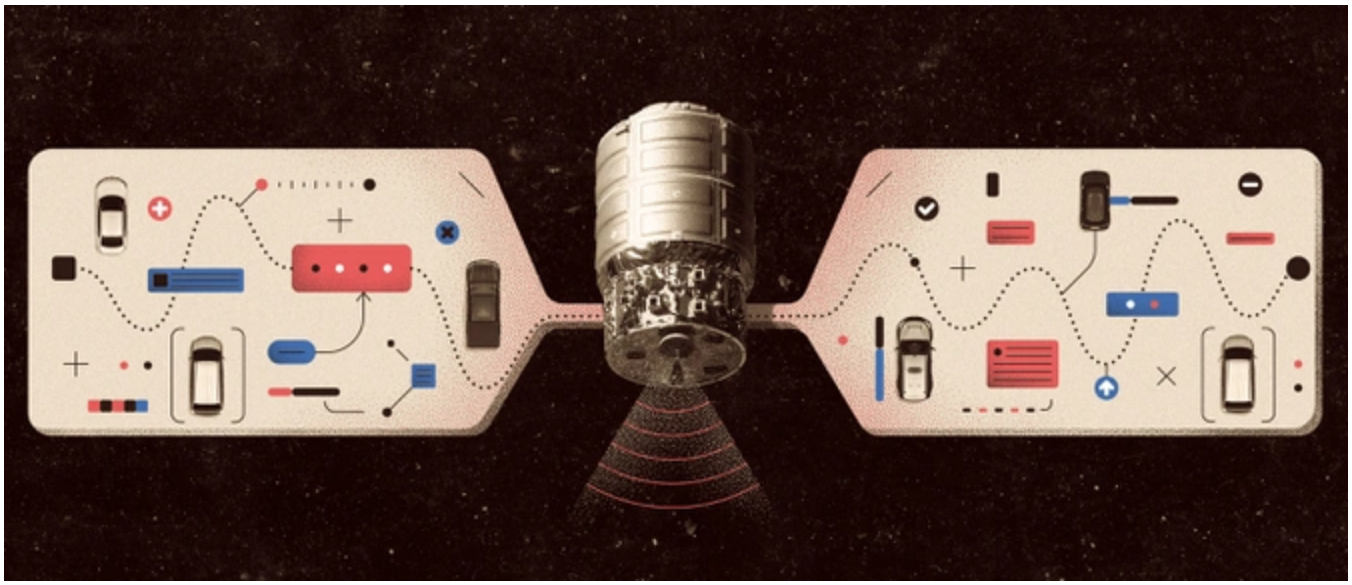
BUSINESS

Stock Picks From Space

Investors are using real-time satellite images to predict retailers' sales. Is that cheating?

FRANK PARTNOY MAY 2019 ISSUE



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One summer day in 2009, Tom Diamond packed his black Infiniti sedan with a week's worth of clothes, his synthesizer, and his amp. He had just left his job as a director at a consultancy that helped financial firms monitor their investments. He was heading from Chicago to Buena Vista, Colorado, to visit his brother, Alex, who worked for DigitalGlobe, a company that sells satellite imagery, mostly to the government.

The financial crisis had hurt Tom's business, and he was ready for something new. The trip was partly about taking some time off and revisiting an old hobby: playing rock arrangements of classical-music standards with Alex, who can shred Schubert's "Suleika II" on the electric guitar. But Tom also wanted to talk with his brother about satellites.

Specifically, he couldn't stop thinking about eight satellite photos Alex had sent him a few months earlier. One of Tom's clients had wanted to buy a factory in Malaysia, and needed proof that it was everything the seller had described. Tom used the photos as part of a presentation on the factory. Trucks, employee vehicles, and stockpiles of raw

materials were clearly visible on the factory site. His client was blown away; applause erupted in the conference room. Tom thought, "There's something here."

When Tom arrived at Alex's house, the brothers repaired to the back porch to admire the view of Mount Columbia in the distance. But instead of jamming, they took out their laptops. Alex pulled up more images taken by DigitalGlobe's WorldView-1 satellite. Tom opened the annual reports of several publicly traded retailers.

There is an old story about Sam Walton: In the early days of Walmart, its founder would monitor how stores were doing by counting the cars in the parking lot. After seeing the power of satellite imagery in his factory deal, Tom had a similar idea, but on a scale Walton could not have imagined. He asked his brother, "What if we could count the cars at *every* Walmart?"

