tanzania and Zimbabwe."

There are other challenges: customers expect 24-hour availability, but total security. Regulators hover, while a generation of fintech start-ups and tech giants nibble at bank business models.

At SIBOS, four areas of banking dominate. Traditional banking is changing rapidly. Start-ups like M-Pesa threaten to replace traditional payment functions, while corporates demand closer integration to make international payments faster,

more transparent and easier to trace. Meanwhile, half the world's population still doesn't have access to a bank account.

Compliance is more complex, with money-laundering and terrorist financing becoming more sophisticated. Emerging regtech (regulation technology) enlists AI to track criminal activity.

"INNOVATIVE BANKS WILL PARTNER WITH TECH COMPANIES."

In securities, regulation is changing the structure of banks. But artificial intelligence and blockchain technology may eliminate manual processes and revolutionize settlement.

Finally, collaboration with fintech companies, or tech giants like Google, Apple and Facebook, may be a shotgun wedding for banks, or a historic opportunity.

Mr. Madhavan suggests that innovative banks will increasingly partner with technology companies so they can think and act local. For example, in South Africa Standard Bank worked with a provider of QR codes called SnapScan, later taking a financial stake in the start-up.

"There are enough inefficiencies in the client experience that there is room for innovative fintech providers," he says, "we bring the balance sheet, and the clients know us. Fintech providers have a tolerance for failure that's much lower than ours, so they quickly solve specific problems."

Tim Phillips is a freelance business and tech writer and author.

The Wall Street Journal news organization was not involved in the creation of this content.

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¹ Ericsson, June 2016; Brookings Institute, July 2012; PGIM Real Estate, February 2017.

² Data as of 6/30/17.

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MARKETS

PayPal's Market Value Eclipses AmEx

Mobile-payments company's shares surge as market cap climbs to \$83 billion

BY PETER RUDEGEAIR

PayPal Holdings Inc. vaulted over **American Express Co.** in terms of market value last week, punctuating a rally that has pushed up the payments company's shares by nearly 75% since **EQUITIES** the start of 2017.

The San Jose, Calif.-based

company has enjoyed break-neck growth in both e-commerce and mobile money transfers. Its market capitalization stands at about \$83 billion, nearly double the \$47 billion value it had when it spun off from eBay Inc. a little over two years ago.

PayPal is even gaining ground on Wall Street titans. Its market value is now around \$6 billion less than Morgan Stanley's and around \$10 billion less than that of **Goldman Sachs Group Inc.**

The strong share gains for the company run by former

AmEx executive Dan Schulman have fueled investor debate about its prospects.

On Wednesday, analysts at Morgan Stanley upgraded PayPal's stock, writing that it "is among the few large companies that can deliver high-teens revenue [growth] ... with significant upside opportunities."

But Craig Maurer, an analyst at Autonomous Research, said in an interview that PayPal's shares are trading so richly that shareholders aren't pricing in much room for error if the company doesn't deliver on its projections.

"When I talk to bulls, they're in the nothing-can-go-wrong camp because it's the only way to justify the valuation," Mr. Maurer said.

PayPal, which reports earnings on Thursday, now trades at a multiple of around 32 times forward earnings, according to FactSet. So although its market value is around half that of Mastercard Inc. and around two-fifths that of Visa Inc., its earnings multiple is far dearer. Visa trades at around 27 times forward earnings and Mastercard is around 29 times. AmEx,

Paying Up

PayPal's shares have soared on the back of strong growth in e-commerce and mobile money transfers.

Market capitalization

	\$
Goldman Sachs	92.3 billion
Morgan Stanley	88.7
PayPal	82.6
American Express	82.1

Sources: FactSet (market cap as of Oct. 13); WSJ Market Data Group (share price)

meanwhile, trades just shy of 15 times.

Under Mr. Schulman, PayPal has sought to branch out beyond its best-known offering of a checkout button that enabled shoppers to easily pay for goods and services on retailers' websites.

The company has spent more than \$1 billion on acquisitions of firms that provide services such as cross-border remittances, utility-bill payments and small-business

PayPal share price



THE WALL STREET JOURNAL.

lending.

Additionally, PayPal has cut deals with credit-card networks, banks, smartphone makers and other technology companies to make it easier for customers of those firms to use its namesake digital wallet.

It is also pushing to expand the reach of divisions like Braintree, which enables tech companies such as Uber Technologies Inc. to accept mobile payments, and Venmo, which

lets users send money digitally to one another.

"It's grown into much more of a technology platform play," said Lori Keith, a portfolio manager and research analyst at **Parnassus Investments**, which owns PayPal shares. "They were trying to be the disrupter in the space, but now they are very much focused on partnering."

One of the biggest pending issues on which investors and analysts are looking for clarity

is what PayPal plans to do with its lending operation.

Unlike Visa and Mastercard, PayPal makes and holds on to loans to consumers and small businesses, which exposes it to the risk of default should the economic environment worsen. At the end of the second quarter, PayPal had \$6.1 billion in loan balances on its books largely financed with the company's cash.

"If they have an adverse credit report, people are suddenly reminded of risk on the balance sheet," said Mr. Maurer.

PayPal executives have said they are looking at ways to continue making loans but unload the credit risk to third parties and potentially sell its outstanding loan portfolio.

Additionally, PayPal faces questions about whether the growth in its payment volume is coming at the expense of profitability. PayPal's so-called take rate, which measures the transaction revenue it earns as a share of total payment volume, slipped to 2.58% in the second quarter from 2.69% in the same period a year ago.

Fintech Firm SoFi Drops Plan for Bank

BY PETER RUDEGEAIR

Online lender **Social Finance Inc.** said Friday that it is pulling its application to open a bank, retreating from one of its most ambitious goals just weeks after its chief executive resigned as lawsuits claimed sexual harassment and a toxic workplace culture at the company.

In June, SoFi had asked Utah state regulators and the **Federal Deposit Insurance Corporation** to bless its plan to launch a wholly-owned banking subsidiary that would offer customers deposit accounts and credit cards. Michael Cagney, then chief executive of SoFi, had written in a letter to shareholders over the summer that the company was "optimistic that the FDIC will move expeditiously to approve our application."

Last month, however, Mr. Cagney suddenly resigned from the company, saying his presence was a distraction, especially in the wake of litigation brought by former employees that accused managers of tolerating sexual harassment. Chief Technology Officer June Ou resigned soon after, leaving four vacancies at SoFi's top ranks following the departures of its chief financial officer and chief revenue officer earlier this year.

"If things were to go bad, you're buying the cream of the U.S. crop," he said.

Surging house prices in Toronto and Vancouver and rising consumer debt levels are causing concern about the potential for consumer defaults and rising stress on bank balance sheets and the economy. Some analysts estimate the Canadian housing market is overvalued by as much as 60%, and Canada's ratio of household debt to disposable income hit a new high of 167.8% in the second quarter.

"I prefer not to hold Canadian bank credit," said Geoff Castle, portfolio manager for Vancouver-based PenderFund Capital. "There's a lot of unusual stuff in the Canadian real-estate market."

Mr. Castle sold some U.S.-denominated Disney debt to buy the Disney Maple bonds so he could hold a highly rated U.S. corporate in his local currency. He said the Canadian Disney debt had a slightly higher yield than the U.S. bonds. He also didn't need to hedge his U.S. dollar holdings, removing a cost, he added.

tion, SoFi clears the field for payments company Square Inc. to pursue its own bid for an industrial-loan company. Square submitted an application in September for a charter that would enable it to offer loans and deposit accounts to the small businesses that use its payment-processing services.

Earlier this week, the Independent Community Bankers of America urged regulators in a letter to deny Square's application because it could jeopardize the safety of the financial system and give Square an unfair advantage over small banks. "The integration of these technology and banking firms would not only result in an enormous concentration of financial and technological assets but also would pose conflicts of interest and privacy concerns to our banking system," the ICBA wrote in a letter to the FDIC.

A Square spokeswoman said in a statement that its application "reflects Square's ability to

SoFi has tried to move past its internal issues under interim CEO Tom Hutton.

build a bridge between the financial system and the underserved, addressing the needs of small businesses that few community banks even reach." She added that Square believes "each and every ILC application should be considered on its individual merits, not ICBA's inaccurate view of ILCs."

Meanwhile, SoFi has been trying to move past its internal issues under interim CEO Tom Hutton. This week, the company completed its largest-ever securitization, a sale of \$776.7 million in bonds backed by refinanced student loans. Roughly 30 investors participated in the transaction and demanded lower yields than they did on a similar SoFi deal earlier this year, according to people familiar with the matter. That signals money managers are still willing to do business with the company in the wake of its management turnover.



SoFi's Michael Cagney resigned, saying his presence was a distraction.



Corporations, including McDonald's Corp., have issued almost C\$15 billion in Canadian-dollar-denominated bonds this year.

U.S. Firms Pile Into Canadian Bonds

BY VIPAL MONGA

TORONTO—More U.S. companies are going north to borrow money.

