

# The Daily Dispatch

## Weekly Special Feature

February 19, 2021

### *The Commercial Space Age Is Here*

By: Matt Weinzierl and Mehak Sarang—Harvard Business Review (*Published on February 12, 2021*)



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**There's no shortage of hype** surrounding the commercial space industry. But while tech leaders promise us moon bases and settlements on Mars, the space economy has thus far remained distinctly local — at least in a cosmic sense. Last year, however, we crossed an important threshold: For the first time in human history, humans accessed space via a vehicle built and owned not by any government, but by a private corporation with its sights set on affordable space settlement. It was the first significant step towards building an economy both in space and for space. The implications — for business, policy, and society at large — are hard to overstate.

In 2019, 95% of the estimated \$366 billion in revenue earned in the space sector was from the space-for-earth economy: that is, goods or services produced in space for use on earth. The space-for-earth economy includes telecommunications and internet infrastructure, earth observation capabilities, national security satellites, and more. This economy is booming, and though research shows that it faces the challenges of overcrowding and monopolization that tend to arise whenever companies compete for a scarce natural resource, projections for its future are optimistic. Decreasing costs for launch and space hardware in general have enticed new entrants into this market, and companies in a variety of industries have

already begun leveraging satellite technology and access to space to drive innovation and efficiency in their earthbound products and services.

In contrast, the space-for-space economy — that is, goods and services produced in space for use in space, such as mining the Moon or asteroids for material with which to construct in-space habitats or supply refueling depots — has struggled to get off the ground. As far back as the 1970s, research commissioned by NASA predicted the rise of a space-based economy that would supply the demands of hundreds, thousands, even millions of humans living in space, dwarfing the space-for-earth economy (and, eventually, the entire terrestrial economy as well). The realization of such a vision would change how all of us do business, live our lives, and govern our societies — but to date, we've never even had more than 13 people in space at one time, leaving that dream as little more than science fiction.

Today, however, there is reason to think that we may finally be reaching the first stages of a true space-for-space economy. SpaceX's recent achievements (in cooperation with NASA), as well as upcoming efforts by Boeing, Blue Origin, and Virgin Galactic to put people in space sustainably and at scale, mark the opening of a new chapter of spaceflight led by private firms. These firms have both the intention and capability to bring private citizens to space as passengers, tourists, and — eventually — settlers, opening the door for businesses to start meeting the demand those people create over the next several decades with an array of space-for-space goods and services.

### **Welcome to the (Commercial) Space Age**

In our recent research, we examined how the model of centralized, government-directed human space activity born in the 1960s has, over the last two decades, made way for a new model, in which public initiatives in space increasingly share the stage with private priorities. Centralized, government-led space programs will inevitably focus on

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space-for-earth activities that are in the public interest, such as national security, basic science, and national pride. This is only natural, as expenditures for these programs must be justified by demonstrating benefits for citizens — and the citizens these governments represent are (nearly) all on earth.

In contrast to governments, the private sector is eager to put people in space to pursue their own personal interests, not the state's — and then supply the demand they create. This is the vision driving SpaceX, which in its first twenty years has entirely upended the rocket launch industry, securing 60% of the global commercial launch market and building ever-larger spacecraft designed to ferry passengers not just to the International Space Station (ISS), but also to its own promised settlement on Mars.

Today, the space-for-space market is limited to supplying the people who are already in space: that is, the handful of astronauts employed by NASA and other government programs. While SpaceX has grand visions of supporting large numbers of private space travelers, their current space-for-space activities have all been in response to demand from government customers (i.e., NASA). But as decreasing launch costs enable companies like SpaceX to leverage economies of scale and put more people into space, growing private sector demand (that is, tourists and settlers, rather than government employees) could turn these proof-of-concept initiatives into a sustainable, large-scale industry.

This model — of selling to NASA with the hopes of eventually creating and expanding into a larger private market — is exemplified by SpaceX, but the company is by no means the only player taking this approach. For instance, while SpaceX is focused on space-for-space transportation, another key component of this burgeoning industry will be manufacturing.