After a week together in the Rockies, the brothers had a plan. Alex left DigitalGlobe and negotiated with the company to sell him three years' worth of archival imagery. Tom downloaded a mouse-click counter, which allowed him to count the cars in those photos by clicking on each one. After a few months of scouring parking lots—at Home Depot, Lowe's, McDonald's, and, yes, Walmart—the brothers had a data set to back-test. Sure enough, the number of cars in a retailer's parking lots seemed to accurately predict the company's revenues.

The Diamond brothers started their own company, called RS Metrics. (*RS* stands for "remote sensing.") Their first client was a stock analyst who asked them to count cars at McDonald's, now using real-time satellite imagery. Lowe's hired them to keep tabs on its own stores—and on Home Depot's, too. Their big break came in mid-2010, when Neil Currie, then an analyst at the investment bank UBS, bought parking-lot counts for 100 representative Walmart stores and published the results in a quarterly earnings preview. The number of cars in the parking lots, he wrote, suggested that Walmart stock was undervalued.

Currie's prediction proved correct. As word spread that satellite images were a reliable predictor of corporate profits, a range of investment funds began buying retail-traffic data from RS Metrics. In the following years, the company expanded, tracking not just parked cars but solar-panel installations, lumber inventory at sawmills, and the mining of metals worldwide.

Today the firm, along with start-ups such as Descartes Labs and Orbital Insight, uses a variety of aerial images and data to help investors pick stocks. When traders wanted to monitor the cars being produced at Tesla's assembly plant in Fremont, California, RS Metrics flew a plane overhead. One morning last November, a train carrying 268

wagons of iron ore derailed in the Pilbara Desert, in Western Australia. Iron-ore prices soared on the news that the supply of a resource used in everything from furniture to paper clips could be interrupted. But some traders carefully analyzed satellite images of the accident and saw the ore piled in a flat area where it could easily be reloaded. They bet that prices would soon decline. They were right—within a couple of weeks the panic had subsided, and they had made a fortune.

The use of such aerial photography might seem to confer an unfair advantage on the investors who can afford it—real-time satellite data cost tens of thousands of dollars a year, at a minimum. The practice is perfectly legal, however. Back in the 1960s, there was a move by regulators and academics to enshrine in law the idea that all investors should have equal access to information when trading securities. But the concept soon fell out of favor. Instead, courts have tended to interpret securities laws as prohibiting trading on information in two kinds of cases: when you are a true insider—if, say, you are a manager and have access to privileged details about a company's performance—and when you "misappropriate" information, which essentially means stealing it.

In theory, investors who seek out ingenious methods to acquire new and useful information benefit the market as a whole, as their savvy trading leads to more accurate prices. But the information gap has widened considerably in recent years. Today, investment firms spend hundreds of millions of dollars a year on so-called alternative data—tracking consumer trends using everything from geolocation to online browsing activity. Matthew Granade, the chief market-intelligence officer at Point72, an asset-management firm, told me his staff talks with more than 1,000 vendors of such data every year.

As the alternative-data arms race has intensified, researchers have started taking a closer look at the collateral damage. Some argue that today's traders are using sources such as the Diamond brothers' satellite images to generate profits for themselves—without returning much value to the market as a whole. The questions these critics raise are fundamental: In a world where information is far from free, how can we balance the goal of efficient markets against the principle of fair play?

To answer the philosophical questions, it would help to address a practical one: How much advantage do alternative-data sources actually confer on the investors who can afford them? And is that advantage passed along to the everyday investor?

Recently, two business-school professors at UC Berkeley (where I am a professor in the law school) endeavored to find out. They asked the Diamond brothers for their retail-

parking-lot data. The brothers agreed to give them nearly their entire trove: daily car counts conducted from 2011 to 2017 at 67,000 stores representing 44 major U.S. retailers, among them Costco, Nordstrom, Starbucks, Target, Walmart, and Whole Foods.

The researchers found that if, during the weeks before a retailer reported quarterly earnings, you had bought its shares when parking-lot traffic increased abnormally, and sold its shares when it declined, you would have earned a return that was 4.7 percent higher than the typical benchmark return. (That advantage is huge: If a fund can reliably outperform the market by even a fraction of a percent, investors will throw money at it.) More cars in the parking lots meant more earnings for the quarter, and more earnings meant higher stock prices. Car counting worked.