Large corporations, including **Apple Inc.**, **Walt Disney Co.** and **McDonald's Corp.**, have issued almost C\$15 billion in Canadian-dollar-denominated bonds this year, the most ever, to take advantage of lower rates and a rise in demand from Canadian investors.

Offerings of Maple bonds—Canadian-dollar-denominated debt issued by non-Canadian issuers—jumped to C\$14.9 billion (\$11.9 billion) between January and Oct. 13, a record, according to Dealogic. That is almost three times the C\$5 billion borrowed for all of 2016 and higher than the previous record of C\$14.3 billion set in 2007.

A key reason: Rates for Canadian debt have been lower than in the U.S. for most of this year, allowing companies to save money by borrowing here, said Brad Meiers, head of debt capital markets in Canada for **HSBC Securities Inc.** The firm worked on a C\$1.25 billion offering by Disney earlier this month.

The issuance was Disney's first in Canada and its first outside the U.S. since 2008. The media conglomerate increased the size of the bond from

Surging

Canadian-dollar-denominated offerings by foreign issuers have hit a record this year.



eager to invest in global household names because they need to diversify bond portfolios that lean heavily toward financial issuers, Mr. Meiers said.

The diversification push comes as some investors are worried about Canadian banks' exposure to an overheating housing market and are looking for other places to park their cash.

"If things were to go bad, you're buying the cream of the U.S. crop," he said.

Surging house prices in Toronto and Vancouver and rising consumer debt levels are causing concern about the potential for consumer defaults and rising stress on bank balance sheets and the economy. Some analysts estimate the Canadian housing market is overvalued by as much as 60%, and Canada's ratio of household debt to disposable income hit a new high of 167.8% in the second quarter.

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Bev SA and PepsiCo Inc. AT&T also cited favorable market conditions for its May issuance of Canadian bonds, adding that it sought to diversify its fixed-income investor base.

A UPS spokesman said the interest rate was lower than it would have been on the U.S. side of the transaction. The company's C\$750 million bond carried interest of 2.125% in May, compared with a 2.35% rate UPS is paying on a five-year bond it issued a few days earlier, he said.

Also driving the trend are Canadian investors, who are

Dollar Weakens Amid Mixed Consumer Data

BY IRA JOSEBASHVILI

The dollar fell Friday, as mixed consumer price data clouded the case for an interest-rate increase over the next few months.

The Wall Street Journal Dollar Index, which measures

the U.S. currency against a basket of 16 others, was recently down 0.2%, at 86.25.

While gasoline prices soared last month, largely a result of hurricanes hitting the southern U.S., prices for other items rose very modestly. Labor Department data showed Friday. Prices for drugs, cars and clothing fell.

Many investors believe con-

sumer price data will play an important role in determining whether the **Federal Reserve** raises rates for a third time this year. Expectations of higher rates costs tend to boost the dollar, as they make the U.S. currency more attractive to yield-seeking investors.

After a sharp September rally, the dollar has made little headway this month, weighed

down in part by mixed economic data.

Further gains will likely depend on how successful the White House is in pushing through its tax reform agenda, said Christian Lawrence, senior market strategist at Rabobank.

The euro was down 0.1%, at \$1.1824. The dollar was down 0.4%, at ¥111.82.

MARKETS

THE DAILY SHOT | By Lev Borodovsky and Colin Barr

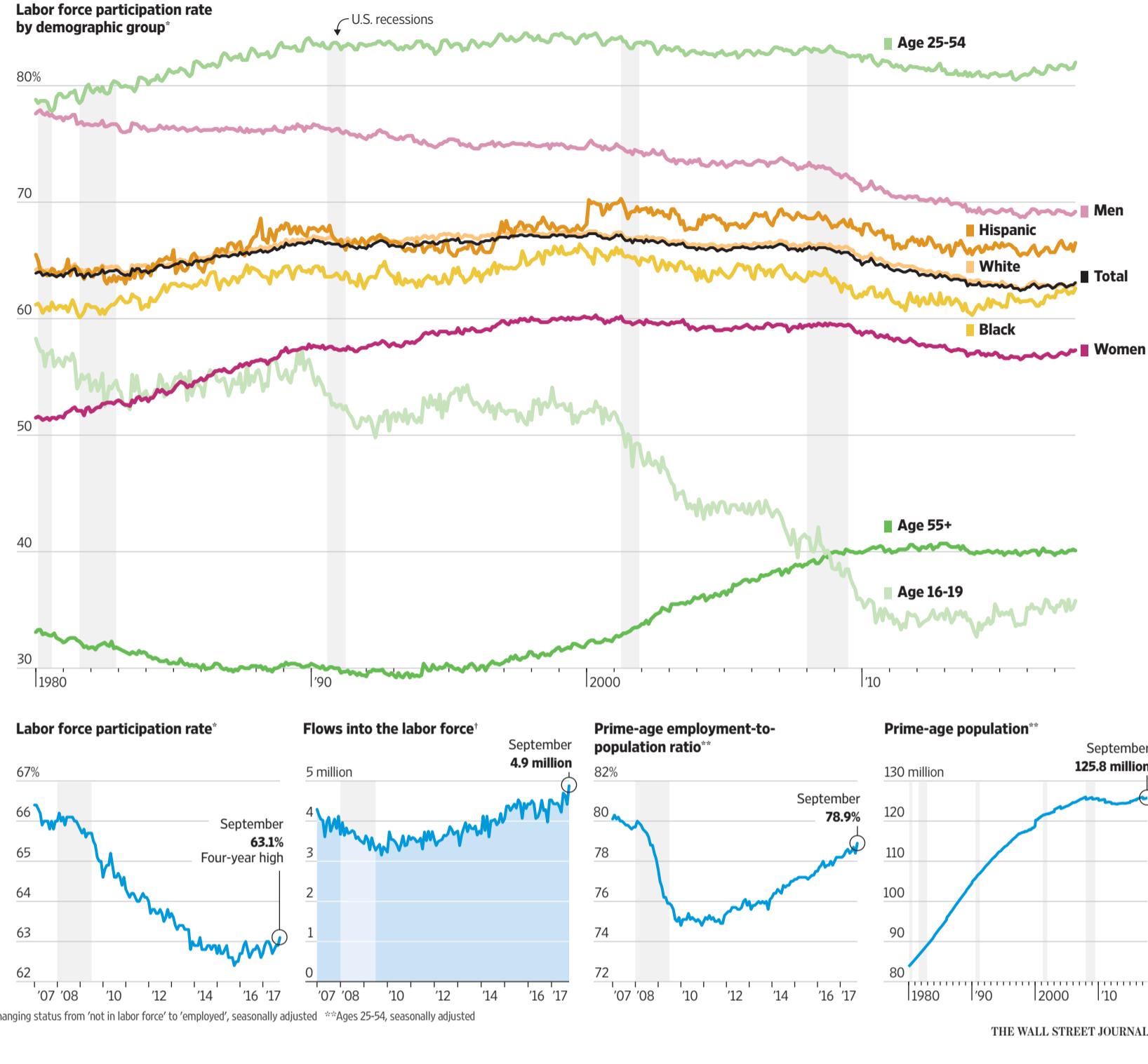
Fixing Up the Labor Market

Taking the temperature of the U.S. labor market has grown more complicated in the aftermath of major storms that hit the Gulf Coast and Florida. Unemployment is low and wages remain mostly tepid. But slack is clearly diminishing, which is why some indicators are drawing analysts' attention.

For instance, flows into the labor force have spiked, driven in part by hurricane-clean-up efforts whose higher pay drew in a group that included retired utility workers and carpenters. At least some of this bump could be temporary, and other dynamics will likely mute some of those gains. Prime-age population has not risen in a decade, and labor force participation trends vary widely in some cases by demographic.

The bigger question is whether the U.S. labor market will recover its resilience. One possible scenario: economic growth sops up the remaining idle workforce, wages finally accelerate, corporate margins get crunched and more firms move abroad in search of labor. Economic growth would stagnate, as it has in Japan—one reason economists view anti-immigration policies so negatively.