Made In Space, Inc. has been at the forefront of manufacturing “in space, for space” since 2014, when it 3D-printed a wrench onboard the ISS. Today, the company is exploring other products, such as high-quality fiber-optic cable, that terrestrial customers may be willing to pay to have manufactured in zero-gravity. But the company also recently received a \$74 million contract to 3D-print large

metal beams in space for use on NASA spacecraft, and future private sector spacecraft will certainly have similar manufacturing needs which Made In Space hopes to be well-positioned to fulfill. Just as SpaceX has begun by supplying NASA but hopes to eventually serve a much larger, private-sector market, Made In Space's current work with NASA could be the first step along a path towards supporting a variety of private-sector manufacturing applications for which the costs of manufacturing on earth and transporting into space would be prohibitive.

Another major area of space-for-space investment is in building and operating space infrastructure such as habitats, laboratories, and factories. Axiom Space, a current leader in this field, recently announced that it would be flying the “first fully private commercial mission to space” in 2022 onboard SpaceX's Crew Dragon Capsule. Axiom was also awarded a contract for exclusive access to a module of the ISS, facilitating its plans to develop modules for commercial activity on the station (and eventually, beyond it).

This infrastructure is likely to spur investment in a wide array of complementary services to supply the demand of the people living and working within it. For example, in February 2020, Maxar Technologies was awarded a \$142 million contract from NASA to develop a robotic construction tool that would be assembled in space for use on low-Earth orbit spacecraft. Private sector spacecraft or settlements will no doubt have need for a variety of similar construction and repair tools.

And of course, the private sector isn't just about industrial products. Creature comforts also promise to be an area of rapid growth, as companies endeavor to support the human side of life in the harsh environment of space. In 2015, for example, Argotec and Lavazza collaborated to build an espresso machine that could function in the zero-gravity environment of the ISS, delivering a bit of everyday luxury to the crew.

To be sure, people have dreamt of using the vacuum and weightlessness of space to source or make things that cannot be made on earth for half a century, and time and again the business case has failed to pan out. Skepticism is natural. Those failures, however, have been in space-for-earth applications. For example, two startups of the 2010s,

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Planetary Resources, Inc. and Deep Space Industries, recognized the potential of space mining early on. For both companies, however, the lack of a space-for-space economy meant that their near-term survival depended on selling mined material — precious metals or rare elements — to earthbound customers. When it became clear that demand was insufficient to justify the high costs, funding dried up, and both companies pivoted to other ventures.

These were failures of space-for-earth business models — but the demand for in-space mining of raw building material, metals, and water will be enormous once humans are living in space (and are therefore far cheaper to supply). In other words, when people are living and working in space, we are likely to look back on these early asteroid mining companies less as failures and more as simply ahead of their time.

## Seizing the Space-for-Space Opportunity

The opportunity presented by the space-for-space economy is huge — but it could easily be missed. To seize this moment, policymakers must provide regulatory and institutional frameworks that will enable the risk-taking and innovation necessary for a decentralized, private-sector-driven space economy. There are three specific policy areas we believe will be especially important:

### 1. Enabling private individuals to take on greater risk than would be tolerable for government-employed astronauts.

First, as part of a general shift to that more decentralized, market-oriented space sector, policymakers should consider allowing private space tourists and settlers to voluntarily take on more risk than states would tolerate for government-employed astronauts. In the long run, ensuring high safety levels will be essential to convince larger numbers of people to travel or live in space, but in the early years of exploration, too great an aversion to risk will stop progress before it starts.

An instructive analogy can be found in how NASA works with its contractors: In the mid-2000s, NASA shifted from using cost-plus contracts (in which NASA shouldered all the economic risk of investing in space) to fixed-price contracts (in which risk was distributed between NASA and their contractors). Because of private companies' greater tolerance for risk, this shift catalyzed a burst of activity in

the sector — sometimes referred to as “New Space.” A similar shift in how we approach voluntary risk-taking by private-sector astronauts may be necessary in order to launch the space-for-space economy.

