

FRMO Corp.

2022 Shareholder Letter

Dear Fellow Shareholders,

The primary focus of the 2021 shareholder letter was cryptocurrency. Fiscal 2021 was a year of significant progress in the evolution of the FRMO cryptocurrency business. In this letter, far more detail will be provided about that business and our cryptocurrency strategy.

This will be easier to understand if, first, an explanation is provided as to why cryptocurrency is so volatile. This volatility can potentially destroy large sums of fiat capital if the investment pace – meaning the capital allocation pace – is not measured.

Essentially, one might say that the value of a cryptocurrency such as bitcoin is primarily influenced by three vectors: the cost of mining equipment; the approaching halving date; and the aggregate system hash rate, or processing capacity.

Mining equipment is a generally declining cost. Cryptocurrency mining is simply the redundant validation – as among the vast number of miners – of transactions to maintain the integrity of the blockchain. The compensation for this activity is the bitcoin block reward that issues new coins approximately every ten minutes. Viewed in this sense, calling this validation process mining is probably a poor choice of words that tends to obscure a proper understanding of the economics of the validation process. Yet, this is now the standard industry parlance.

The mining equipment must logically decline in value continuously, because of the so-called "halving." Every four years, the block reward is reduced by 50%. The costs of mining are primarily electricity expense. This is very unlikely to decline and will probably increase over time. Therefore, a machine is scheduled, so to speak, to become less productive. A less productive device is less valuable. Ultimately, the cost of this equipment must decline in order for mining to remain a profitable endeavor.

Moreover, since the halving date is known in advance, the decline in the value of the equipment should be exponentially smooth as one gradually approaches the halving. In actuality, there have been two enormous mining device price increases in the current block cycle. The first was a nearly five-fold price increase between November 2020 and April 2021. The second was an approximately 70% device price increase between July 2021 and December 2021. As the mining equipment prices increased, bitcoin became much more valuable because it became far more expensive to mine bitcoin. This coin price increase should not be surprising, because the price of any commodity will increase to reflect additional production cost.

However, this sudden, almost discontinuously elevated price for bitcoin mining equipment should not have happened, because all participants are presumably aware of the approaching halving; there should be no 'surprise' factor. The reason for the increase in device prices was the activity of many mining firms raising capital and almost simultaneously placing large orders for equipment. This should not have taken place, at least from a calculable return-on-invested-capital perspective, since the progress to the halving is inexorable and device prices must fall accordingly.

In fact, from December 2021 to August 2022, state of the art mining devices declined in price by about 70%. This obviously reduced the cost of mining bitcoin, and the price of bitcoin has declined proportionately.

However, the other two vectors cause the price of bitcoin to rise over time. The first of these is the inexorable approach of the halving. At the time of the halving, the block reward will decrease by 50%. Consequently, twice as much equipment will be required to mine the same quantity of bitcoin. This is a production cost increase. At the time of this writing, the halving is scheduled to occur in roughly 623 days.

The third vector is the so-called aggregate system hash rate. The term hash rate is merely industry vernacular for the aggregate computational power of the system. At the moment, the hash rate is 231.62 Exa hash per second. Exa is the prefix for 10 followed by 18 zeros, or 10^{18} . Thus, the system attempts to solve the block reward equation at the rate of 10^{18} calculations per second.

Incidentally, this is why bitcoin is so difficult to hack (actually, has never been hacked). Obviously, an enormous amount of computational power would be required to illegally penetrate the system and appropriate bitcoin. This is so much computational power that the entity making the attempt would need to use so much electricity that it would probably be identified before the attempt was made.

However, even if this were not the case, bitcoin is still likely to be safe, because the bitcoin data architecture was designed to limit the size of any given block. This places a constraint on the market value of every block, since the number of transactions in that block are limited. The value of the equipment necessary to steal coins in a single block would be greater than the value of the coins in the block.

The aggregate system hash rate has an impact on the value of bitcoin, since computation is performed in pools so that the block reward is almost always shared among many entities. As the computational power of the system rises, the reward is shared between more entities. Therefore, each participant in a pool needs to add computational power and the incremental expense to earn the same amount of bitcoin. If the hash rate were to decline, and this does happen, each item of equipment automatically becomes more productive and earns more bitcoin. This is arithmetically very much like a decrease in the cost of equipment, since one needs less equipment to mine the same number of bitcoin.