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^{*}Seasonally adjusted [†]People age 16 and older changing status from 'not in labor force' to 'employed', seasonally adjusted ^{**}Ages 25-54, seasonally adjusted

Source: Bureau of Labor Statistics

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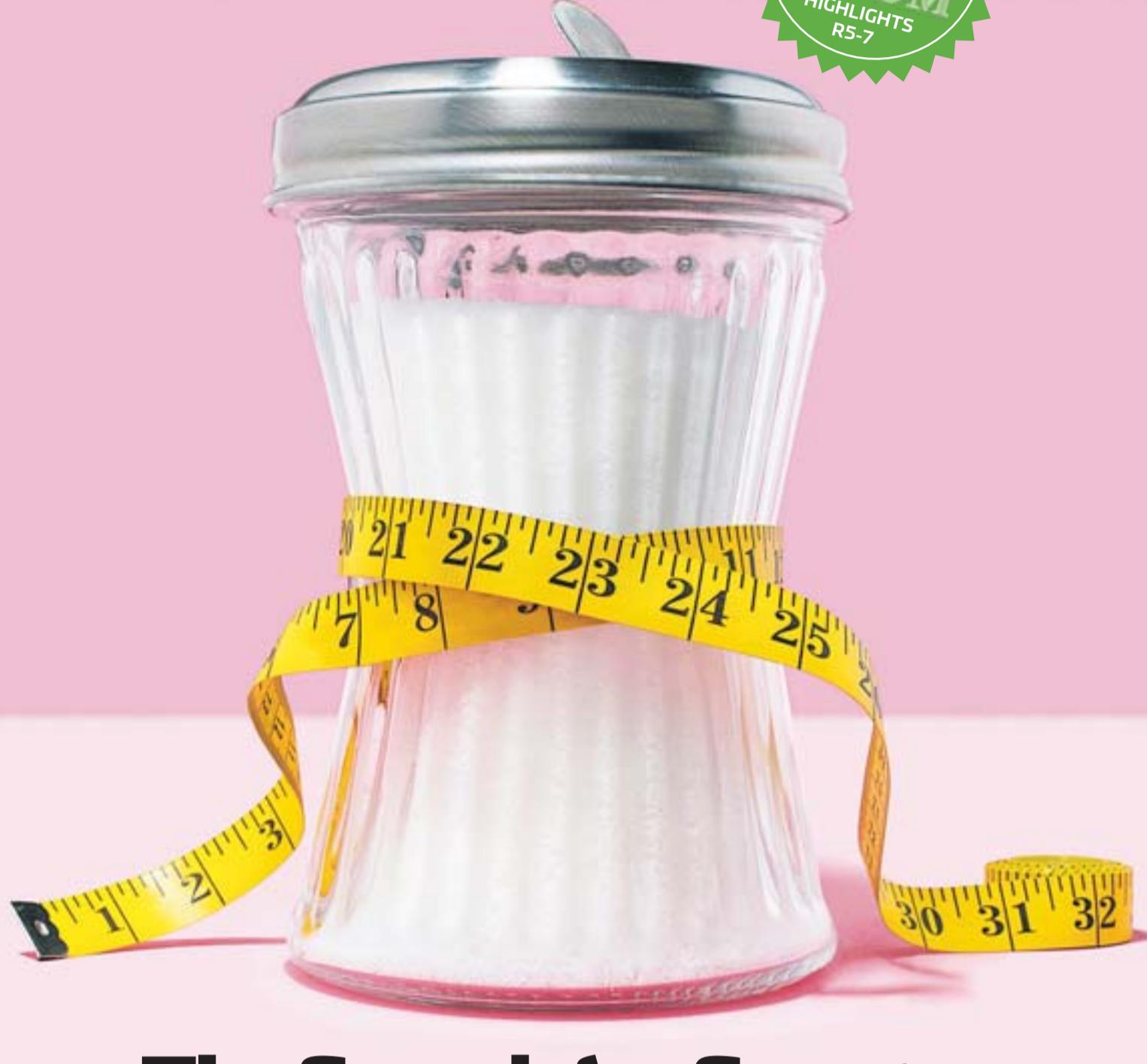
1. Source: BlackRock and Morningstar, as of 4/30/17. Comparison is between the average Prospectus Net Expense Ratio for the iShares Core Series Bond ETFs (0.08%) and the average Prospectus Net Expense Ratio of active open-end mutual funds in comparable Morningstar categories (0.84%) available in the U.S. on 4/30/17. Visit www.iShares.com to view a prospectus, which includes investment objectives, risks, fees, expenses and other information that you should read and consider carefully before investing. Investing involves risk, including possible loss of principal. Fixed income risks include interest-rate and credit risk. Typically, when interest rates rise, there is a corresponding decline in bond values. Credit risk refers to the possibility that the bond issuer will not be able to make principal and interest payments. Buying and selling shares of ETFs will result in brokerage commissions. The iShares funds are distributed by BlackRock Investments, LLC. © 2017 BlackRock, Inc. All rights reserved. iSHARES and BLACKROCK are registered trademarks of BlackRock. 247208

THE FUTURE OF FOOD

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THE WALL STREET JOURNAL.

Monday, October 16, 2017 | R1



The Search for Sweet

As traditional sweeteners come under attack, food companies are in hot pursuit of alternatives. It isn't easy.

BY ANNIE GASPARRO

FOOD MAKERS ARE RACING TO FIND

acceptable alternatives to sugar. But it's hard to replace a taste that so many Americans have grown to love.

Traditional sweeteners—from sucrose, or table sugar, to high-fructose corn syrup—are an increasing concern to consumers and lawmakers, who see them as a key culprit in America's obesity and diabetes epidemic.

Now researchers at food giants, startups and universities are looking for new ways to make foods sweet without putting people's health at risk. Some are testing out natural zero-calorie ingredients like monkfruit and South American root extracts that are so intensely sweet that they can add flavor without calories. Others are manipulating granules of sugar to make them taste sweeter. They're also developing new ingredients that will block bitter taste receptors and make food seem like it has more sugar than it does.

Nestlé SA scientist Olivier Roger, who's leading the food titan's sugar-reduction effort globally, says many companies are working on finding answers. Adding to the urgency: Some companies, like Nestlé, have self-imposed deadlines for lowering sugar content in food.

But there are big challenges to removing what has been a key ingredient in processed food for over a century.

For one thing, there are side effects to removing sugar: It not only adds sweetness but also functions as a preservative and adds texture, as well as contributing to the overall volume of food. Whole recipes have to be rethought when it is removed. And after finding an alternative, companies may face higher costs, supply constraints or regulatory hurdles related to the substitute ingredients.

"It's very difficult, very complex. We still don't have the magic solution that would replace sugar," Mr. Roger says.

The push comes amid a widespread effort to put the brakes on sugar consumption. In a

survey released by market-research firm Nielsen earlier this year, 22% of respondents said they already restrict their sugar intake. Most major food makers, including Mars Inc., General Mills Inc. and Kellogg Co., have pledged to reduce sugar in candy, children's cereals and other products.

Last year, the federal government called out sugar consumption as a problem in the U.S. Dietary Guidelines, recommending for the first time that people consume no more than 10% of their daily calories from added, or refined, sugars. Americans currently average 13% of their calories from added sugar, the report says.

Regulators also said last year that food and beverage makers will be required to disclose on nutrition labels how much sugar has been added to products, as a distinct item within the total sugar content. The FDA recently extended the deadline for the new labels to Jan. 1, 2020 from July 2018.

Cutting the amount of sugar will be a steep task. More than 22,000 products in the U.S. contain high-fructose corn syrup, according to food labels cataloged by Nielsen and Label Insight, a provider of food-label data. Even foods widely seen as healthy contain added sugars. For instance, among yogurt products, 86% contain added sugars of some kind, as do 79% of shelf-stable juices and drinks.

Years ago, when consumers were trying to cut calories in general, artificial sweeteners such as aspartame (Equal) and later sucralose (Splenda) gained popularity, and scientists thought they had cracked the code. Now those products have come under scrutiny by consumer advocates over health concerns.

While there is still a debate among the scientific community, the Center for Science in the Public Interest, CSPI, warns that artificial sweeteners may pose a slight risk of cancer. More than half of Americans surveyed by Nielsen said they avoid those artificial sweeteners.

One avenue researchers are exploring is altering sugar itself. Nestlé, which adds sugar to chocolate bars, ice cream and less-obvious products like frozen dinners, says it has discovered a way to make sugar particles dissolve faster when people eat them. That allows people to taste the sugar immediately so that the product seems sweeter, allowing the company to reduce sugar content by up to 40%.

Hershey, meanwhile, says it has patented technologies that boost sweetness by altering the surface area and shape of sugar particles in chocolate. It wouldn't provide details of how shape impacts taste, but some scientists say that when there's more surface area to touch the tongue's taste receptors, a food can seem as sweet with less sugar.

Please turn to the next page

Souring on Sugar

As more U.S. consumers snub sugar and artificial sweeteners, natural alternatives gain ground

22%

Americans who restrict their sugar intake

52%

Americans who avoid artificial sweeteners like aspartane

22,000

Food products containing high-fructose corn syrup

206

Variations on how high-fructose corn syrup can be listed on labels

19%

Increase in 2016 sales of products with natural/low-glycemic sweeteners

Source: Label Insight, Nielsen
THE WALL STREET JOURNAL.

INSIDE

The Future of Protein

The hunt for meat alternatives is heating up

R2

Food Companies Revamp for a Digital World

Enticing online shoppers to make impulse purchases is just one challenge they are working to solve

R4

When Restaurant Apps Don't Work as Planned

Starbucks and others adjust as mobile orders create new hassles

R4



The Grocery Store of the Future

In Kroger labs, scientists hunt for patterns in data

R8

GLOBAL FOOD FORUM

Where the FDA Is Going Under Trump

Scott Gottlieb says it is about making the agency more efficient

R5

Trade in the Balance

Archer Daniels Midland's CEO says the U.S. food sector is incredibly productive. For now

R6



The Seafood Shortfall

Tj Tate and Amy Novogratz on the promises and problems associated with sustainable seafood

R6

How Data Science Will Transform Farming

Hugh Grant of Monsanto and James C. Collins Jr. of DowDuPont on new gene-editing technologies

R7

The Agricultural Agenda

Sonny Perdue talks about the TPP, Nafta and climate change

R7

Thank You and Congratulations President Trump!