### 2. Judiciously implementing government regulation and support.

Second, as with most markets, developing a stable space economy will depend on judicious government regulation and support. NASA and the U.S. Commerce and State Departments' recent recommitment to “create a regulatory environment in [low-Earth orbit] that enables American commercial activities to thrive” is a good sign that the government is on a path of continued collaboration with industry, but there's still a long way to go.

Governments should start by clarifying how property rights over limited resources such as water on Mars, ice on the Moon, or orbital slots (i.e., “parking spots” in space) will be governed. Recent steps — including NASA's offer to purchase lunar soil and rocks, last April's Executive Order on the governance of space resources, and the 2015 Commercial Space Launch Competitiveness Act — indicate that the U.S. government is interested in establishing some form of regulatory framework to support the economic development of space.

In 2017, Luxembourg became the first European country to establish a legal framework securing private rights over resources mined in space, and similar steps have been taken at the domestic level in Japan and the United Arab Emirates. Moreover, nine countries (though Russia and China are notably missing) have signed the Artemis Accords, which lay out a vision for the sustainable, international development of the Moon, Mars, and asteroids. These are important first steps, but they have yet to be clearly translated into comprehensive treaties that govern the fair use and allocation of scarce space resources among all major spacefaring nations.

In addition, governments should continue to fill the financial gaps in the still-maturing space-for-space economic ecosystem by funding basic scientific research in support of sending humans to space, and by providing contracts to space startups. Similarly, while excessive regulation will stifle the industry, some government

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incentives, such as policies to reduce space debris, can help reduce the costs of operating in space for everyone in ways that would be difficult to coordinate independently.

### 3. Moving beyond geopolitical rivalries.

Finally, the development of the space-for-space economy must not be undermined by earthly geopolitical rivalries, such as that between the United States and China. These conflicts will unavoidably extend into space at least to some extent, and military demand has long been an important source of funding for aerospace companies. But if not kept in check, such rivalries will not only distract attention and resources from borderless commercial pursuits but also create barriers and risks that hamper private investment.

On earth, private economic activity has long tied together people whose states are at odds. The growing space-for-space economy offers exceptional potential to be such a force for unity — but it's the job of the world's governments not to get in the way. A collaborative, international approach to establishing — and enforcing — the rule of law in space will be essential to encouraging a healthy space-for-space economy.

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Visions of a space-for-space economy have been around since the dawn of the Space Age in the 1960s. Thus far, those hopes have gone largely unmet — but this moment is different. For the first time in history, the private sector's capital, risk tolerance, and profit motive are being channeled into putting people in space. If we seize this opportunity, we will look back on 2020 as the year when we started the truly transformational project of building an economy and a society in space, for space.

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Source: Matt Weinzierl and Mehak Sarang (2021) 'The Commercial Space Age Is Here,' *Harvard Business Review*. Available at: <https://hbr.org/2021/02/the-commercial-space-age-is-here> (Accessed 17 February 2021)

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February 19, 2021  
TODAY'S TOP NEWS

## Diokno rules out asset price bubbles

The Philippine central bank does not expect financial stability concerns to cause asset price bubbles and excessive credit growth after a coronavirus pandemic forced it to cut benchmark interest rates to a record. Philippine economic output plunged by 9.5% last year — the steepest since the second World War — amid the global health crisis.

## Mindanao-Visayas power grid link faces delay

A crucial transmission project that will link the separate power grids of Visayas and Mindanao may not be completed by the end-2021 target date after portions of fiber optic submarine cables were damaged, the grid system operator said on Thursday.

## DoTr starts seeking bidders for Cebu BRT package 1

The Transportation department has started seeking bidders for the first package of the World Bank-funded Cebu Bus Rapid Transit (Cebu BRT) project. The P1.05-billion contract covers sidewalk improvement and construction of trunk lines, stations, and other appurtenance.

