CIO Academy

Metaverse: A new world of opportunities

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- It is no secret that the world is digitising at a fast pace. From an era of static websites and 1-Dimensional texting in the 1990s to an age of 2-Dimensional social media and cloud computing, we now stand at the threshold of a new 3-Dimensional virtual world of the Metaverse.
- But what exactly is the Metaverse? And why should we, as investors, care to learn more about it? Metaverse is nothing but digitisation of human activity and disruption of everything that hasn't been disrupted yet. It is a new virtual world where our physical and digital lives effortlessly converge. To put it simply, the Metaverse is a new immersive virtual phenomenon where most real world activities like work, play, socialising, and economic transactions are mirrored into the virtual world, in same time and space.
- In this paper, we try to demystify the new virtual world of Metaverse from an investor's vantage point, especially as it is a structural trend which is expected to permeate most aspects of human activity in the next decade, creating attractive investment opportunities for those who understand it and invest in the right areas.
- We see attractive investment opportunities in 3D digital content (highly immersive 3D gaming, virtual tours, concerts etc.); Delivery (Metaverse hardware like VR headsets, smart devices); and Infrastructure & Connectivity (server ecosystems, cloud supply chains and datacentres). We also like real world applications of the Metaverse through 'digital twinning' of product life cycles. Despite recent volatility, we hold our conviction in these four areas, whilst steering clear of unregulated segments of the Metaverse like NFTs and virtual real estate etc.

What is the Metaverse?

In the last few decades, humanity has witnessed a fascinating journey of the world's digitisation. It all started from the onset of the internet in 1990s, which through decades of evolution and technological advancements, has morphed into a new 3-dimensional virtual world of the Metaverse in the 2020s. **But what exactly is this Metaverse anyway and why should we as investors care to pay attention to it?**

To better understand the concept of Metaverse and what it is all about, we think it may be worth starting from where this entire journey began from – that's the Web 1.0, which alludes to the onset of internet; to Web 2.0 which signifies the 2-dimensional social media; to Web 3.0 now which signifies the rise of the Metaverse:

Web 1.0: We all know that when the internet came into being in the early 1990s, it was an early stage nascent technology, where in the Netscape connected us to the internet. At this juncture, network speeds were slow and computing prowess was in its infancy, so the world wide web simply collected and shared information via very basic static websites and simple emails. Then came the cellular phone technology. Some of us may remember the early days of pagers and bulky cellular phones, with patchy networks and signal issues. **It was a time when information sharing was 1-Dimensional - just in black and white texts, not in real time. This phase is widely known as the Web 1.0.**

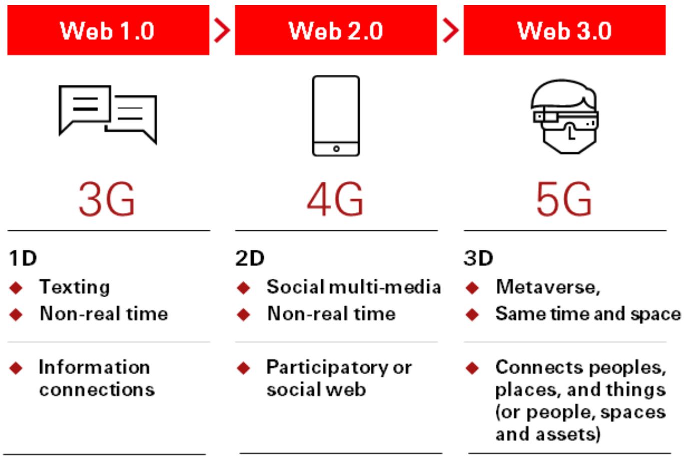
Web 2.0: Soon, with the advancement of technology and computing prowess, the internet slowly evolved into 'the social web' in the early 2000s. In this phase, the arrival of platforms like Facebook, Instagram and Twitter encouraged people to share much more information about each other and the world around them in 2-Dimensional formats like pictures, videos, voice memos etc. This was termed as the Web 2.0, which we are all very familiar with now, where, with the help of smart phones and 4G network, we effortlessly communicate on platforms like WeChat or WhatsApp on a daily basis without thinking much of it and save our valuable data on cloud computing. In Web 2.0 the control of data is centralised as it is saved and controlled by Tech giants like Apple, Google and Facebook.

