COVER STORY

Seeing is (Not) Believing:

Generative AI and the Rise of Malicious Deepfakes.

Hello!

Welcome to the July 2023 edition of *TSG Invest Magazine*!

Our monthly publication is your source for the latest trends in disruptive innovation, along with valuable insights into the Economy, Markets, Venture Capital, and Real Estate.

We are grateful for your support as a valued client and subscriber of *TSG Invest Magazine.*

Stay tuned for next month's magazine as you continue your journey toward financial success.

Cheers to your wealth!

CONTENTS
07/23 ///

01 Seeing Is (Not) Believing:

Generative AI and the Rise of Malicious Deepfakes

At around 8:42 a.m. Eastern Time on Monday, May 22nd, 2023, a picture showing a large plume of black smoke rising next to the Pentagon—the Department of Defense's headquarters in Arlington, Virginia—began to make rounds on Twitter.

The image, which purportedly captured the immediate aftermath of an explosion, was quickly picked up by widely-followed accounts like RT, a Kremlin-controlled English news network with 3.1 million Twitter followers. Other accounts, like @WhaleChart—a handle with 337,000 followers—captioned the image, "BREAKING: Explosion near Pentagon".

By the end of the morning, the image had accrued millions of impressions and an estimated 3,785 retweets. Among this tally included the now-suspended @BloombergFeed, a handle that had been "verified" under the recently-launched $8-a-month Twitter Blue subscription program and was designed to imitate Bloomberg, the financial news and data provider.

A retweet by this account lent even more credence to the image, spooking Twitter users with visual evidence that America was once again under attack.

But there was one problem: the Pentagon picture was an AI-generated deepfake.

Produced using deep learning techniques, these fake-yet-plausible images, audio, and video creations have soared in popularity over the last several years, as innocuous comedians and malicious fraudsters alike have found ways to use them for amusement and alarm, respectively. As a result, deepfakes run the gamut from a playful video of Dwayne "The Rock" Johnson starring as Dora The Explorer to fodder for far more disturbing instances of online disinformation, like this Pentagon photograph in question.

Luckily, this deepfake had little time to spread unchecked. Within half an hour of the image's first appearance, the Pentagon Force Protection Agency and the Arlington County Fire Department's issued a statement using the latter's Twitter handle, declaring that "[t]here is NO explosion or incident taking place at or near the Pentagon reservation, and there is no immediate danger or hazards to the public."

Deepfake Disruption

Though this deepfake was rapidly debunked, the gravity of what it conveyed and the velocity at which it spread was enough to inflict real-world consequences.

In this instance, the Pentagon deekfake caused enough panic to trigger a U.S. stock market selloff. In the 25-minute window between 8:40 and 9:05 am,

S&P 500 futures declined about 0.73%, registering a roughly 30-point drop from 4,221.75 to 4,191. The broad-market index only began to recover after officials dispelled rumors of an alleged attack.

As the (real) Bloomberg News puts it, this is "possibly the first instance of an AI-generated image moving the market".

Unfortunately, it's unlikely to be the last. As generative AI technologies continue to improve, deepfakes will become increasingly more difficult to distinguish, making it easier for nefarious actors to generate fear-inducing audio, images, and videos that cause deepfake-fueled financial market disruption.

In particular, the rise of *multimodal* generative models—those that can simultaneously interpret and output different modes of media, including images, text, audio, and video—could uniquely exacerbate the unwanted dissemination of AI-driven fake news. This is because multimodal generative models grant bad actors the ability to propagate disinformation with greater ease, coherence, and believability—a warning recently echoed by market researchers at UBS, who note in a May 26th op-ed that generative AI technologies could be "highly disruptive" to capital markets.
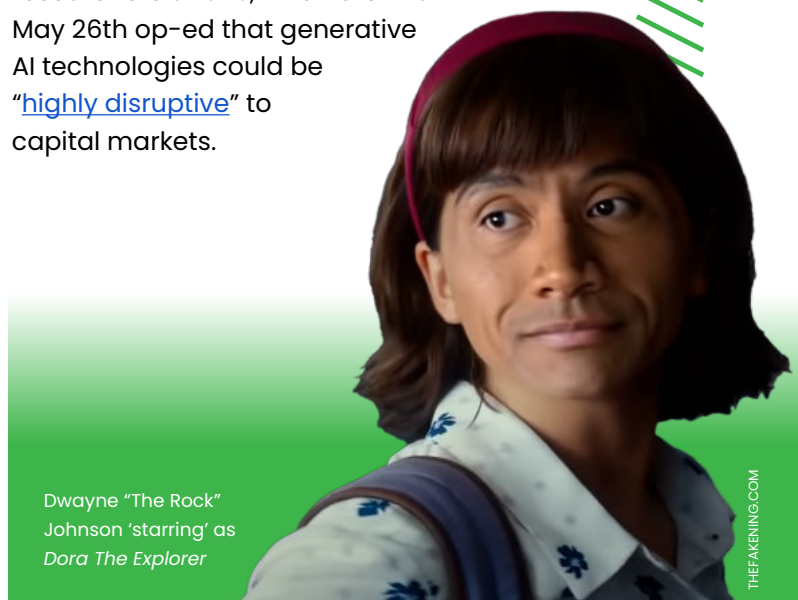
Dwayne "The Rock" Johnson 'starring' as *Dora The Explorer*