Since the beginning of calendar 2022, the hash rate has increased by about 14%, and this has served to offset slightly the decline in bitcoin prices that occurred because of the decline in device prices. This dynamic reflects the impact of the three vectors.

It is important to remember that the hash rate tends to rise over time. The halving or bitcoin block reward reduction is inexorable, and every passing day brings the system closer to that point so that, in the long run, the halving is the dominant variable.

It will be recalled from the fiscal 2021 shareholder letter that FRMO owned, on a cost basis, 1.43% or \$68,854 worth of **Horizon Kinetics Cryptocurrency Mining I** and 1.48% or \$125,000 worth of **Horizon Kinetics Cryptocurrency Mining II**. On December 1, 2021, these interests

were exchanged on a tax-free basis for \$454,884 worth of the newly created **Consensus Mining & Seigniorage Corporation** (CMSC). This is to be a publicly traded company that should commence trading on or about December 1, 2022.

On June 30, 2022, Consensus Mining held 144.5 bitcoin and 2,493 Litecoin, as well as very small quantities of Bitcoin Cash, Z-Cash, Ethereum, and Ethereum Classic. Balance sheet cash at quarter end was about \$65.8 million. Most of the cash raised in the equity offering that created Consensus Mining has not been spent, for the reason that mining devices were priced at unsustainably high levels.

At this point, the reader is probably wondering how anyone can possibly know whether or not a mining device is unsustainably expensive. In fact, it can be calculated with a great degree of specificity. It is known that an S-19 Pro 110 TH/s device can be purchased for \$4,000. At the time of this writing, this S-19 Pro will produce \$10.44 worth of bitcoin per day. This type of data is readily available on mining-related websites. If one assumes an electricity cost of \$0.08 per kw/hr, the operating cost will be \$6.24 per day. Therefore, 952.38 days are required to earn back the \$4,000 investment. The problem is that the halving will take place in 623 days. Subsequent to the halving, the revenue will be reduced by 50%, while the costs will remain unchanged or potentially increase. The daily profit at that point will be, at best, \$1.02 per day.

On the 623rd day, at a daily profit of \$4.20 (\$10.44 of revenue minus \$6.24 per day of operating expense), total earnings would be \$2,654.40. Earnings of \$4,000 would merely be breakeven, so the additional earnings needed to reach breakeven would be \$1,845.60. At the rate of \$1.02 daily, this would require another 1,319 days. The problem is that on the 623rd day, there will be 1,460 days remaining to the next halving, and the process would recommence. In practice, it is likely that new, improved equipment will have been developed long before that point, equipment that would be able to operate profitably in the subsequent halving environment. The current state of the art device we're evaluating, that S-19 Pro, would probably be obsolete long before this presumptive break-even point had been reached.

One might object at this point and argue that an equipment purchase could still be justified if one believes that bitcoin will rise in value during the life of the device to be purchased. However, if one really believes that bitcoin will appreciate, surely it is better to simply purchase the coin itself rather than engaging in the complexity and effort of mining.

In actuality, this really happens within the cryptocurrency mining marketplace. When mining profitability does not reflect the approaching halving, investment tends to shift from mining to outright coin purchases. That coin purchase activity can raise the price of bitcoin. Meanwhile, with machines not being replaced at the end of their useful lives, the system hash rate eventually declines, reflecting the economic realities of the approaching halving, and mining once again becomes more profitable for the remaining participants. This is the cycle that engenders the extreme volatility of the coin price. However, that volatility is only possible because the economics of cryptocurrency mining are not well understood. Ultimately, this state of information inefficiency will change, and the dynamics of mining economics will become well understood. The coin price as well as the device prices will reflect those dynamics. At that point, the system will become far less volatile.

At present, though, as is plain to see, the system remains volatile. If one is interested in holding cryptocurrency and also wishes to avoid volatility, the best way to do so is with a low-cost mining operation. Mining is a more efficient means of acquiring bitcoin in this environment. The example of the FRMO investment in **Winland Holdings Corp.** (ticker WELX) will illustrate this point.

In the 2021 FRMO annual report, it was stated that Winland owned 27.7376 bitcoin. At the time of this writing, Winland owns 68 bitcoin.