Web 3.0: Web 3.0 is all about content creation, ownership, and distribution of content in more decentralised fashion. This trend should proliferate further with the onset of 5G, which offers greater speed in fractional time. And now, the internet is at the edge of further disruption. We find ourselves at the dawn of a new 3-Dimensional virtual world, called the Metaverse.

But what exactly is the Metaverse? It's a new virtual world where our physical and digital lives effortlessly converge to create a unified space where one can work, play, socialise, transact and interact. Simply put, the Mataverse is a new immersive virtual phenomenon where most real world activities are mirrored into the virtual world - in same time and space - where you can present yourself as an avatar to engage in the digital landscape. It is nothing but digitisation of human activity and the disruption of everything that hasn't been disrupted yet.

But while Web 3.0 is about content creation, ownership, and distribution of content in a more decentralized fashion, the Metaverse will centre around how users experience and interact with the internet of the future.

From Web 1.0 with the internet, to Web 2.0 with social media to Web 3.0 with the rise of the Metaverse. Web 3.0 connects people, places and things in a way they have never engaged in before.



Source: HSBC Global Private Banking, March 2022

There are a wide range of Metaverse experiences ranging from - Virtual Reality (VR) to Augmented Reality (AR) to mixed reality – covering content that is fully synthetic, to synthetic content - that interacts with the real world. As we move into this 'new normal' 3D digitised world in 2020s - where you can be physically in one place but with the help of an advanced VR interface, instantly get transported into another place via your virtual avatar, and go about your business virtually - this entire space is expected to become extremely competitive in our view, providing an array of new investment opportunities to investors.

While the Web 2.0 altered the way we interact, we think the Web 3.0 Metaverse has the potential to create an even more profound change in almost every aspect of our lives.

Different features of Web 1.0, 2.0 and 3.0

	Web 1.0	Web. 2.0	Web 3.0
Ways of interaction	Read only	Read-write	Read-write-own
Level of content	Static text	Interactive content	Virtual economies
Structure	Companies	Platforms	Networks
Infrastructure advancement	Personal computers	Cloud and mobile	Blockchain cloud
Control	Decentralised	Centralised	Decentralised

Source: HSBC Global Private Banking, March 2022

What role did the pandemic play in accelerating this trend?

As they say, adversity is the mother of invention. And that's certainly true of the global pandemic, which created a big shift in human behaviour and consumption preferences, giving a big push to technology advancement and adoption. COVID induced restrictions of movement and reduced face-to-face interactions fuelled an exponential increase in demand for virtual human connection, immersive digital content and online experiences. Traditional TV viewership and movie attendance seriously declined while interactive gaming, video streaming and social media boomed. People fast adapted to new ways of remaining connected and adoption of new technologies. This collective change in human behaviour and circumstances combined with rapid advancement of technology and the media landscape make the early 2020s ripe for the next big disruption of the internet, the Web 3.0.

The opportunity

As the Web 3.0 further accelerates and evolves, we think the Metaverse will greatly affect how people engage in e-commerce, use the social media, access and experience entertainment services and also how they interact with one another. Needless to say, this entirely new ecosystem would create a whole new opportunity set for organisations. For example, buying real world goods in virtual 3D stores and picking them up in the real world; attending a virtual 3D concert of a real world artist and doing a virtual 3D property visits before buying real estate would all become as normal for us in the near future, as is instant messaging on Whatsaap today.

We breakdown four key areas in the Metaverse, where we think investors can find attractive opportunities:

1.) **Digital Content**: Content is king, especially in the Web 3.0 virtual world. 3D content like 360 VR concerts and events, conferences, games and education providing more cognitively enhanced and immersive experiences could prove to be game changers in terms of how we live, work and play. By dematerialising the actual physical space, distance and things, the Metaverse phenomenally changes the online experience of gaming, using social platforms, e-commerce and online sports.

The monetisation of gaming: In the centrally controlled structure of Web 2.0, gamers were unable to monetise their investments and efforts. Game developers did not allow players to trade items with other players and kept these virtual worlds closed so that players could not transfer their virtual wealth to the real economy. **But, the evolution from Web 2.0 to Web 3.0 has led to a shift from 'closed ownership' (i.e. a centrally owned ecosystem, controlled by the web giants) to 'open ecosystems' operating in decentralised fashion on the blockchain technology.** In the Metaverse, 'open' ecosystems operate in decentralised fashion on the blockchain technology. These are owned and controlled democratically by the users, not the web giants.