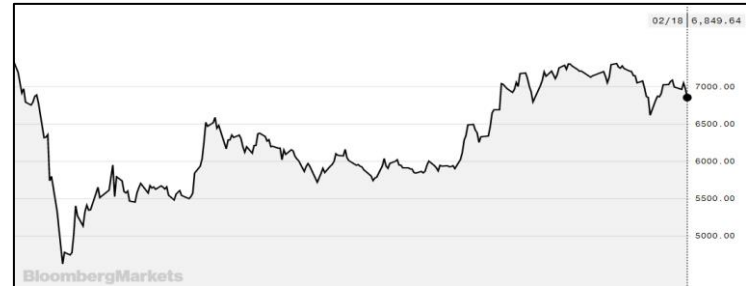
## Listed companies paid nearly P343B cash dividends

A total of 105 of the 271 companies listed at the Philippine Stock Exchange (PSE) paid P342.88 billion in cash dividends to common stock stockholders last year, providing investors a yield of 2.5%, the exchange said on Thursday.

## Atram rolls out pioneering equity fund

A pioneering equity fund that advocates sustainability investing by handpicking local publicly-listed companies that embrace the United Nations Sustainable Development Goals (SDGs) has been rolled out by fund management firm ATR Asset Management (Atram).

## Philippine Stock Market Update



**Previous Close:**

6,849.64

**1 Yr Return:**

-5.33%

**Open:**

6,858.72

**YTD Return:**

-3.75%

**52-Week Range:**

4,039.15 - 7,472.99

**Source:**

Bloomberg

## Foreign Exchange

As of Feb. 18, 2021

US Dollar	Philippine Peso
1	48.43

## BVAL Reference Rates

As of Feb. 18, 2021

Tenor	Rate
1Y	1.433
3Y	2.293
5Y	2.796
7Y	3.055
10Y	3.236
20Y	4.027

## Daily Quote

"One doesn't discover new lands without consenting to lose sight, for a very long time, of the shore."

-- Andre Gide



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## MORE LOCAL NEWS

### BPI, DTI team up to help SMEs recover

MANILA, Philippines – Ayala-led Bank of the Philippine Islands (BPI) has teamed up with the Department of Trade and Industry (DTI) to help small and medium-sized enterprises (SMEs) bounce back from the effects of the coronavirus disease 2019 (Covid-19) pandemic.

### Neda wants food importation fast-tracked

Acknowledging that consumer price hikes in the Philippines have been the fastest in the Association of Southeast Asian Nations (Asean)-5 and badly hurting poor Filipinos, state planning agency National Economic and Development Authority (Neda) is pushing to fast-track food importation and nationwide distribution of agricultural goods.

### Peso seen further strengthening vs dollar in 2021

The Philippine peso would further strengthen this year although at a slower pace than last year's gains amid expectations of sustained US dollar weakness, the UK-based Oxford Economics said.

### Metrobank profits down 50%, stocks up on dividends

Metropolitan Bank and Trust Company (Metrobank) saw its full-year 2020 net income plunge by 50% to P13.8 billion, as it guarded itself from bad loans. Before loan loss provisioning, Metrobank said its profits surged by 26% to P61.8 billion.

### Landbank opens P2b credit line for fishing

State-run Land Bank of the Philippines has opened a P2 billion lending facility to assist existing and prospective commercial fishing operators in the purchase of new sea vessels. Under the Landbank Commercial Fishing Vessel Financing Program, the new credit line allows fishing operators to borrow up to 80% of acquisition cost.

### DBP extends P1 billion loan for water projects

The Development Bank of the Philippines has provided a P1.097b loan to fund various water projects in underserved areas in Cebu and Southern Luzon. DBP president Emmanuel Herbosa said the bank has signed a term loan agreement with Abejo Waters Corp. for the development of water supply and distribution system in Cebu and Quezon

### DTI: Business registrations soar over 100K

Businesses registered with the Department of Trade and Industry (DTI) for the year have so far reached over 100,000. Speaking at the Amazon Southeast Asia Online Seller Summit yesterday, Trade Secretary Ramon Lopez said total business registrations for this year have already hit more than 108,000.