One year ago, bitcoin traded at \$49,296. Thus, the 27.7376 coins were worth \$1,367,353. At the time of this writing, the 68 coins are trading at \$21,243 each for an aggregate value of \$1,444,524. The value of the Winland bitcoin holdings has increased by 5.64%, while the value of bitcoin has *declined* by over 56%. This illustrates the economic difference between a mining corporation and a bitcoin ETF. The mining entity is continually manufacturing more bitcoin (and, necessarily, at an operating profit, otherwise the mining devices would be immediately turned off). The ETF simply holds bitcoin, but not even a fixed amount; it is a modestly shrinking sum of bitcoin due to fees and expenses.

To further test the difference between buying vs. mining, let us assume that bitcoin had doubled in price, rather than dropping by over half. In principle, the ETF would double in value, less applicable expenses. If bitcoins were now worth \$49,296 x 2, or \$98,592, the 68 coins held by Winland would be worth \$6,704,256 or 4.9x the amount of coin that Winland held just one year ago.

Viewed in this sense, it is important to maintain a mining business that can continue to accumulate coins in the variety of favorable and unfavorable operating environments that are likely to be encountered. In other words, the risk/reward spectrum of cryptocurrency mining is far more favorable than the risk/reward spectrum of merely owning cryptocurrency.

Given these factors, it should not be surprising that FRMO has increased its exposure to Winland Holdings. One year ago, FRMO owned 28.2% of Winland. FRMO owned 30.72% of Winland as of the close of the FRMO fiscal year on May 31, 2022. FRMO has since purchased more Winland shares in the open market. Winland, on June 30, 2022, held over \$1.2 million of balance sheet cash as well as some Mt. Gox bitcoin trade claims that were purchased after Mt. Gox filed for bankruptcy.

Similarly, FRMO is increasing its coin exposure by virtue of the same mining strategy. The coin positions as of May 31, 2020 and May 31, 2021 were as follows:

FRMO Corp.'s Coin Positions

	As of		
	June 30, 2020	May 31, 2021	May 31, 2022
Bitcoin	60	98	129
Ethereum	35	35	35
Ethereum Classic	662	662	662
Zcash	49	57	62
Litecoin	458	898	1,678

In the past year, FRMO has placed somewhat greater emphasis upon mining Litecoin than mining bitcoin. The reasons for this are, firstly, that Litecoin is much closer to its halving than bitcoin and thus the pricing environment reflects a profitable post-halving dynamic. At the time of this writing, the Litecoin halving will take place in 349 days.

It should also be observed that Litecoin has the same monetary policy as bitcoin. Litecoin simply commenced later and, at the moment, has a higher interim inflation rate. Ultimately, the bitcoin and Litecoin inflation rates will converge at near zero. Presently, though, Litecoin has only 1% of the value of bitcoin. However, if bitcoin is ultimately hoarded, as would be predicted by Gresham's law, there will be a valid use case for Litecoin, in which case the coin could experience considerable appreciation.

FRMO has not purchased any mining equipment in calendar 2022.

The Horizon Kinetics cryptocurrency exposure is as follows:

Horizon Kinetics Coin Positions
As of 8/31/22

Bitcoin	115
Ethereum	175
ZenCash	67
Zcash	183
Litecoin	1,208
Bitcoin Cash	82

It might be observed in passing that an even better investment case might be made for Bitcoin Cash than for Litecoin. This is because when the Bitcoin Cash fork occurred in August 2017, it was not supported by most cryptocurrency exchanges. Consequently, many holders of bitcoin needed to actually obtain the Bitcoin Cash coins themselves, using the blockchain and private keys. For want of the requisite technical expertise, though, many bitcoin holders simply did not obtain the Bitcoin Cash coins. That means that many of the coins on the Bitcoin Cash blockchain remain unclaimed by any owner and likely can never be claimed. In other words, the effective number of Bitcoin Cash coins outstanding is probably far lower than the actual blockchain quantity. However, Bitcoin and Bitcoin Cash have approximately the same number of coins outstanding on the respective blockchains.

The Bitcoin Cash market capitalization is roughly one half of 1% of the market capitalization of bitcoin. Yet, as noted above, Bitcoin Cash has the same monetary policy as bitcoin. If bitcoin were to rise in value and Bitcoin Cash were to have a use case as a supplement for bitcoin hoarding due to Gresham's law, it is possible that in these circumstances Bitcoin Cash could exhibit a very high rate of return in order to achieve parity, in terms of total market value, with bitcoin.