THEFAKENING.COM

Thematic analysts at Deutsche Bank have made similar cautions. Jim Reid, the bank's Head of Global Economics and Thematic Research, argues in a [10-page thematic research report](#) he co-authored that society "now face[s] the prospect of orders of magnitude more misinformation" due to generative AI. He further warns that "there is simply no text, no voice recording and no video clip whose content we will be able to trust unless we know it comes from a trusted
source, and even then
with caveats."

Spotting Deepfakes and AI-Generated Fake News

On a more optimistic note, ordinary consumers of news are not completely helpless against this ongoing onslaught of disinformation. Rather, there are several powerful techniques that can be used to identify deepfakes and spot AI-generated fake news.

DALL·E 2023-03-09 11.46.45 - kneading dough

AI image models have an incomplete picture (pun intended) of how hands look and function in real life

Look at the Subject's Hands— or Stare Into Their Eyes

The first and most obvious tactic is to critically examine the image, video, or audio clip for telltale signs that it could be a deepfake. Pay particular attention to hands, feet, limbs, or eyes featured in an image or video clip.

Do they appear distorted, mangled, or sport more (or fewer) than five fingers or toes? If so, that's a sign the image could be a deepfake.

In a similar vein, AI-generated videos can be identified by looking at the subject's eyes. Do they blink as the video progresses? If the subject doesn't blink at all—or if they blink very infrequently— the video could be a deepfake.

Looking for deformed extremities and eyes that don't blink are reliable tactics for identifying deepfakes because they target quirks in the datasets used to train image-generating AI models. After all, it's these same datasets that systematically influence the way a model's image or video outputs appear to a viewer.

Specifically, AI image models usually excel at generating human faces but do a [poor job at producing anatomically-correct extremities](#) because the latter often appear as small and undetailed peripheral features in training images. To quote a Stability AI spokesperson who talked with Buzzfeed News, "hands… tend to be much smaller in the source image…[and] are rarely visible in large form." For this reason, AI image models have an incomplete picture (pun intended) of how hands look and function in real life.

For deepfake videos featuring [eyes that don't blink](#), the explanation is much the same: training data used for AI video generators seldom contain videos (or frames within videos) that feature closed eyes.

Examine the Background and Scope Out the Scene

But what if the image or video doesn't feature hands or eyes? In this case, looking beyond the foreground—and closely [scrutinizing small details in the background](#)—could help uncover clues.

Let's try applying this tactic to the Pentagon deepfake by taking a look at the lamppost to the right of the plume of smoke. Oddly, the section of the perimeter fence below it appears to merge in with the crowd barriers.

Meanwhile, to the right and center of the photo is the entrance to the building. Like many government buildings in Washington, D.C., the Pentagon sports a Neoclassical look and features columns in front of the building's entrance.

However, these columns look unnatural—they're either too thick or too thin. Even more strange are the shadows behind the columns—things are dark towards the left of the entrance but become noticeably more bright just one column over.

But perhaps the oddest thing about the image is that there's nobody in the image at all—not a single person, ambulance, fire truck, police car, or news van. There are no onlookers, first responders, or journalists at the scene.

If the model had generated an image capturing the explosion the moment it went off, a scene absent of human activity would've been plausible.

But this is different. Supposedly, the image captures the *aftermath* of an explosion. In real life, the Pentagon would've likely been swarming with people. The fact that this image shows a deserted Pentagon instead is yet another sign that it is a deepfake.

Find Corroborating Evidence From Other Sources

Looking for signs of activity at the scene of a disaster isn't just a visual tactic for spotting fake news. It also relays a more fundamental maxim: consequential events—and the news that follow—[don't happen in a vacuum](#).

In other words, if a newsworthy event is real, it's bound to attract coverage from a diverse range of reputable sources and appear on numerous social media channels. This also means that there'll more often than not be several pieces of eyewitness footage or testimony that should roughly point to the same facts—not just a single image or video shot from one angle.