Congratulations to the Trump administration and Agriculture Secretary Sonny Perdue (pictured left, at last week's second annual Global Food Forum) for increasing America's food exports by 9 percent in the past 12 months — including beef by 25% and dairy by 16% — after recent years of decline.

We salute the Trump Administration's constancy of focus on exports, deregulation and other key drivers of success for farmers and food processors of America.



Anthony Pratt
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JOURNAL REPORT | THE FUTURE OF FOOD

Food Companies Revamp for a Digital World

Big brands learn new tricks to spur impulse buys, aid search results, drive reorders

BY ANNIE GASPARRO AND HEATHER HADDON

AS CONSUMERS increasingly shop for groceries online, giant food brands are scrambling to keep up.

Consider just one small fact: Consumers who buy groceries online usually stick to a list of must-have items. That has left some big food companies scrambling to find new ways to persuade them to add that last-minute chocolate bar or bottle of water.

Hershey Co., for instance, is working on a technology to make it easier for online shoppers who pick up their orders at stores to throw in a piece of candy or a pack of gum at the last minute. As customers arrive at the store and an employee prepares to bring their groceries out to their car, an offer would pop up on a smartphone app, suggesting they add something extra to their orders. The idea is to mimic the experience in the checkout lane, where 56% percent of shoppers always or often purchase a snack, the company says.

Figuring out how to drive impulse purchases is just one of the challenges that multibillion-dollar food brands face as they gear up to win customers online. They also have more competition from startups on the internet, where it is possible to build a consumer following without a massive marketing budget and where newer brands perceived as less processed and more healthful tend to be popular.

As food makers and retailers test new technologies and develop e-commerce strategies to compete in this changing landscape, the overall grocery-shopping experience for customers is likely to shift dramatically, food executives and analysts say.

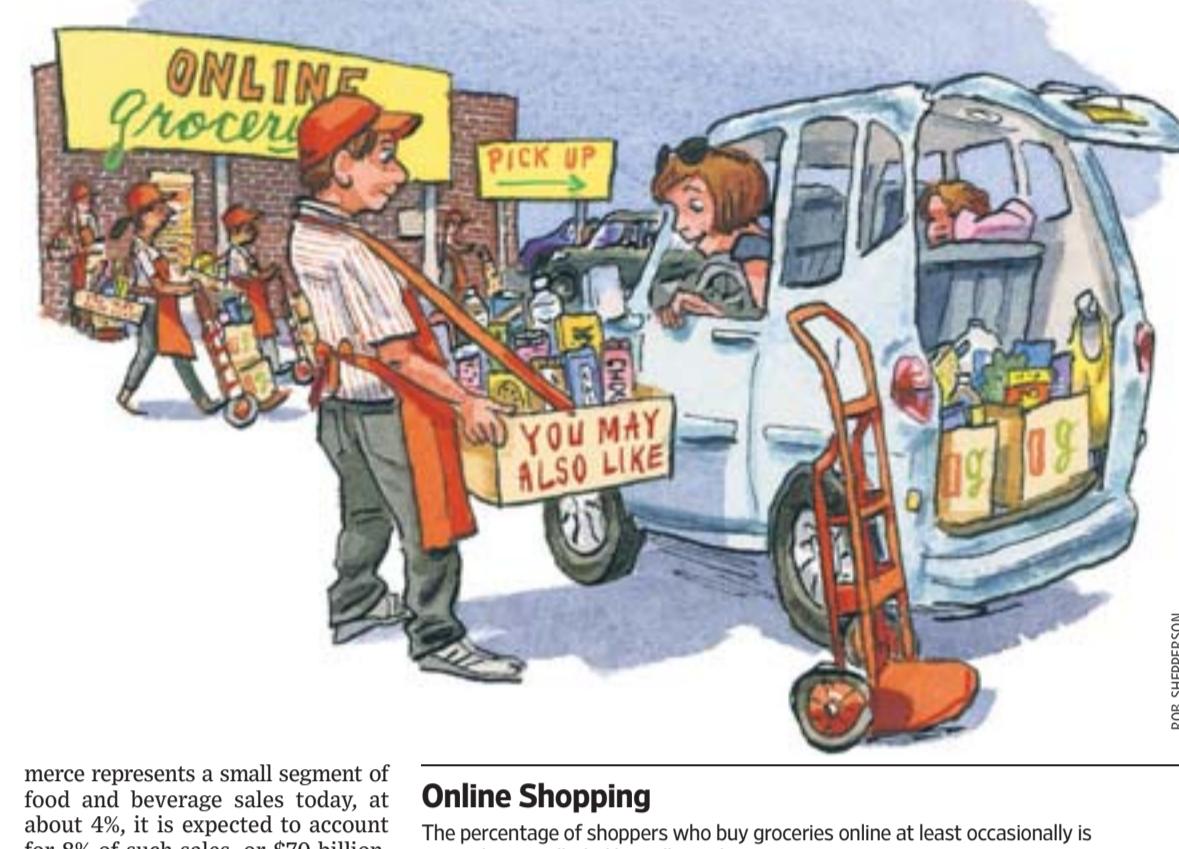
"Food is changing like it's never changed before," Kroger Co. Chief Executive Rodney McMullen told investors earlier this month. "It will be anytime, anything, anywhere that they want it."

Critical segment

Amazon.com Inc.'s recent acquisition of Whole Foods Market Inc. and its big push into the grocery industry is generating a new sense of urgency among food makers and traditional supermarkets to keep up with the e-commerce giant.

Campbell Soup Co., **Conagra Brands** Inc., Kraft Heinz Co. and others, have said they are investing more to build sales online, hiring e-commerce experts and making adjustments to their supply chain and distribution systems to serve e-commerce needs.

The stakes are high. While e-com-



ROB SHEPPERSON

merce represents a small segment of food and beverage sales today, at about 4%, it is expected to account for 8% of such sales, or \$70 billion, by 2021, according to Inmar Willard Bishop Analytics, a Chicago-area consulting firm.

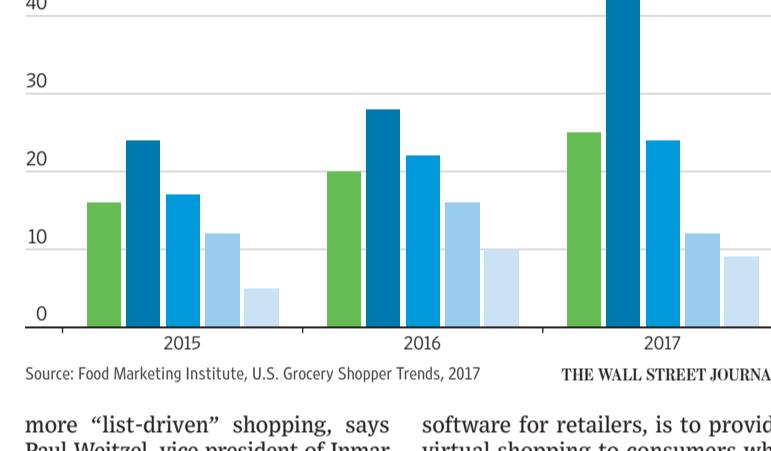
One big challenge for behemoth brands such as Campbell's chicken-noodle soup and **Mondelez International** Inc.'s Oreo cookies is that they don't always have the kind of leverage online that they are used to having in brick-and-mortar stores. For decades, such brands controlled grocery-store aisles, commanding prime shelf space and funding expensive advertising displays. Online, however, the playing field is more level, as the internet has provided a quick, cheap and easy sales platform for newer, trendier food companies to reach consumers.

David Ciancio, senior customer strategist for consumer-data firm Dunnhumby, says that foods viewed as healthful and consumed as part of a routine—such as breakfast bars made with ingredients perceived as simple or nutritious—do better online because they are habitual and therefore ripe for automatic reordering. Processed foods and items bought on impulse, such as candy, typically suffer in the transition to online, he says.

Many websites have no way of presenting impulse-related food items as pop-ups when shoppers check out, and buying online doesn't offer immediate gratification. As such, online shopping lends itself to

Online Shopping

The percentage of shoppers who buy groceries online at least occasionally is expanding rapidly, led by millennials:



Source: Food Marketing Institute, U.S. Grocery Shopper Trends, 2017

THE WALL STREET JOURNAL.

more "list-driven" shopping, says Paul Weitzel, vice president of Inmar Willard Bishop.

Hershey CEO Michele Buck, who took the helm in March, said on an earnings call in July that the company plans to continue working with retailers to find ways to drive impulse purchases online. "I can't tell you I have the answer to that right now," she said, but "we are doubling-down" on e-commerce.