The 'open' Metaverse ecosystems on Web 3.0 eliminate the need for capital controls imposed by Web 2.0 tech giants and players can 'Play to Earn', by using 'permissionless' consensus such a 'proof of work' or 'proof of stake' typically used by decentralised blockchains.

This new regime allows players to create and own their own digital assets in the form of Non Fungible Tokens (NFTs) which can be traded and transferred to digital wallets, creating an entirely new digital economy which has monetary value in the real world. This has established a new 'creator economy' in the Metaverse, which lets content creators design experiences which are in demand through use of tools like geospatial mapping, 3D drawing etc.

As per one estimate, video games, online videos and music streaming generated over $200bn annually in 2019, with over three-quarters of this number coming from video games alone (Source: HSBC Global Research, December 2021). According to another industry estimate, gaming industry's revenue could grow from circa $180bn in 2020 to about $400bn in 2025 (Source: Grayscale, January 2022). This is due to continued monetisation of video games by the game developers. A key trend in this continued evolution is a move away from 'paid games' to games that are 'free-to-play', which the developers monetise by selling players virtual items, virtual real estate etc. to improve their experience of the play and also their social status within these virtual worlds. The introduction of smart phone gaming had already expanded the player base, but now, the growth of the Metaverse should be another catalyst in expanding the gaming base and generating greater revenues.

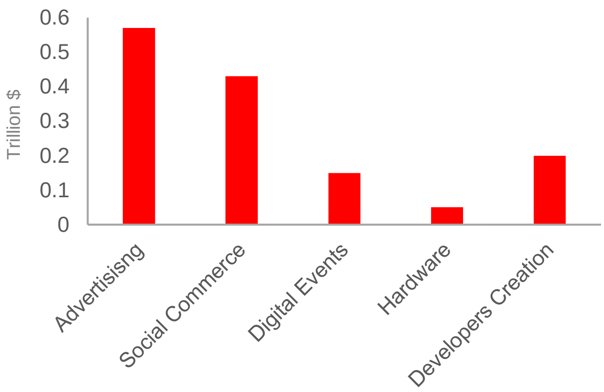
3D gaming industry revenues are on the rise

Source: HSBC Global Private Banking, March 2022

As a result, some of the biggest Tech giants like Facebook, Apple and Amazon, several other businesses in different sectors are recalibrating their business models and planning to somewhat open up their closed ecosystems to benefit from the decentralised world of Metaverse. In January 2022, Microsoft acquired video game publisher, Activision Blizzard, for US$75 billion (Source: Bloomberg), to be an active participant in this booming industry and to also create compelling content in the Metaverse.

For businesses, investment into the Metaverse ecosystem offers tremendous return potential, with revenue opportunity of over a trillion dollars in targeted advertising, digital events, monetisation of the virtual world of games and social commerce (see chart).

Global Metaverse potential total addressable market



Source: HSBC Global Private Banking, Grayscale, March 2022

Monetisation of targeted advertising in Metaverse: Another big allure of the Metaverse is targeted advertising. Meta (Facebook's parent company) hopes to use tiny human expressions to create a virtual world of personalised advertisements and spend over $10bn annually over the next decade to develop their Metaverse ecosystem and services. Recently, its CEO, Mark Zuckerberg, laid out his ambition to get *"1bn users and hundreds of billions of dollars of digital commerce this decade*" by selling discounted VR headsets to its enormous user base and create a de-facto large market place that attracts services, supports e-commerce and engages in targeted advertising (Source: CEO analysts conference, 28 October 2021).