Conversely, if a piece of news only appears on a single site, receives no coverage from sources with a track record for original reporting, or is accompanied by scant on-the-scene footage or similar primary evidence, then red flags should go up. While this is not a guarantee that a piece of news is fake, it should raise one's suspicions that it might be.

Regulating Deepfakes

Suffice to say, practicing [good information hygiene](#) and becoming more news literate can help individuals become less susceptible to AI-generated fake news. At the same time, asking Internet users to interpret every piece of content with skepticism and caution—as the only line of defense against deepfakes, no less—appears to be unsustainable.

For this reason, legislation that imposes civil or criminal penalties on actors who knowingly generate malicious deepfakes that cause public harm could be a reasonable next step. Nonetheless, state legislatures and Congress alike have been slow to pass legislation aimed at regulating deepfakes, for fear that these new laws run afoul of free-speech protections.

But the country isn't entirely absent of deepfake legislation either. For the time being, existing laws that regulate AI-generated media generally target two types of content: non-consensual, deepfake pornography and fake news that has the potential to influence elections.

Nine states—Hawaii, California, Washington, Wyoming, Minnesota, Texas, Georgia, Virginia, and New York—[impose criminal or civil penalties](#) against the creation of non-consensual

pornographic deepfakes. Three of these states—namely California, Texas, and Virginia—also have legislation that prohibit spreading political and election-related disinformation via deepfake content.

All of these laws, however, were passed well before the current AI frenzy—some, like California's Assembly Bill 602 and Assembly Bill 730 were passed as early as 2019. Given the rapid proliferation of next-generation text-to-image models from companies like Stability AI, Midjourney, and Adobe, it remains to be seen whether these laws can continue to hold up in an era where anyone with a laptop can generate deepfakes on a whim.

Luckily, more statehouses are beginning to take action on deepfakes. In recent months, four more states—Louisiana, Illinois, New Jersey, and Massachusetts—have [proposed legislation](#) to regulate political and pornographic deepfakes.

Some members of Congress have also demonstrated an interest in regulating deepfake imagery at the federal level. In May 2023, Joe Morelle, the U.S. Representative for New York's 25th congressional district, [introduced](#) legislation the Preventing Deepfakes of Intimate Images Act.

Crafted in consultation with SAG-AFTRA and the Cyber Civil Rights Initiative, the bill would, among other things, "prohibit the non-consensual disclosure of digitally altered intimate images and make the sharing of these images a criminal offense".

Though this bill has a long way to go before it becomes law, it represents a hopeful step in the right direction—one that seeks to harness AI's powers, nurture its promises, and defuse its perils. ⑤

Economy, Markets, Venture Capital, and Real Estate

The Macroeconomy: Inflation, Debt Ceiling, and More

U.S. Avoids Default and Suspends Debt Ceiling Until 2025 ↗

In a last-minute vote, Congress passed legislation that would suspend the federal debt ceiling for two years and allow the U.S. Treasury to avoid defaulting on its debt. In exchange for temporarily suspending the self-imposed debt ceiling, this bill will cap spending growth on certain discretionary, non-defense programs at 1% per year over the next decade. However, defense spending—including spending related to veterans' medical care—will not be affected.

Why Isn't Inflation Going Away? ↗

While inflation isn't hitting consumers and businesses as hard as it was in 2021 and 2022, key inflation gauges in both the United States and abroad indicate that economic policymakers have a ways to go until inflation returns to its historical levels. Unfortunately, taming inflation is a tall order. Its myriad causes, which range from supply chain woes and labor shortages to "greedflation" and rising demand, are difficult to isolate—and even harder to treat.

Key Risks Facing the Economy After the Debt Ceiling ↗

Even if legislation to raise the debt ceiling passes before the June 1st deadline, the U.S. economy isn't out of the woods yet. Fears of a credit rating downgrade due to political "brinkmanship", rising interest rates, and inflation that appears more difficult to tame than initially expected all continue to send mixed signals about the near-term direction of the economy.

U.S. Consumer Spending and Inflation Both Up in April ↗

Data from the U.S. Department of Commerce showed that consumer spending grew by 0.8% between March and April 2023, an encouraging sign after March's relatively modest 0.1% gain. However, inflation remains elevated. The Personal Consumption Expenditures (PCE) index, a national cost-of-living gauge, increased by 4.4% on a year-over-year basis in April 2023.