Some companies are looking toward new technologies to help them drive more online sales in general. One idea, from **InContext Solutions**, which has developed virtual-reality

software for retailers, is to provide virtual shopping to consumers who own VR headsets. By one day enabling people to virtually unwrap candy bars and look inside boxes of cereal while they shop, the technology could make food look more appealing than on a 2-D computer screen, InContext says.

Elsewhere, **Instacart**, an online grocery-delivery service that partners with many major retailers, is working with hundreds of brands, ranging from large companies such as **Unilever** and PepsiCo Inc. to smaller niche sellers, to put samples of items in customers' deliveries.

Mondelez, which hired a vice president of global e-commerce about a year ago, says snacks are relatively underdeveloped in e-commerce today, generating just 2% of overall online grocery sales in the U.S. and 15% in China.

The company is trying a variety of strategies to drive sales online, including subscription options on Amazon, where shoppers get a lower price on products such as belVita breakfast cookies in exchange for signing up for automatic reorders.

Mondelez says it is aiming to generate at least \$1 billion in e-commerce revenue by 2020, up from about a third of that now.

Campbell Soup recently created an e-commerce business unit for North America and named Shakeel Farooque, a veteran of Amazon and eBay, to lead it. The company says it is working with retailers to capture more sales online and investing in a network of distribution centers in states such as Texas and Ohio to better serve e-commerce customers. It aims to generate \$300 million in online sales over the next five years.

An advantage

One benefit big food companies have online is that store brands, called private label, aren't as popular as they are in stores. General Mills says that in the U.K., where online shopping is more prevalent, its market share is almost 30% higher for e-commerce than in physical stores.

Company executives say getting products such as Cheerios cereal and Progresso soup into the customer's first online order is a priority for them because people often reorder past purchases out of convenience.

General Mills say best-selling products tend to come up early in search results, though many retailers offer paid search advertising that can drive placement.

In addition to paying for placement, some food manufacturers are striking partnerships with other brands to give shoppers discounts if they purchase two products together. Companies are using customer analytics to figure out if a frozen-dinner buyer might also buy snack cakes, for example, says Bill Bishop, co-founder of consulting firm Brick Meets Click.

"There is a tremendous focus on paying to move up [in search results]. The question is, is it worthwhile," said Mr. Bishop. "You have to get to the granular data."

Ms. Gasparro and **Ms. Haddon** are reporters for The Wall Street Journal in Chicago. Email them at annie.gasparro@wsj.com and heather.haddon@wsj.com.

When Restaurant Mobile Apps Don't Work as Planned

Starbucks and others found online ordering initially increased congestion and frustrated customers

BY JULIE JARGON

RESTAURANT-CHAIN APPS are reshaping a business built on human interaction. But these new systems don't always work as planned.

Soon after **McAlister's Deli**, a chain of sandwich shops, introduced mobile ordering a few months ago, it found it had a problem: The counter where customers place their orders in the shops was often clogged with patrons who had ordered meals ahead of time through the McAlister app.

"People who place mobile orders think they have to wait in line," says Paul Macaluso, president of McAlister's, which is owned by **Focus Brands** Inc. "They feel bad about cutting the line."

They also felt frustrated. To fix the problem, McAlister's built cubbies with sliding doors that open to the kitchen, so that employees can pass takeout orders onto shelves where customers can pick them up without standing in line with people ordering food. New signs in the store direct customers who placed online orders to the pickup area, and employees were given extra training that includes guiding to-go customers to the right area.

To further improve customer flow, soon an updated app will allow patrons to choose to pick up their food curbside or in the restaurant, Mr. Macaluso says.

Starbucks Corp. noticed a



Starbucks changed the way it handles mobile orders after drink pick-up areas became clogged.

similar problem about nine months ago at its 1,000 cafes with the highest volume of mobile orders. Congestion was getting worse in the area where drinks are handed off, as customers who ordered online showed up to pick up their orders. Many customers who came into the cafes to buy something saw the long lines and turned away, contributing to an overall decline in transactions.

In an effort to reduce the crowding, Starbucks has changed the way its baristas handle orders. Previously, orders would show up on a display screen that made no distinction between those made online and those made at the registers in the cafes. Now, baristas can see which orders were made online, and they can notify customers on the app when those orders are ready, so that those patrons don't need to mill around the cafe waiting for their drinks.

In addition, the new system allows Starbucks to track how long it takes to fill mobile orders, and adjust staffing accordingly.

For example, almost all

Starbucks cafes have two espresso machines, but often only one was in use at a time. Now, during peak traffic periods at certain cafes, a barista uses one machine to make drinks for mobile customers while another uses the second to make drinks for in-store guests.

Starbucks says it has shaved one minute off wait times for all customers at some of its cafes, though it won't say how long wait times are. It also scores at those stores have improved significantly. "We got faster at making food and beverages for all customers," Mr. Brotman says.

The company also "rethought the entire production methodology," says Adam Brotman, the company's executive vice president of global retail operations and partner digital engagement.

For example, almost all

years, like **Domino's Pizza** Inc., are facing new challenges as technology evolves. The pizza chain is one of the few restaurant companies to allow voice ordering through Amazon's Alexa and Google's Home devices.

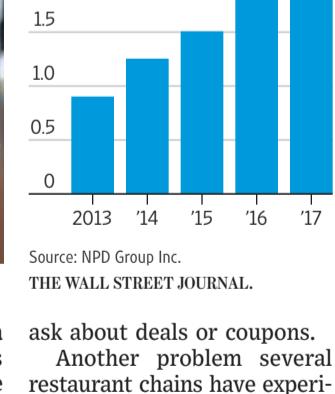
The challenge is that voice technology doesn't always work well with coupons, and more than three-quarters of orders in the pizza industry involve coupons. "If it's a local coupon that's only available in one or two stores, the voice assistant has a hard time figuring out which coupon you're talking about," says Dennis Maloney, Domino's chief digital officer. "Some people give up and move to another platform like desktop or mobile," he says.

Domino's is working to find a solution, Mr. Maloney says, but until it does it is offering 20% off on platforms including Alexa and Home if customers

On-the-Go Ordering

The number of food orders placed via mobile app, text message or the internet for pickup or delivery has more than doubled over the past five years.

Digital food orders placed annually, in billions



Source: NPD Group Inc.

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ask about deals or coupons.

Another problem several restaurant chains have experienced is that customers often end up at the wrong location to pick up their order, because they tend to place orders while in transit, and the software selects the location closest to them to fill the order, rather than the destination they intended.

"Inaccurate location is our top user error right now," says Kira McCabe, associate director of digital media and marketing at **Tropical Smoothie Cafe**, which is adding a "confirming location" button to the ordering process in its next app update.

"We have a highly mobile audience and they're distracted," Ms. McCabe says.

Ms. Jargon is a Wall Street Journal reporter in Los Angeles. She can be reached at julie.jargon@wsj.com.

JOURNAL REPORT | THE GLOBAL FOOD FORUM

Where the FDA Is Going Under Trump

Commissioner Scott Gottlieb says it isn't about more or fewer regulations. It's about efficiency.

Food and Drug Administration Commissioner Scott Gottlieb serves a president who regularly speaks of rolling back business regulation. Dr. Gottlieb has postponed Obama-era food-labeling rules, pleasing some food manufacturers. But at the same time, he says, the FDA is working to implement another law passed under the former administration: the Food Safety Modernization Act, which will require companies to develop plans to prevent foodborne illness. Dr. Gottlieb talked about his job with Wall Street Journal reporter Jacob Bunge. Edited excerpts follow.

MR. BUNGE: You are part of an administration looking for ways to roll back regulation. Does this mean that food becomes less safe?"

DR. GOTTLIEB: I certainly don't look at it that way. It is true we are undertaking an effort to look across a lot of regulations where we can make regulations more efficient. Where things might be outdated we're going to need to pull certain regulations or update them. But there is a lot of opportunity to look across our regulatory portfolio to try to find efficiencies in what we do. There are some things we do that maybe don't make a lot of sense, relative to the modern world. We have a regulation that establishes a standard of identity for cherry pie. I'm not sure FDA in a modern, risk-based environment needs to be regulating the contents of cherry pie.

But remember, we introduce innovation and efficiency by issuing regulations. So part of what FDA does is issue regulations to try to create a more modern framework for new technologies, new ways of doing business. It isn't a question of regulations or no regulations. I think it is a question for us of smart regulations.

MR. BUNGE: With the example of the cherry pie, the Obama administration tried in certain ways to drive more transparency in food with regulations around labeling. What happens to that under your watch?

DR. GOTTLIEB: We're committed to the food labeling regulations, if that is what you're talking about. Menu labeling and nutrition facts.

This isn't just an issue of transparency. This is an issue of public health. There is evidence that there is public-health value in providing this information to consumers in a restaurant, or providing information in a better way on the nutrition-facts label.

This was a comprehensive rethinking of the nutrition-facts label. We have implemented some delays in the implementation of those regulations. But those delays were required to make certain adjustments to make sure that they're sustainable for the long run.