Last summer, Ralph Laurent launched an inaugural collection of digital apparels on a 3D platform in which customers were offered 50 items to dress their avatars in the brand's signature "prep-school" look. Within weeks, over 100,000 pieces were sold for between $0.57 and $2.86 each to customers who were ready to embrace and explore the new frontiers of virtual fashion. And Ralph Lauren isn't alone. An influx of luxury and consumer brands like Starbucks, McDonald's are looking to exploit advertising and marketing opportunities offered by the Metavarse, in a market where annual revenue could soon soar to US $1 Trillion (Source: South China Morning Post, 12 March 2022)

Companies are finding new ways of engaging with new customers as advertising models shift in the Metaverse. Some companies have created digital headquarters in the Metaverse for their employees to meet up in their virtual avatars and collaborate with each other in real time whist still working from home. Several others have erected digital billboards in the Mataverse as a new form of advertising. There have been virtual art auctions conducted by well know art galleries, selling NFTs of sought after artists.

Therefore, as society and industry become increasingly digitised and connected, there are several potential investment opportunities originating from the 'creator economy' of the Metaverse.

2.) **Delivery:** As the Metaverse grows and integrates with the real world, it would actually be the wearable devices that would drive investment opportunities, in our view.

One of the main ways in which the fullest, highly immersive, 3D Metaverse experience is delivered today is through Virtual Reality (VR) headsets. Wearing a VR headset puts one into a digitally constructed, 3-Dimensional world, taking over one's visual field of view through goggles and headsets, creating an illusion that one is elsewhere. These enhanced cognitive experiences that the Metaverse offers could prove to be a shot in the arm for the Virtual Reality (VR) landscape and exponentially raise its public visibility and demand.

We see great investment opportunities in the Metaverse hardware space, especially in the VR headsets which have upgraded design and functionality. Currently, the VR headsets have a reputation of being heavy, less sensitive to sensory movements and difficult to wear over longer periods of time. For VR to grow beyond a niche product, wired devices need to transition into wireless devices. But, as the quality of virtual reality headsets improves - with greater tech sensitivity to voices, eyeball movements and gestures, higher download speeds, extra cameras - these smarter gadgets will become more complimentary to other hardware and will become much easier and enjoyable to use. Headsets with 6 degrees-of-freedom (6DOF)- a term for completely wireless headsets, not requiring any external tracking equipment or PC, are likely to make the VR experience more immersive, appealing and user friendly with their powerful chips and better operating systems.

There could be a wave of hardware demand (VR headsets) comparable to the early years of smartphones. Therefore, for investors, headsets are one way to take advantage of the opportunities offered by the world of Metaverse. But that's not the only avenue. With a boom also expected in technologies such as sensors and semiconductor chips, which are used in smart phones, 3D glasses, connected watches, smart audio devices and speakers, haptic devices etc. there are attractive opportunities in these areas too.

Upgraded wearables like VR headsets could drive a wave of hardware demand comparable to the early years of smartphones

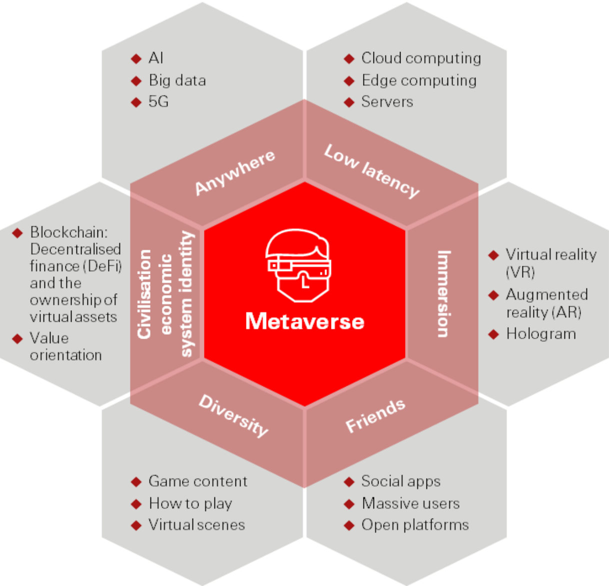
Source: Bloomberg, HSBC Global Private Banking, March 2022.

3.) Infrastructure and connectivity: Software ecosystems such as AI-servers, cloud supply chains and datacentre providers will form the key infrastructure necessary for the Metaverse, making it another attractive investment area. Selective companies which specialise in the AI-server space and pose entry-barriers to new entrants due to server motherboard design difficulties offer attractive investment opportunities. Selective names in this space have the potential to grow and gain market share due to their prior experience in AI-server infrastructure and the experience of working with big tech names like Google and Apple. Moreover, a number of technology companies in Asia have started placing themselves into the new Metaverse era by acquiring related technologies. Strategic investments and partnerships with such companies and astute acquisitions of innovative start-ups offer great value-add potential to investors.

