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THE BUSINESS REASONING OF BUYING VS. MINING CRYPTOCURRENCY: A BITCOIN ETF VS. A BITCOIN MINING COMPANY

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Conceptually, the potential return on a bitcoin ETF is easy to understand. The return on the ETF will be equal to the return on bitcoin for the time period in question, less the management fee and less any transaction costs of buying or selling bitcoin. Conceptually, bitcoin mining should be similar.

The return from mining should be equal to the number of bitcoins produced by the mining equipment over the useful life of the equipment, multiplied by the return produced by the coins, less the costs of operating the equipment.

However, there are considerable forecasting challenges for a mining operation. First, one cannot know with any precision how many coins will be produced over the useful life of the mining equipment. Second, one cannot know the estimated useful life of the equipment. A life of two years is a reasonable estimate, though in practice some equipment has had a useful life of four years.

The next challenge is estimating the productivity of the machine. An important factor here is the hashrate. Due to the bitcoin halving protocol – which is the 50% reduction in the block reward every four years – and the empirical reality that the hashrate of the system is generally rising. That is simply because, if any given miner receives half as much bitcoin as previously, then in order to maintain the prior level of profitability, the miner has to double the amount of processing power expended in mining. But then, as the systemwide hashrate increases, the difficulty of solving the block reward algorithm is increased in order to keep bitcoin issuance to a roughly ten-minute timescale. All of this also applies to Litecoin and any of the other roughly 40 mined coins that follow a mining protocol similar to that of bitcoin.

It is reasonable to assume that the number of coins produced by each machine in any given period will decline over time. Yet, even this is not always true; though relatively brief, there have been periods of system hashrate decline. The hashrate is simply the aggregate computational power of the entire mining community.

Generally, for those who want to buy a bitcoin mining rig, it's paid for it in bitcoin. It's not because the operator wants to spend bitcoin; rather, it's because bitcoin is what the sellers want. How is the decision to mine made, versus simply buying bitcoin? If you are potentially a candidate for mining and you really believe in the value thesis behind bitcoin, you would not buy a machine just on the possibility that bitcoin might appreciate. What if it doesn't? The necessary precondition for buying a machine is you must believe that the price of bitcoin is going to go up, in which case you're better off buying a bitcoin than buying a machine. You'd make more money on the currency than on the mining. At least on a momentary basis. But if more people like yourself actually do

buy bitcoin instead of the machine, the coin price would be higher, ergo the machine would be more profitable and that would solve the problem.

Another way this buy/operate question can resolve itself is if a certain percentage of the miners — let's say half— were to say, "I'm going to stop mining because I don't believe my rig is going to be sufficiently profitable to induce me to mine." If half the miners drop out of the system, the remaining miners would be that much more profitable and therefore would be encouraged to buy more rigs. But, again – though is not widely understood – rig manufacturers insist in being paid in bitcoin. Consequently, those miners who remain either have to surrender some of the bitcoin balances that they mined, as payment for the rigs, or they have to buy some bitcoin in order to pay for the rigs. This latter approach is especially true for people who are not currently mining but wish to or are attracted to mining. This mining rig-economics-based buying or selling pressure on bitcoin partly explains why the bitcoin price is so volatile; these are some of the vectors.

You can see that in success mode, bitcoin mining, or mining in general, can be very profitable; not always, but frequently so. But that's frankly the wrong way to look at it. One should not mine bitcoin to cash in a dollar profit. That would be a misuse of capital, although, frankly, many people do it.

The way to think of bitcoin mining is that it is a way of getting a return on your bitcoin. It works as follows. The salient number in everybody's mind is, what is the exchange ratio between bitcoin and the U.S. dollar? That is, if Bitcoin buys more U.S. dollars, that's the same as saying bitcoin is going up. Everybody is focused on that. What they're not focused on is the alternative to the conventional notion. Conventionally (if you're not a cryptocurrency miner), if you had some bitcoin, and you are interested in having more, you do that by just taking some capital and buying more of it. But another way to get more bitcoin is to take some of your existing bitcoin and convert them to a mining device.

Let's say you bought 100 bitcoin worth of mining machines, and you ran them until they couldn't run anymore. The object is to have, at the end of that period, say 150 coins instead of 100. Whatever the rate of exchange happens to be, you now have more coins. The idea of bitcoin mining is to multiply your coins. If the price of bitcoin also rises by 50% versus the dollar, and you also have 50% more coins, then you actually earned 125% on your investment as opposed to the 50% you would have earned by just buying bitcoin. Alternatively, what if the price of bitcoin declines by 50%, but, though mining, you have 50% more coins. The mining production mitigate the 50% decline in the bitcoin price, which is not an infrequent occurrence. One can think of this as the risk/reward profile of cryptocurrency mining, which is much lower than simply owning the coins.