You talk about them as transparency initiatives. I look at them as public-health initiatives. I see evidence of public-health benefit in providing this information to consumers. We're going to go forward and provide it to them.

MR. BUNGE: What is your operating definition of "healthy," and why is it important for FDA to regulate this?

DR. GOTTLIEB: There's a broader question. "Healthy" is obviously a term that is becoming used in certain labeling. It is a subject of litigation in California.

There's a broader principle of what role FDA plays more generally in the regulation of labeling. When certain claims that might be important to providing information to consumers get made in the absence of a scientific framework and get litigated in state courts and torts, outside our review, I think that isn't what was intended. I think we have a role to play.

I want to see the agency step in to adjudicate some of the important claims that product developers want to make on labeling that could be

important in informing consumers. So we intend to do that. We're taking a more wholesale look right now inside the agency at the full range of claims that product developers want to make on labeling or are making on labeling where FDA hasn't played a role, and making a decision from a public-health standpoint where it is important for us to step in.

"Healthy" might be one of those claims. We might make a decision that that claim is more of a commercial claim and doesn't really convey something important from a public-health standpoint to a consumer. I don't know where we're going to come out on that. But we're going to prioritize from a public-health standpoint which claims we think we should be providing more adjudication of.

If a manufacturer can't make a claim around some attribute of the health of a food product, then they're going to innovate in areas where they can make claims. And invariably it is around portion size and taste and convenience.

1 in 6
People sickened by food annually in U.S., according to the CDC

And those are all important attributes. They provide value to consumers.

But I'd like to see more manufacturers trying to innovate around things that actually deliver health attributes to people, because I'm the FDA commissioner, and I think in order to allow innovation around things that produce public-health benefits, we need to allow people to make claims around those public-health attributes.

MR. BUNGE: What happens to the Food Safety Modernization Act now?

DR. GOTTLIEB: Implementation is moving forward. We've recently made again certain accommodations to push out certain deadlines related to FSMA to make sure we get it right. These are very important laws. FSMA is an exceedingly important change in the whole posture of the FDA toward food safety, to an environment of preventive controls, as you know.

We need to make sure we get it right. And there are certain aspects of that implementation that certain sectors weren't really ready to accommodate. The produce industry had certain concerns around us going onto the farms and whether or not they were ready for the inspections. And so we talked about pushing out another year the actual inspectional regime and doing more readiness inspections for the next year.

There were concerns around how we were going to assess agricultural water on the farms. So we've extended a deadline on the imposition of a requirement on how we're going to do that. We're going to go back and take a look at that and make sure we have the right tools for doing that, the right standards for doing that so they can actually be implemented by producers.

There are aspects of FSMA we're continuing to look at very closely to make sure we get it right. I've been at the agency before. I worked with three different commissioners. And I will tell you, when you get it wrong the first time, it is very hard to unwind that.

MR. BUNGE: How do you think about providing an atmosphere of predictability for the companies that have to plan and invest for years in the future in this industry?

DR. GOTTLIEB: Well, you come to forums like this and you talk about what you intend to do. I think we've been pretty transparent. I've been pretty communicative with the press. I was very clear from the outset that with respect to FSMA,

nutrition-facts labels, menu labeling, and there are others, that we're fully committed to implementing these; and when we talked about what aspects of it we were going to try to push out a little bit to give industry more time to come into compliance, to give us more time to come up with ways to implement these things so we're being efficient and not overly burdensome.

The administration's fully committed to the ethos of food safety. And FSMA was an important, broadly bipartisan,



"We introduce innovation and efficiency by issuing regulations."

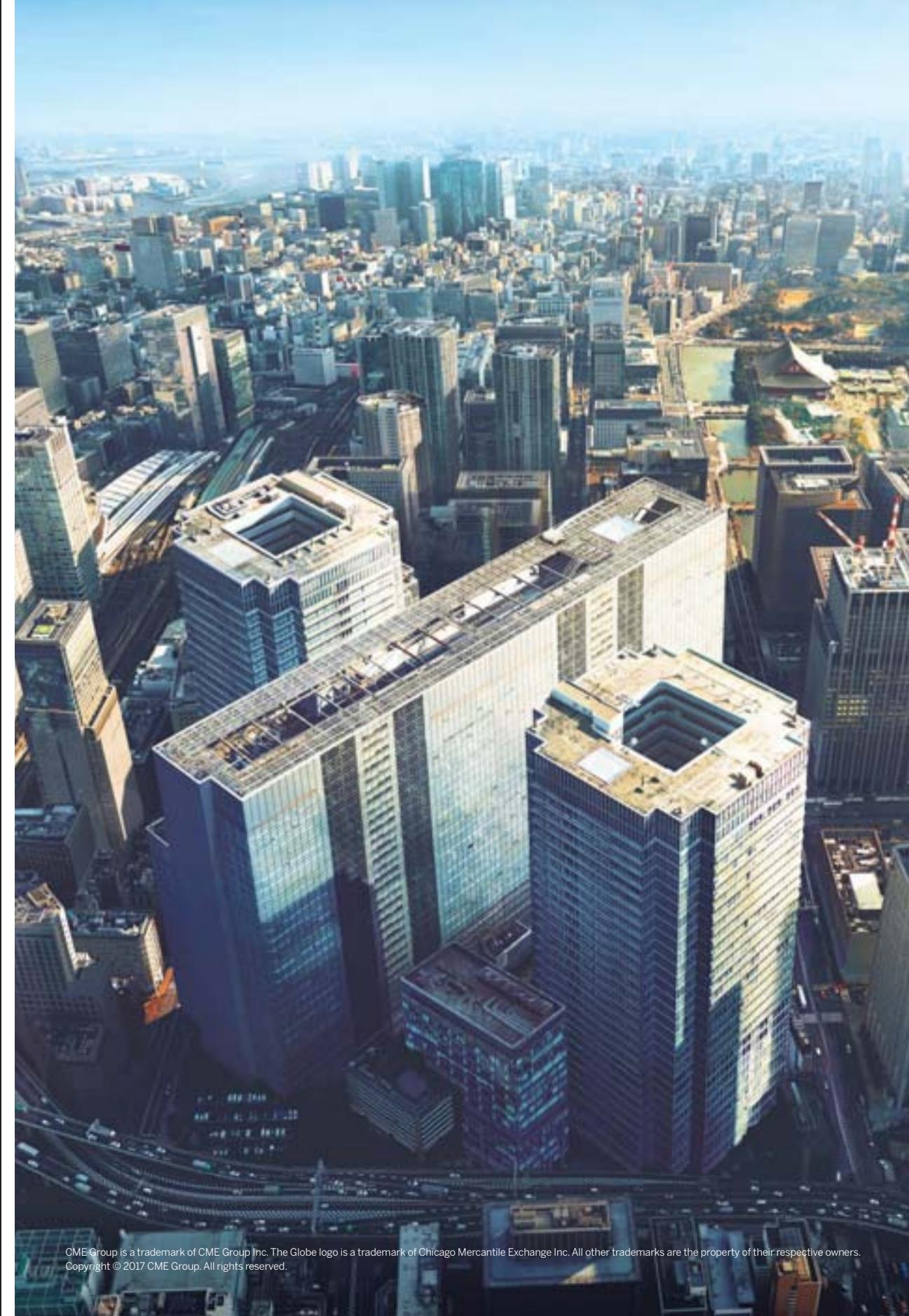
wholesale change in how we approach food safety. But I think from the standpoint of the policy and the politics of this, because you keep going

back to the politics of this, what we want to do is make sure we do this efficiently. That's the key from my standpoint, that we're not imposing undue costs on industry, that we're doing this in an efficient way and providing very clear rules that people could actually implement.

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JOURNAL REPORT | THE GLOBAL FOOD FORUM

Trade in the Balance

Juan Luciano of Archer Daniels Midland says the U.S. food sector is incredibly productive. For now.

Feeding the world while dealing with the complexities of global trade has never been so difficult. And no industry has a bigger stake in succeeding abroad than the U.S. food sector. Matt Murray, deputy editor in chief of The Wall Street Journal, sat down with Juan R. Luciano, chairman, president and CEO of Archer Daniels Midland Co., to discuss the challenges through the prism of ADM. Edited excerpts follow.

MR. MURRAY: What's your sense of today's trade atmosphere?

MR. LUCIANO: I continue to be optimistic. But, of course, a company that has been around for 150 years, we are pretty paranoid. This was the first year that I've been to China and Mexico twice before February. We spent a lot of time making sure that we clarified the message, if you will.

MR. MURRAY: Meaning, whatever happens, we're a global company, global trade ties are still central to the industry?

MR. LUCIANO: I think the message is that trade flows in the food industry, or free trade in the food industry, is essential.

MR. MURRAY: Even though the U.S. is coming off record harvests, as a percentage globally, isn't it bound to decline in coming decades? Brazil is rapidly increasing, including in areas like corn. China is picking up. The U.S. role in the total food trade globally has got to change, right?

MR. LUCIANO: Yes. Obviously, we're going to feed the world with more yield. So, it isn't that much about shifting of land right now. The critical point will be how do you turn God-given advantages into competitive advantages.