In addition to the M&A opportunities, investment opportunities in gaming platforms that offer infrastructure for people to create content or games; or gamified social networks which support more programmable experiences; and platforms where real world experiences can be improved by augmented reality and virtual reality also offer attractive investment opportunities in the Metaverse infrastructure and connectivity space.

But as the society becomes more and more adaptive to digitisation and gets immersed in the Metaverse, better energy generation solutions will be required to power this highly energy intensive ecosystem. It is important that investors understand this connection between digital growth and the rising demands on the global energy systems. Global electricity grids face huge supply constraints from rising data consumption and from new data-intensive applications such are virtual reality, which are also power intensive. In a scenario of accelerated digitisation, power consumption just due to digitisation could grow from almost 2000GWh (8.9% of global power) to 6,200GWh (19% of global power consumption); (Source: HSBC Global Research, Dec 2021). In our view, there is evident demand growth for datacentre solutions and services, with an ongoing focus on energy efficiency and reduction in emissions, which also tie in well with our ESG focused investment solutions.

Key features of the Metaverse



Source: HSBC Global Private Banking, March 2022

4.) **Virtualization and digital twins**: One of the biggest developments in the world of technology in recent years has been that of 'digital twins'. The idea of 'digital twins' essentially emerged in the product lifecycle management, to streamline product development. **A 'digital twin' is nothing but a virtual replication of a physical system, process or product. Twins are linked to live streams of data collected from sensors and other connected devices, which allows them to mirror, analyse and predict the behavior of their real world equivalents** and the impact of proposed improvements or sudden changes.

Product development and manufacturing is being aided by the concept of 'digital twins'

Source: HSBC Global Private Banking, March 2022

The concept of 'digital twins' is now being used in the real world in areas of product development, manufacturing, automotives, architecture of smart cities and healthcare. Organisations in these industries are using the 'digital twin' technology to identify where improvements can be made to attain more favourable outcomes for the future by demonstrating the full life cycle of a product, service and experience through robust simulation.

In another example of productivity enhancement through the use of AR/VR, some companies have introduced 'enterprise edition glasses', which are lightweight, transparent, wearable computer glasses that allow hands-free work, and are especially used in areas of manufacturing, logistics and healthcare. As they are hands-free, they reduce production time on complex assemblies. Several warehouses use such glasses in supply chain processing, scanning and order picking, directly from the line of sight, hence improving operational efficiency.

Companies using such enhanced 'digital twins' model and technologies are therefore likely to improve their product quality, operational efficiency and face fewer real world reprimands, fines or regulatory issues due to improved safety. Such companies offer better value to both customers and investors alike.

Areas of the Metaverse that we are less enthusiastic about:

We have clearly highlighted the four key areas where we see attractive investment opportunities in the virtual world of Metaverse. But there are some other areas of the Metaverse which we are less convinced about, primarily due to a lack of well-established public markets, market making practices and also due to potential regulatory concerns. **We therefore do not prefer investing in virtual real-estate, NFTs and cryptocurrencies.**

Investment Summary

In a nutshell, we see great investment opportunities in the Metaverse space, especially in 3D digital content, its delivery (which essentially focuses on the VR hardware and wearable devices), in the digital infrastructure arena and in companies which use the concept of 'digital twins' to improve their product life cycle management.

Our Metaverse High Conviction Investment theme exploits all these opportunities and looks for a blend of investment solutions/ stocks which are mega/large caps and have the ability and wherewithal develop their Metaverse ecosystems through continuous capex and innovation. But we also focus on small/mid-cap opportunities which are much more 'pure play' but may be riskier investments. A prudent blend of large cap and small cap stocks which pass our fundamental bottom up stock selection approach should prove to be good thematic overlays to well diversified multi-asset investment portfolios.

Whilst we think the four key areas of the Metaverse discussed in this paper offer attractive investment opportunities, investors may need to be mindful of the fact that this is still a relatively new phenomenon which is in early stages of its ecosystem development. Development of such large scale technological ecosystems takes time, with several companies indulging in capital expenditure spanning over several years in the future.