HM Tech is yet another of the cryptocurrency businesses. It is 7.4% owned by FRMO and 51% by Horizon Kinetics. The company hosts cryptocurrency mining equipment, including equipment belonging to FRMO and Horizon Kinetics. The company also repairs mining equipment. FRMO owns the buildings in which HM Tech is located. The HM Tech business has been flourishing. Recently, it expanded the hosting business, increasing power capacity by several megawatts that were recently energized.

The last 12 months have been a very busy time for the disparate collection of FRMO cryptocurrency businesses.

It has also been a busy time in the asset management realm at Horizon Kinetics. In January 2022, the **RENN Fund** (RCG) completed a rights offering, raising capital by selling 1,063,830 newly created shares at a price of \$1.98 per share. The capital raised was \$2,106,383. Shareholders submitted subscriptions for 317% of the permitted number.

The **Horizon Kinetics Inflation Beneficiaries ETF** (INFL) now has \$1,297 million in AUM. In addition, Horizon Kinetics recently launched the **Blockchain Development ETF** (BCDF). Being newly launched, this ETF has only \$1.87 million in AUM. Eventually, blockchain technology will impact all business. At the moment, it is very early in the blockchain evolutionary process. There are other blockchain ETFs that trade. This fund focuses upon companies that have policies of gradual and measured blockchain capital allocations in a manner similar to the policy of FRMO and the companies in which it has chosen to invest.

Cryptocurrency has yet to be established as a legitimate institutional-grade asset class. Moreover, almost all financial transactions worldwide are administered by a centralized trusted counterparty or intermediary. Decentralization has yet to make its appearance in a meaningful way in the financial services industry. However, if and when that does happen, it will transform society far more profoundly than the changes brought about by the evolution of the internet.

Horizon Kinetics itself has experienced asset inflow in the past 12 months. The active management industry in general, or more properly speaking, what remains of the active asset management industry, has performed well in the past 12 months. Nevertheless, new funds continue to flow largely to passive management.

The debate between the active and passive approaches to the investment of capital is the most consequential investment issue of the contemporary era. If passive management remains the dominant strategy, or even increases its dominance, then it must follow that new investment capital will continue to flow towards the largest, most mature firms, yet which generally have no need for incremental investment capital, and without regard to market-based clearing prices (passive fund inflows are formulaic and valuation-indifferent). The small firms that might have growth opportunities will find that it is difficult, or at least expensive, to raise investment capital.

One example of this phenomenon is the SIFMA (Securities Industry Financial Markets Association) equity issuance statistics. In the US, from 12/31/2021 to 7/31/2022, total equity issuance this year was \$57.7 billion, down 79.7% from the comparable period one year ago. The issuance from initial public offerings (IPOs) was \$4.9 billion, or a reduction of 95.3%.

For scaling perspective, the S&P 500 market capitalization is approximately \$35.5 trillion. Thus, even IPO issuance of \$100 billion is quite negligible capital in relation to this figure. It is hardly any less negligible in relation to the GDP of the U.S., which is approximately \$24 trillion.

In the bond market, the impact of non-market-based price distortion is even more severe, since the U.S. government securities comprise the largest portion of the bond asset class. In the U.S.

bond market, over 40% of all issuance is by the U.S. Treasury, while another 27% is from federal agencies such as Fannie Mae and Freddie Mac. The U.S. Treasury alone is anticipated to issue at least \$1.6 trillion of new debt in the next 12 months. In one of the never-ending self-reference paradoxes of indexation practice, government bond issuance increases the float of government bonds, which increases the weight of government bonds in the broad bond indexes, which then requires yet more purchases of U.S. government debt by index investors.

The consequence is that the entrepreneurial class is responsible for the investment of an ever-diminishing proportion of the capital of the nation. Of course, entrepreneurs can and frequently do misallocate capital as well as anyone. However, the consequence is that these entrepreneurs are quickly relieved of responsibility for asset allocation. The index is merely a computer algorithm. It can never be judged to have misallocated capital for the simple reason that it can't underperform itself – whatever the outcome, it is merely the index return or the return that should have been earned even if that return happens to be negative.

In this climate, our investment in **Miami International Holdings** (MIH) has prospered. As a private company, the accounting-based valuation for MIH remains at \$4.322 million on the FRMO balance sheet. Operationally, volume is steadily increasing and intriguing new products are being launched.