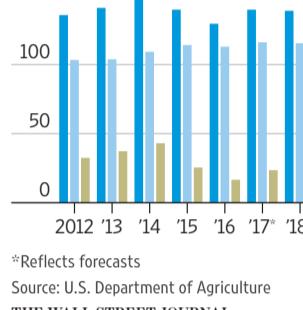
Today the U.S. sends about 55% or 60% of production

through the river in barges— incredibly efficient—versus maybe 15% in trucks. The Brazilian situation is the reverse. But Brazil has committed \$14 billion in infrastructure. China has committed \$1.4 trillion in the new silk road.

Think about the productivity of this. Today, a towboat with barges of soybeans can push the equivalent of nine football fields down the Mississippi River. You can push one metric ton of grain 652 miles with a gallon of fuel. It is incredibly efficient.

Trade Outlook

The U.S. agricultural trade surplus is forecast to decline by \$100 million in fiscal 2018 from fiscal 2017.



*Reflects forecasts

Source: U.S. Department of Agriculture

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But those 240 locks and dams in the Mississippi River, they date from 1930, some from 1903. So far, we have an advantage. But we need to pay attention to it.

MR. MURRAY: Are there things in trade conversations that get you concerned?

MR. LUCIANO: I worry about whether we're going to define trade as being good or bad depending on whether we have a net positive balance with a certain country.

In food, it changes, but the basic trade flows have been

stable for the past 50 years. And I think the less governments touch on those things, the better. The more we send price signals that are incorrect, the more mistakes the farmer will make in terms of planting what we need.

MR. MURRAY: In terms of Nafta, are there food issues that need adjustment?

MR. LUCIANO: When I talk to the Mexican officials, they realize Nafta was put together, like, 23 years ago. And there were things that weren't on our radar screen 23 years ago, whether it's sustainability or e-commerce or things like that. The consumer has shifted significantly.

I think everybody acknowledges that we probably need to open up, look at all those things, and put it back together again. I don't expect a massive revolution. The U.S. has been incredibly blessed with two very peaceful partners. I think we need to leverage that and continue with that advantage.

MR. MURRAY: ADM is in 160 countries. It is a volatile time in the world. What does it mean for your company?

MR. LUCIANO: There are difficult challenges; feeding a growing population. By 2050 we will have to feed 10 billion people. It looks like we're going to have time. I worry more about the next 10 years.

I'm very optimistic about this convergence of technologies from computing science, from biological science and physics science. I'm an engineer so I love technology. The potential is, for the first time, we're going to get the ability to learn faster. I don't think that happened in the previous industrial revolutions.

MR. MURRAY: And when you think about the next 10 years,



GABE PALACIO/DOW JONES (3)

This was the first year that I've been to China and Mexico twice before February.

let alone 2050, what do we need to learn faster?

MR. LUCIANO: Think about corn yields, for example. The next feeding of the world won't come from more land. It will come from intensity, from yields. So, I bet a lot on technologies. Farming has become so full of data now. Sensors are almost free, so you can have a sensor in every bushel, a sensor in every acre. You can predict much better. Agriculture has become high tech.

MR. MURRAY: Is there anything, just as an engineer, that really excites you about the future of the industry?

MR. LUCIANO: We have bought a company, Biopolis, which is a microbiology company. It is a genome company. We're looking much more at personalized nutrition, the impact or the interactions between the microbiome in your gut with either your food or your pharmaceuticals.

People are taking a more proactive approach to health. If you have heart disease and diabetes, you can influence those with food, with functional food, personalized nutrition. So, we are putting a lot of research into can we get ingredients, microbiology ingredients, that we can use to

tailor food for you? That will be the next revolution.

MR. MURRAY: What are the black swans you worry about? Climate change? Superbugs?

MR. LUCIANO: On this task of feeding the world, I worry about two things. One is, right now we have an abundance of crops. Inventories are very high in the world. It could lead us to this sense of complacency, that everything is going to be all right. We can't. We need to produce more food in the next 40 years than we produced in the last 10,000. It hasn't been done. And it needs a lot of things.

The Large Seafood Gap

Tj Tate and Amy Novogratz say innovation is the key to increasing production

Seafood has a big role to play in feeding a rapidly growing global population. But there aren't enough wild fish in the sea to do the job. So fish farming, or aquaculture, with its promise of sustainable seafood, will have to fill the gap. The question is: Can it?

The Wall Street Journal's Matt Murray sat down with Tj Tate, director of the sustainable-seafood program at the National Aquarium, and Amy Novogratz, co-founder and managing partner of Aquasparke, an aquaculture investment fund, to discuss the promise and problems of sustainable seafood. Edited excerpts follow.

Tough goal

MR. MURRAY: Tj, what's unsustainable about our seafood ecosystem today?

MS. TATE: The most unsustainable thing has to be the lack of knowledge, the ignorance in how far we've come in technology, in the need for growth, in innovation, and that it has to be the solution for feeding our future populations.

MR. MURRAY: Ignorance of the consumer, you mean?

MS. TATE: Exactly.

MS. NOVOGRATZ: It's hard to get clear information about seafood, where it comes from, how it's produced.

But when you're talking about unsustainable seafood, it's also the fact that we just don't have enough. We're taking as much as we can from the oceans and we're currently producing a whole lot of aquaculture, but we're predicted to need to actually triple the amount of aquaculture we're producing by the end of the century.

MR. MURRAY: Simply to feed the growing population?

MS. NOVOGRATZ: Yeah.

MR. MURRAY: So what needs to happen?

MS. NOVOGRATZ: We need to improve our practices. We need to bring in some of the better technologies for aquaculture. We need to lower the [environmental] footprint of aquaculture as we grow it.

MR. MURRAY: Better practices like what? What are the big hurdles?

MS. NOVOGRATZ: If we really are going to triple our aquaculture production, it's predicted that we'll need 300 million more metric tons of feed to be able to do that. So feed is a huge issue.

Current feed for fish is in large part made up of wild-codfish meal and fish oil. It's



'We need to improve our practices,' says Amy Novogratz.



'I think you have to have government' involved, says Tj Tate.

not necessarily environmentally friendly. But even if that's not your thing, we don't have enough of it to get there.

MR. MURRAY: Is it a problem to get it? Or is it just simply a technical hurdle that you have to overcome?

MS. NOVOGRATZ: It's just that we're taking fish from one part of the ocean ecosystem and kind of emptying it. It just isn't sustainable. It's also expensive.

So we're looking at replacements for fish meal. For example, we're working with a company that's created a microbial alternative to fish meal that's almost an identical amino-acid profile.

MS. TATE: But also when you're talking about the innovation side and it comes to feed, back in the day in aquaculture, we used to just feed and feed and feed. Feed is 60% to 70% of the operational cost of a farm.

So they had to get smarter with their feed usage, which means that there are cameras in the water. When [fish farmers] see the fish swimming around and the fish swim by the food, they stop feeding. For shrimp, for example, if they don't hear the crunching of the food, they stop feeding.

The technology has helped us get to the level of not wasting, but actually utilizing what we have—and using those by-

products of fish that are caught from the wild harvest and then putting that back into the feed so that for wild-harvest fish, every single part of that fish should be utilized.

More challenges

MR. MURRAY: What are the other challenges for the kind of aquaculture world you envision?

MS. NOVOGRATZ: We need better ways to battle disease. We're working with a Polish company now that uses phages that can potentially replace antibiotics in fish farming.

There is now more and more technology around land-based systems that do things well with no pollution whatsoever.

And we're finally getting to a place where those kind of deep, submersive, open aquaculture technologies that you can use out in the open ocean are actually getting to the point where they're commercially viable and cost effective.

So technology is absolutely changing aquaculture and changing it quickly.

MR. MURRAY: Fish farming historically has been an environmental challenge, right?

MS. TATE: Actually the environmental challenges are one of the things that are being

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JOURNAL REPORT | THE FUTURE OF FOOD

Grocers Imagine the Store of the Future

Straight from Kroger labs:
customized ads, smart shelves,
sensors that deploy cashiers

BY HEATHER HADDON

FOOD RETAILERS are racing to leverage one of the most important weapons in their battle to keep people coming to grocery stores: data.

"Data is the new battlefield," says Stuart Aitken, chief executive of 84.51°, Kroger Co.'s data-analytics unit, whose name derives from the longitude of the division's Cincinnati headquarters and because its 750 employees do so-called longitudinal studies, researching habits of customers over long periods.

Working from a small host of research facilities, Kroger's app developers and data scientists are mining consumer information to devise the grocery store of the future. They are testing apps for shoppers' mobile devices that will highlight sales based on whether the customer eats meat or needs help finding recipes for chicken, for example. Want to make fish tacos tonight? Another app will populate a user's digital shopping list with the necessary ingredients available at the store.

For store managers, meanwhile, a program is in the works to allow them to literally see how products are selling in a given aisle, using augmented-reality apps on their phones that show the prices and sales figures for the products found there.