The Metaverse is also in the early stage of its journey on the end-user ‘adoption curve’, As VR headsets and other smart devices become more advanced; are readily offered by well-known platforms to access immersive 3D experiences and engage in 3D ecommerce; and much like today’s smart phones, become a new norm of life - we expect more and more people to get comfortable with the new virtual world of the Metaverse and become engaged with its offerings. This too shall take some time, in our view. Therefore, all in all, this is very much a long term investment theme, which may take time to yield investment returns and is potentially only suitable for investors with medium-to long term investment horizons, with an ability to ignore short term market gyrations.

Having said that, as astute investors, the time to learn about the Metaverse, identify its bountiful opportunities and selectively invest in them for medium-to-long term, is here and now.

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Risks of investment in fixed income

There are several key issues that one should consider before making an investment into fixed income. The risk specific to this type of investment may include, but are not limited to:

Credit risk

Investor is subject to the credit risk of the issuer. Investor is also subject to the credit risk of the government and/or the appointed trustee for debts that are guaranteed by the government.

Risks associated with high yield fixed income instruments

High yield fixed income instruments are typically rated below investment grade or are unrated and as such are often subject to a higher risk of issuer default. The net asset value of a high-yield bond fund may decline or be negatively affected if there is a default of any of the high yield bonds that it invests in or if interest rates change. The special features and risks of high-yield bond funds may also include the following:

- Capital growth risk - some high-yield bond funds may have fees and/ or dividends paid out of capital. As a result, the capital that the fund has available for investment in the future and capital growth may be reduced; and
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- Vulnerability to economic cycles - during economic downturns such instruments may typically fall more in value than investment grade bonds as (i) investors become more risk averse and (ii) default risk rises.

Risks associated with subordinated debentures, perpetual debentures, and contingent convertible or bail-in debentures

- Subordinated debentures - subordinated debentures will bear higher risks than holders of senior debentures of the issuer due to a lower priority of claim in the event of the issuer's liquidation.
- Perpetual debentures - perpetual debentures often are callable, do not have maturity dates and are subordinated. Investors may incur reinvestment and subordination risks. Investors may lose all their invested principal in certain circumstances. Interest payments may be variable, deferred or canceled. Investors may face uncertainties over when and how much they can receive such payments.
- Contingent convertible or bail-in debentures - Contingent convertible and bail-in debentures are hybrid debt-equity instruments that may be written off or converted to common stock on the occurrence of a trigger event. Contingent convertible debentures refer to debentures that contain a clause requiring them to be written off or converted to common stock on the occurrence of a trigger event. These debentures generally absorb losses while the issuer remains a going concern (i.e. in advance of the point of non-viability). "Bail-in" generally refers to (a) contractual mechanisms (i.e. contractual bail-in) under which debentures contain a clause requiring them to be written off or converted to common stock on the occurrence of a trigger event, or (b) statutory mechanisms (i.e. statutory bail-in) whereby a national resolution authority writes down or converts debentures under specified conditions to common stock. Bail-in debentures generally absorb losses at the point of non-viability. These features can introduce notable risks to investors who may lose all their invested principal.

Changes in legislation and/or regulation

Changes in legislation and/or regulation could affect the performance, prices and mark-to-market valuation on the investment.

Nationalization risk

The uncertainty as to the coupons and principal will be paid on schedule and/or that the risk on the ranking of the bond seniority would be compromised following nationalization.

Reinvestment risk

A decline in interest rate would affect investors as coupons received and any return of principal may be reinvested at a lower rate.
Changes in interest rate, volatility, credit spread, rating agencies actions, liquidity and market conditions may significantly affect the prices and mark-to-market valuation.

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Renminbi bonds are settled in renminbi, changes in exchange rates may have an adverse effect on the value of that investment. You may not get back the same amount of Hong Kong Dollars upon maturity of the bond.
There may not be active secondary market available even if a renminbi bond is listed. Therefore, you need to face a certain degree of liquidity risk.
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There is a possibility of not receiving the full amount in CNY upon settlement, if the Bank is not able to obtain sufficient amount of CNY in a timely manner due to the exchange controls and restrictions applicable to the currency.

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