Federal Reserve Could Continue to Raise Rates in June or July Meeting ↗

Despite raising the federal funds rate on nine separate occasions in 2022 and 2023—seven times last year and twice so far this year—the Federal Reserve has signaled that this cycle of rate hikes may not be over yet. The Federal Open Market Committee (FOMC), the governing body responsible for interest rates, could vote to raise interest rates by another 25 basis points during its June or July meeting. The federal funds rate currently sits 5% to 5.25%, after it was raised by a quarter percentage point in May 2023.

Nvidia Gains 24.4% And Hits All-Time High Amidst AI Windfall [↗]

Chip designer Nvidia posted its largest one-day gain since 2016 after reporting earnings for the first quarter of 2023. Shares of the company surged by 24.4% on May 25th, 2023, closing at $379.74—a figure that translates to a $950 billion market capitalization. If shares rise by roughly another 5%, it will become one of just six companies globally to command a market cap in excess of $1 trillion.

Tech Stocks Are Hot But Cash Is Cool [↗]

Though tech stocks are outperforming the broader market in 2023, safe investments like cash are also becoming more attractive—especially as annualized yields on money market and short-term bond funds approach 5%. While the Federal Reserve's aggressive rate hikes have raised the cost of borrowing, they've also increased yields for savers and depositors alike.

Is the AI Stock Surge Also Good for the U.S. Dollar? [↗]

In recent weeks, analysts at Barclays have noticed a correlation between the surge in AI stocks and the strength of the U.S. dollar. This is a sign that foreign investors are bullish about U.S. stocks, and have a particular appetite for companies whose core businesses can stand to benefit from the proliferation in artificial intelligence technologies.

Peter Orszag to Become Next Lazard CEO [↗]

Peter Orszag, the 37th Director of the Office of Management and Budget (OMB) under the Obama Administration, has been named the next CEO of Lazard, effective October 1st, 2023. Currently, Orszag is the Global Co-Head of Healthcare. Previously, he served as the boutique financial advisory firm's Head of North American M&A. Prior to joining Lazard, he held roles at Citigroup between 2011 and 2016.

Apple Strikes Multibillion-Dollar Deal with Broadcom [↗]

Apple unveiled a multiyear, multibillion-dollar deal with Broadcom to develop 5G radio frequency components and other wireless hardware. Components will be manufactured in Fort Collins, Colorado, and across Broadcom's other manufacturing facilities in the United States. This deal with Broadcom is the latest in Apple's broader, $430 billion push to manufacture more products in the United States.

Venture Capital: Funding and Startup News

AI Safety and Research Company Anthropic Raises $450 Million Series C ⤤

Anthropic, a public-benefit corporation founded by former OpenAI leaders and siblings Daniela Amodei and Dario Amodei, has raised $450 in a Series C round led by Spark Capital. The AI startup develops general AI systems and language models, with a particular focus on models that are "reliable, interpretable, and steerable".

Fintech Scaleup Nymbus Raises $70 Million Series D ⤤

Nymbus, a fintech startup that helps banks, credit unions, and other financial services firms modernize their technology stack, closed a $70 million Series D round on Thursday, May 25th. The round was led by Insight Partners, a New York City-headquartered venture capital firm. Other investors included Banc Funds Company and Mendon Venture Partners. Notably, some of Nymbus' customers—including ConnectOne Bank and PeoplesBank—also participated in the round.

Data Platform Elementl Secures $33 Million in Series B Financing ⤤

Elemental, a startup building a data platform on top of data orchestrator Dagster, has announced a $33 million Series B led by Georgian. The company's Series B saw new participants in 8VC and Human Capital, as well as follow-on investments from five venture capital firms that participated in the startup's earlier funding rounds.

Early-Stage Consumer Savings Startup Checkmate Attracts Star VCs ⤤

Checkmate, a company that helps consumers find and automatically apply coupon codes to online purchases, announced a $15 million Series A financing round led by celebrity investors. These include Google Ventures (GV) partner Frederique Dame and Mantis VC, a venture capital firm founded by The Chainsmokers. The startup's flagship app boasts more than 400,000 users, and its Series A comes just nine months after its $5 million Seed, which it closed in September 2022.

Austin-Based Episode Six Raises $48 Million in Series C Led by Avenir ⤤

Cloud-based enterprise payments technology startup Episode Six announced that it had closed a $48 million Series C on Tuesday, May 23rd. Led by Avenir, a growth-equity and investment banking firm, the round also saw participation from Anthos Capital, a Santa Monica-based venture capital firm. Episode Six says it will use proceeds from its Series C to invest in go-to-market efforts and scale up its TRITIUM platform, which helps banks and credit unions rapidly implement and deploy payment solutions for their end users.