### Philippines lags in e-commerce usage in ASEAN

The Philippines ranked 96th out of 152 economies in the Business-to-Consumer (B2C) E-Commerce Index 2020 released by the UN Conference on Trade and Development (UNCTAD), lagging behind most of its neighbors in Southeast Asia in terms of readiness to support online shopping.

### Palay output declines in Q4

The country's production of palay (unhusked rice) declined by 1.3% in the last quarter of 2020 due to the consecutive typhoons that hit the country. Based on the seasonally adjusted rice production and prices for October to December 2020 of the PSA, palay output went down to 4.86 million metric tons (MT) from 4.92 million MT in 2019.

### Monetary easing seen on hold until 2022

In a new Asia Pacific research brief, UK-based Oxford Economics said that in countries like India and the Philippines, negative real interest rates prevail as monetary authorities keep rates at record lows to support their pandemic-battered economies.

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## TODAY'S TOP ASIAN NEWS

### Philippines set to take rare top spot for IPOs in SEA

A clutch of Philippine firms, including newly launched real estate investment trusts (Reits), could make the country South-east Asia's biggest IPO market this year, driven by attractive valuations and a recovering economy.

### SGX eyes more M&A to drive multi-asset strategy

The Singapore Exchange (SGX) is exploring mergers and acquisitions (M&A) to drive its ambitions as a multi-asset exchange. The bourse has operations in place across asset classes and will now concentrate on bolstering them, chief executive Loh Boon Chye said in an interview on Wednesday.

### TikTok sister app Douyin deepens search capabilities

ByteDance-owned Douyin, the sister app of TikTok, plans to increase investment in its search capabilities to enable users to navigate through a rising sea of short videos, an initiative that could change the way internet users find information online and rival advances made by Google over the years.

### Keppel Reit seeks to raise \$270m

Keppel Reit's manager yesterday proposed a private placement of between 235.6 million and 242.8 million new units at an issue price of between \$1.112 and \$1.146 per new unit to raise at least \$270 million in gross proceeds.

## TODAY'S TOP GLOBAL NEWS

### Bain hires banks to revive IPO of Autodis

The private equity owner of French car parts group Autodis has hired banks to resume plans for a share sale in Paris in a bid to take advantage of strong investor demand in the busiest-ever start to a year for stock listings, sources told Reuters.

### Health crisis drives surge in global debt

Stimulus measures and fiscal response to a global coronavirus pandemic added \$24 trillion to a record \$281.5 trillion in the world's debt mountain last year. Outstanding global debt, which rose by 9.4% year on year, was equivalent to 355% of total economic output in 2020.

### Cryptocurrency Ethereum hits record high

Ethereum, the second largest cryptocurrency in terms of market capitalization and volume, hit a record high on Thursday, lifted by growing institutional interest in the space, and more than a week after its futures were launched on the Chicago Mercantile Exchange.

### Dropbox to sublease some offices in transition

Dropbox Inc said it would sublease some of its office spaces as the file hosting service transitions to a remote working model. The firm, which has a sprawling warehouse-styled office building in San Francisco's South of Market neighborhood, is one of the many technology companies to make work from home a permanent arrangement.

### Automakers pause North American production

Freezing weather that interrupted gas supplies in the southern United States and Mexico was wreaking havoc on Thursday on car manufacturing plants on both sides of the border, with Ford Motor Co, Nissan Motor Co Ltd and Toyota Motor Corp reporting disruptions to their assembly lines.

### Walmart's Mexico unit boosts logistics in \$1b capex

Walmart's Mexico unit will ramp up logistics spending this year as a part of a 22.2 billion peso (\$1.09 billion) plan aimed at further boosting online sales, which soared in 2020, the retailer said on Thursday.