In balance sheet terms, FRMO is at the strongest point in its history. Shareholders' equity attributable to the Company stands at \$181.4 million. This is despite the significant recent decline in the value of bitcoin. The two largest capital commitments remain **Texas Pacific Land Corp.** and the **Grayscale Bitcoin Trust** (GBTC). Shares held of Texas Pacific Land, both directly and indirectly, total 51,705 as of May 31, 2022, and shares held of the Grayscale Bitcoin Trust (GBTC), both directly and indirectly, total 599,723. Total assets of FRMO equal \$338 million. This includes somewhat less than 5% of the cash and marketable securities of Horizon Kinetics. FRMO owns 4.95% of Horizon Kinetics, LLC, and this firm maintains a highly liquid balance sheet and owes no debt. The sole debt of FRMO is a \$699,840 mortgage against the buildings in which HM Tech is located.

Some years ago, FRMO established **Horizon Kinetics Hard Assets, LLC** in order to make investments in securities deemed to be inflation beneficiaries. At fiscal year-end, FRMO holds a 21.88% interest in HK Hard Assets. One year ago, this interest was 22.02%. FRMO has continued to make monthly investments in HK Hard Assets. The participation rate has declined only because one of the authors of this review has also continued to make monthly investments in HK Hard Assets, and since the sum of the parts must equal the whole, this has resulted in a modestly lower proportionate ownership for FRMO despite its continued investments. The largest holding of HK Hard Assets is Texas Pacific Land Corp.

Several months ago, **Horizon Kinetics Hard Assets II** was created. FRMO is making monthly investments that commenced at the end of February 2022. The portfolio was initially funded with some shares of Texas Pacific Land Corp. However, the object of the portfolio is to focus upon other investments, specifically on beneficiaries of inflation that have no need to raise outside capital. The process for FRMO will be to continue to make monthly investments. The fund will include non-FRMO capital.

Hard Assets II has already made an aggressive, for us, investment in the energy area. Strong consideration is being given to another possible investment in the energy services industry. The unifying fund construct will remain beneficiaries of inflation.

Historically, arguably until 1980, most wealth was tangible or hard asset wealth. The term financial asset was generally not utilized. Even intellectual capital such as patents and copyrights were deemed to have transitory value. A copyright eventually expires. This is also true of a patent. However, in the case of a patent, the intellectual property can be rendered obsolete by a superior innovation long before patent expiration. This has been happening with increasing frequency in the 21st century as the pace of technological change has accelerated and continues to accelerate.

The extremely high interest rates in existence at the end of the 1970s made possible the refinancing of debt at continually lower interest rates – essentially, a multi-decade bull market in stock and bond valuations – and this made the financial asset, as an implementable asset class, possible. In addition, the approaching collapse of Soviet Communism placed a large variety and vast supply of hard commodities on the world market in an attempt to earn a sufficient amount of hard currency to maintain the system. Ultimately, the effort failed, and in the aftermath of failure, even more commodities were sold to prevent bankruptcy. This dramatically, and for a very extended period, lowered the cost of essential raw materials for the industrialized economies.

The Chinese Communist society found itself in a similar position of dire need for hard currency, but had very few commodities to place upon the world market. However, the nation did have, at the time, 1 billion people. Hence, it placed a vast supply of low-cost labor on the world market. This strategy had its later imitators in India, Pakistan, Malaysia, Thailand, Vietnam, and many other nations such as Turkey and Mexico. It is probably no exaggeration to state that between 1982 and 2019, several billion lower-cost workers entered the world labor market. In concert with the impact of the excess commodity supply, this period was therefore one of the great disinflationary periods in human history.

Unfortunately, those counter-inflationary forces cannot be continued, because the supplies of both commodities and human beings willing to work for very low wages are limited. Just as the disinflationary era created the financial asset, the limitations of those disinflationary trends should ultimately restore the hard or tangible asset to its historical primacy. After decades of disinflation, the financial or intangible asset has achieved primacy in indexation. There is very little tangible or hard asset exposure in the typical equity index.

In this letter, we have provided more detailed information than usual of the extent of our cryptocurrency activities. We have launched several investment vehicles by which to participate in what we believe will be a continuation of recently emerging investment trends that have been dormant for perhaps four decades. As always, we thank our shareholders for their continued support. If this letter provokes questions, please do not hesitate to contact us so that we can provide answers.

Murray Stahl
Chairman and CEO

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