Whiteboard fever

"We play in a variety of spaces," says Matt Wiley, a developer at 84.51°, during a behind-the-scenes tour that wound continuously through groups of employees brainstorming ideas on white boards. The analytics unit also does consulting for such firms as Procter & Gamble Co., General Mills Inc. and Pep-

siCo Inc.

Kroger, the nation's largest supermarket chain by revenue and store count, competes with food sellers such as Wal-Mart Stores Inc. and a growing cohort of online food-shopping rivals, chief among them Amazon.com Inc. The Seattle-based company is generally upending retail business with its competitive prices, quick deliveries and the data analytics it uses to target customers based on their buying and shopping habits.

Food industry executives know they have to be smarter and faster to compete. Kroger has invested billions over the past decade and a half to hire engineers out of leading universities and away from companies recruiting talent with the same kinds of specialized skills—including data analytics, logistics and app-development. Recent innovations developed in Kroger's labs include infrared sensors that monitor the number of customers in a store and automatically deploy checkout clerks as the number grows. This tool alone, Kroger says, has reduced wait times by several minutes across its stores.

In-house equipment at most Kroger locations remotely monitors the freshness of certain produce and notifies managers the second a cooler blows out. Set to roll out at stores next year: shelves with sensors designed to recognize and communicate with apps on the mobile devices of certain customers. The apps contain data about each customer's shopping habits, and the shelves, in response, display banner ads customized for them, for such products as gluten-free or nondairy products. Kroger also is rolling out a wireless scanning device it calls Scan, Bag, Go at 400 stores next year. Customers



Kroger's Scan, Bag, Go system allows customers to check out items in store aisles as they shop.

Digital Tools

Percentage of food shoppers who use a smartphone to do the following either before or during a visit to the grocery store:



*Note: Scan QR codes or barcodes

Source: Food Marketing Institute, U.S. Grocery Shopper Trends, 2017

THE WALL STREET JOURNAL

will use the device to ring up groceries as they shop, then pay for their purchases through an app.

Other retailers are using similar devices and other technology to woo customers. At Wal-Mart's Sam's Club stores,

members can scan goods on their mobile devices while they are still shopping and pay through an app as they exit the store. Wal-Mart, the biggest U.S. food seller by stores and sales, also has developed—but not yet deployed—a patented facial-recognition technology that it says could be used to detect dissatisfied customers and respond to their needs.

"We're going to make shopping with us faster, easier and more enjoyable," Wal-Mart Chief Executive Doug McMillon told investors and employees this summer.

Not all of the supermarket industry's tech-driven efforts are about increasing sales. Costco Wholesale Corp., for example, uses its ability to track every purchase to inform its customers of food-safety recalls. And at Wal-Mart, stores are using virtual-reality headsets to train employees to deal with situations from holiday-shopping crowds to spills in the beverage aisle.

Supermarkets increasingly need to woo shoppers to their stores. Only 47% of 2,145 grocery shoppers surveyed in February said they shopped for most of their food at one

primary supermarket, down from 61% a decade earlier, according to Hartman Group Inc. research for the Food Marketing Institute.

Mining customer data is increasingly seen as the key to maintaining market share for supermarkets. Large regional chains, such as Michigan-based Meijer Inc. and California's Raley's Supermarkets, are hiring consultants to harvest data from their customers.

But Kroger has a head start on many of its competitors. Wal-Mart's advance into the grocery business in the late 1990s prompted it to start a customer-loyalty program in part to keep closer tabs on its shoppers. Today Kroger uses 850 algorithms to personalize the coupons it mails to 12 million households. The company can use purchase data to determine whether someone has gone on a diet, had children or retired, and to market different products to those customers accordingly. Some Kroger coupons have a redemption rate of 65%, compared with a national average of about 5%, executives say.

"We know our customers better than anyone," Kroger Chief Executive Rodney Mc-

Mullen told investors last month.

Retail analysts say that Kroger and other grocery companies need to do even more to make their discounts and stores appealing to shoppers as Amazon ramps up its attempt to grab more of the \$800 billion U.S. grocery market. The e-commerce powerhouse, whose recent acquisition of the Whole Foods chain makes its ambitions in the food-retailing space even more plain, spends 12% of its sales on technology each year, compared with less than 3% at most grocers, according to estimates from the U.K.-based consumer-analytics firm Dunhamby.

"Grocery companies need to think of themselves more like tech companies," says David Ciancio, senior customer strategist at Dunhamby.

Amazon declines to comment on its investments and grocery strategy.

Risky investment

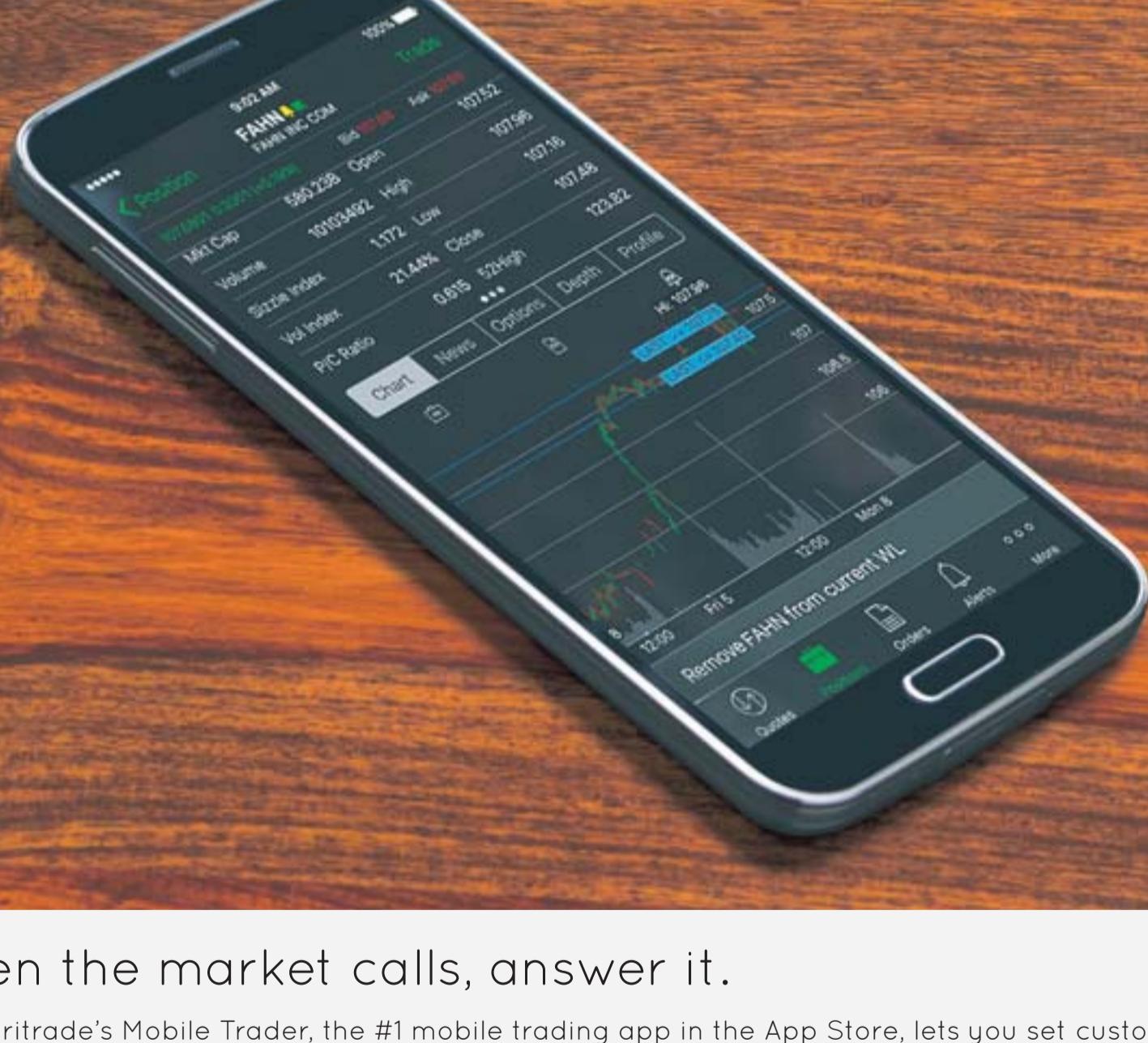
Selling groceries is a low-margin business, meaning that big investments in technology can be risky. Sometimes companies invest in new features their customers don't want to use, says Michael Halula Jr., retail practice director for the Americas for Teradata, a database analytics firm. "Too often it is the 'Field of Dreams' scenario," Mr. Halula says.

Kroger's digital spending is weighing on profits, which is one reason the company recently lowered its financial outlook this year. The grocer's stock has lost more than a third of its value this year.

But executives insist that technology is critical to keeping Kroger competitive.

"This is the obsession," says Chris Hjelm, Kroger's chief information officer; it is "the customer experience in our stores and how technology can be a part of that."

Ms. Haddon is a reporter for The Wall Street Journal in Chicago. Email her at: heather.haddon@wsj.com.



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