The researchers also discovered, to their surprise, that stock prices did not adjust as sophisticated investors used the satellite data to profit from trading shares. Instead, during the period before earnings reports, the information stayed within the closed loop of those who had paid for it. (Economists don't have a good explanation for why new information doesn't always affect stock prices—but a lot of people have become billionaires because it doesn't.) Nor did Wall Street securities analysts, the supposedly well-informed market watchers who regularly recommend stocks—and who had been among the first to embrace car counts—update their quarterly forecasts. Hedge funds that traded early based on their analysis of the satellite data were right; the securities analysts who didn't adjust their forecasts (either because they didn't have, or didn't heed, the data) were wrong—as were the individual investors who follow their advice.

Panos N. Patatoukas, one of the study's co-authors, told me he thinks the use of satellite imagery creates opportunities for sophisticated investors at the expense of small individual investors. In a certain sense, buying and selling stocks based on satellite data resembles insider trading. One reason insider trading is illegal is that it benefits those with superior information and deceives outsiders who lack such an advantage. Sure, the number of cars in a parking lot is technically public information, but as a practical matter, few investors have the resources to take advantage of it. "Isn't trading based on satellite information similar to trading based on material nonpublic information?" Patatoukas asked.

Predictably, Maneesh Sagar, the CEO of RS Metrics, doesn't see it that way. While he acknowledges that satellite imagery is an expensive commodity at present, he predicts it will gradually become cheaper and available to a wider segment of the market, as is often the case with new technologies. "First it is expensive and no one has it," he told me. "But then it becomes cheaper, used by more people. Eventually everyone will have

real-time satellite access on their phone." At that point, presumably, market prices will reflect the information more rapidly. In the meantime, we live in a capitalist society: Brief periods of inequity are the price we pay for what will ultimately be a more efficient market.

Aerial imagery is certainly becoming more widely available. Planet, a satellite company founded by three NASA scientists, offers a product called Planet Explorer. I signed up for a free trial and within minutes I was looking at photos of retailers near my house—it was like having a real-time version of Google Earth. But most investors can't afford such services after the trial period expires, at least not yet.

By the time they can, the value of the images may have waned. Some wealthy investors told me that the advantages of counting cars have already dissipated. The most sophisticated investors have moved on to strategies based on wider swaths of data. "The pictures themselves give you only a tiny edge," Alex Diamond told me.

Hedge-fund managers now rely on machine-learning algorithms that incorporate car counts as well as other types of alternative data. Thasos Group uses the geolocation capabilities of mobile phones to monitor consumer behavior. Other companies track (anonymized) consumer transactions. Combining satellite images with analysis of spending patterns and foot-traffic data provides an even richer—and pricier—portrait of consumer behavior.

The more people participate in a market, the better that market will perform: Prices will reflect the wisdom and instincts of a wider group of investors. But that doesn't mean everyone ought to open a brokerage account and start picking stocks. One hedge-fund manager told me the lesson of the alternative-data boom is not that markets should be regulated, but that retail investors should avoid betting on individual stocks. "If average investors inevitably will be disadvantaged from trading, they shouldn't do anything except buy and hold a passive index fund," he told me. If you can't be competitive, don't play the game.

Of course, that's coming from a Wall Street type who is poised to play the game and win. But it's not just big-shot investors who hold this view. I asked Jill Fisch, a securities-regulation expert at the University of Pennsylvania, what she thought about hedge funds' profiting from satellite imagery. She was unperturbed. The idea of equal access to information, she said, is a myth: "Some people always have better information, and the fact that they are informed actually protects the rest of us, because it helps make market prices more accurate. We'd be worse off with only uninformed traders." As for the fact that there's often a delay between when hedge funds buy satellite data and the

release of earnings reports that shift stock prices significantly, Fisch was similarly untroubled. “The delay is more of a problem for the wealthy investors than for us,” she said. “They are the ones taking more risk during this time”—success isn’t guaranteed, even with the most sophisticated alternative data at hand—“and they are being compensated for it.”

It’s unclear whether the Securities and Exchange Commission will share this view. Its mission is to protect investors. As the market’s most sophisticated players come to rely on sources of information that are ever more out of reach for the rest of us, the question regulators will have to answer is: Which investors?

This article appears in the May 2019 print edition with the headline “Stock Picks from Space.”

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