Real Estate: Supply, Demand, and Market Trends

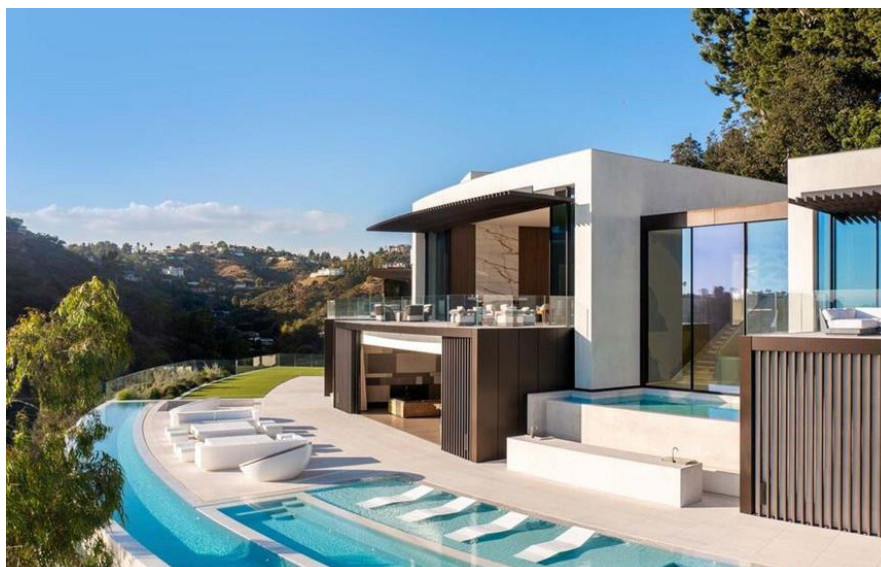### Office REITs Plunge to 2009 Low [↗]

The post-pandemic shift to hybrid and work-from-home arrangements have seen demand for office space crumble. As a result, commercial REITs—and in particular office landlords—have taken a beating. Though the S&P Composite 1500 Office REIT index makes up just 6% of the broader REIT sector on a capitalization-weighted basis, its underperformance is staggering: the index is down by 27% since the start of 2023, pushing the index to lows not seen since July 22nd, 2009.

Vacation Home Prices in the Hamptons Decline Slightly [↗]

The Hamptons, a well-known summer vacation destination for wealthy New Yorkers, boasts some of the most expensive real estate in the world. However, 2023 may be a good year for well-to-do urbanites looking to save on vacation costs: the average nightly rate of a Hamptons rental is now just $970, a 10.1% or $110-per-night decline from the $1,080 nightly average posted in 2022.

Los Angeles Mansion Hits the Market for $185 Million [↗]

A 35,000 square foot megamansion in Bel Air, an enclave for the super-rich located in the west side of Los Angeles, is asking $185 million. The home, which is tied to Chinese investor Maggie Gong Miracle, features trappings such as an underground lake and hidden homes. If it trades at its list price, it will be one of the most expensive properties ever sold in the southern California megalopolis.

Why Are Wealthy Home Buyers Moving to Puerto Rico? [↗]

For the wealthy, living in Puerto Rico can unlock one of the most lucrative tax advantages attainable: an exemption from federal capital gains tax. Thanks to Chapter 2 of Act 60—which is more commonly known as the Individual Investors Act—bona fide residents of Puerto Rico can enjoy a 0% federal capital gains tax rate on passive income, including dividends, interest, and capital gains that are earned or accrued after an individual becomes a Puerto Rican resident. Tax advantages aside, other factors, like the shift to remote work and the island's tropical weather, are also compelling wealthy taxpayers to more seriously consider a move to the U.S. territory.

Despite Stellar Credit Ratings, Commercial Property Owners Could Default [↗]

The collapse in commercial real estate valuations in major metropolitan areas like San Francisco and New York could spell financial doom for some of the city's smaller office space owners. The country's top landlords, on the other hand, have deep pockets and could continue to service their debt, staving off default even in the steepest of commercial real estate recessions. However, some may choose to default anyway, sacrificing their credit ratings to walk away from deeply unprofitable assets with a long road to recovery. Ⓢ

The Spaventa Group ("TSG") is a leading investment company located in New York.

We invest across various asset classes in addition to providing investment opportunities to both individual and institutional investors. Our asset management business encompasses investment vehicles focused on alternative assets, including venture capital and real estate, and our advisory business provides traditional financial services including wealth management, investment management, and insurance planning.

TSG bridges technology with a human component in everything we do. We are forward-thinkers and strive to uncover trends, technologies, and opportunities to reshape finance, investing, and society at large.

TSG
SPAVENTA
GROUP