Obviously, mining continues, so what frequently happens when bitcoin declines by 50%, is that the systemwide hashrate declines. That's because some people drop out of mining. But if you're one of those who don't drop out, your proportion of the total daily block reward is going to increase, so your earnings are going to increase. In that case, over the life of the machines you run, maybe you won't earn 50% more bitcoin. Maybe you'll earn 75% more or 80% more bitcoin. In this

example, the price of bitcoin versus the dollar declines by 50% in a given period of time, but you have 80% more bitcoin.

Essentially, when you undertake mining, it's a way of increasing your coin holdings. Imagine, as a corollary, if you have U.S. dollars, and you have a choice of either holding them as is, uninvested, or, as the only way to increase your holdings in the interest-rate sense, by investing in a Treasury security or some other bond. If you buy the Treasury instead of holding the cash, you get interest along the way, and at maturity, say in five years, you get your money back. In the same way, mining equipment is priced to earn a higher return than owning bitcoin alone. This is necessary because mining requires considerable effort. There is no incentive to make such effort unless the return prospect from mining is greater than the return prospect of simply buying and holding bitcoin. Therefore, as a matter of business economics, a mining company should have a higher expected return than making an equivalent investment in bitcoin or a bitcoin ETF.

Unfortunately, all the publicly traded mining companies have no choice about how they present that economic reality: they must state their profit/loss in U.S. dollars. You can see why everybody who examines these companies thinks the idea is to harvest coins – convert them to fiat currency – in the same way as you would if you were a wheat cultivator. You spend dollars to produce wheat, but you have no interest in holding it, and are going to sell all the wheat you produce. Most commodities are degradable, like wheat, soybeans and rice, so they are not held. Even oil is not held, it's consumed. From the business perspective, it can be stored for some period of time, but the idea is not to hold oil in storage.

Gold and silver are different. They can be produced and hold them in storage. As for bitcoin, the mining of gold and silver involves electricity and other production costs. Once the bitcoin is mined, though, the cost of storage is zero, for practical purposes. That is not true of gold. It is not so inexpensive to store gold. If you really want to store your gold on your own, you lose a certain amount of value every year by whatever your insurance and custody costs are. The cost of bitcoin or Litecoin storage is essentially zero.

Let's contrast simply holding bitcoin, like bitcoin that you might purchase, with mining. You do not get any interest just holding bitcoin, but by mining, you do earn a return, measured in bitcoin—not exactly interest, but a return. If you mine Litecoin, you earn a return in Litecoin. That is the idea of mining.

The mining companies may trade their coin holdings periodically, but their objective is to accumulate more and more of them. If one carries that concept through to its logical conclusion, at some point in time the largest asset those companies have will be the amount of cryptocurrency on their books. Even though they are ongoing businesses in the sense that they will still engage in mining, at that point they also will have a very large balance sheet asset that continues to increase every day. Therefore, if the type of coin they accumulate is bitcoin, they will be, de facto, a bitcoin ETF.

As the accumulated bitcoin increases, there will be some sort of arbitrage between a mere bitcoin ETF and a mining company that holds considerable bitcoin and is capable of producing and therefore holding yet more bitcoin without raising capital. Of course, the irony is that if a bitcoin mining company can earn a higher rate of return than simply owning bitcoin in an ETF, this in itself serves to alter the supply/demand dynamics for a bitcoin ETF. In other words, the mining companies are gradually but nevertheless inexorably evolving into bitcoin ETFs. If the store of bitcoin accumulated were to become sufficiently large, the mining companies could actually spin off some, or perhaps even all, of their bitcoin holdings to form ETFs.

In the case of a bitcoin ETF, the return would be zero, before deduction of any management fees for the period. Consider which you would rather own, because it is a very, very important choice. On the one hand, you could have a bitcoin ETF that charges a fee of X% of AUM. The bitcoin might appreciate relative to the dollar, so you will make money, but you will lose a little bit of bitcoin every day via the fee. On the other hand, you could own a company that is mining. With the latter choice, you increase your bitcoin holdings by a small increment every day.

In practice, the distinction between mining and holding bitcoin in ETF form is not so simple. This is because the mining companies are also accumulating and holding bitcoin. Which one would you rather have? Bitcoin miners tend to hold mined coins subject to the exceptions that some coins must be sold to fund operating expenses and to replace obsolete equipment. Consequently, one could quite justifiably assume that the number of bitcoins held by such firms will be increasing over time. It then follows that more and more of the return on these stocks will be attributable to the accumulated bitcoin. Viewed in this sense, the mining companies will not actually compete with a future bitcoin ETF, since they are gradually in the process, perhaps unintentionally, of transforming into something not unlike a bitcoin ETF.

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