

DIVERSIFICATION DASHBOARD

August 2020

Diversification Ratios[®]

<p>TOBAM's Diversification Ratio[®] (DR) measures to what extent a portfolio is diversified. The DR² (square of the diversification ratio) measures the number of independent sources of risk to which a portfolio is exposed. As the table shows, the "broad market" indices do not fully utilise diversification capabilities. In addition to a snapshot of each market's DR², the table shows the DR² of a well-diversified portfolio, and the fraction of available diversification used by the index.</p>	Universes	DR ² Benchmark	DR ² Anti-Benchmark [®]	% diversification captured by benchmark
	MSCI All Countries World	2.27	5.30	42.9%
	MSCI World	2.11	5.45	38.7%
	MSCI US Equity	1.81	4.26	42.6%
	MSCI Emerging Markets	2.87	4.91	58.5%
	MSCI Pacific Ex-Japan	2.16	4.16	52.0%
	MSCI EMU	1.96	4.43	44.3%
	MSCI Japan	2.53	5.32	47.5%
	MSCI UK	2.15	3.29	65.3%
	BofA Merrill Lynch US Corporate & High Yield	1.97	2.54	77.8%
	BofA Merrill Lynch Global High Yield	2.53	3.35	75.4%

Source: TOBAM, figures as of July 2020

Bitcoin: a unique diversifier.

On November 20th, 2017 TOBAM launched the first European open ended fund invested in physical bitcoins (BTC). The vehicle provides a convenient and secure means to acquire exposure to physical bitcoins.

Our investment thesis can be summed up as follows: the theoretical and empirical characteristics of Bitcoin are such that it has the potential of becoming a new store of value, a 'gold 2.0' so to speak.

This dashboard aims at shedding light on the motivation, potential virtues and actual usefulness of Bitcoin by first revisiting its origins, then assessing its role from an empirical point of view in an asset allocation context and lastly commenting on its behavior during the current Covid crisis.

I The Origins of Bitcoin

The origins of Bitcoin are traditionally traced back to a paper, *Bitcoin: A Peer-to-Peer Electronic Cash System*, published under the pseudonym of Satoshi Nakamoto on October 31st 2008, in the wake of the Global Financial Crisis. The paper outlines how a trustless decentralized bookkeeping system would allow individuals to send and receive payments without involving any intermediary financial institutions, using an electronic coin as a chain of digital signatures: Bitcoin.

While Nakamoto did not reinvent the wheel, his contribution lays in combining three pre-existing technological advances:

1. *Peer-to-Peer protocol*: Creating a decentralized information system, in which participants are equally privileged. This allows the system to be run with no central counterparty and ensures redundancy as well as censorship resilience.
2. *Proof of Work*: Creating a piece of computational ‘work’, which is difficult and costly to produce but straightforward to check. This ensures that the network cannot be ‘spammed’ by malicious actors and essentially creates a decision system, whereby votes are casted by the use of computational power (and hence by the energetic and hardware investment devoted to the system).
3. *Asymmetric Cryptography*: Mathematical guarantee that transactions can only be authorized by the rightful signatory, while allowing all network participants to check the validity of past transactions.¹

To understand the roots of Bitcoin or the crypto-asset ecosystem and what place it could probably take in the long-run in the mainstream financial system, it is also useful to keep in mind its libertarian root ethos. When Hayek wrote his famous essays on the *Denationalization of Money* he could of course not know what opportunities technology would once provide, however, regarded from today’s point of view, the crypto-asset ecosystem makes Hayek’s thought experiment of a competitive system of privately issued currencies rather than government monopolies become reality.

Bitcoin has in fact been conceived to address certain perceived shortcomings of traditional ‘*fiat*’ currencies, which could make it a hedge for its bearer.

II A New Standard of Value?

In the era of Quantitative Easing and ever easing central bank policies, Bitcoin could be considered a compelling alternative to traditional stores of value and means of exchange. A key advantage is that the maximum amount of bitcoins that can ever exist under actual protocol rules is of 21 million. Bitcoin is hence designed to be non-inflationary and the number in circulation is even likely to decline throughout the years given that a positive number can be expected to be lost (e.g. through negligence) each year.

Decentralisation is core to its second value tenet. In Bitcoin, there is no counterparty risk, nor risk of having one’s funds illegitimately seized (e.g. by Chavistas’ Venezuela) or lost following a banking ‘bailout’ (see Cyprus in 2013). As long as you have control over your Bitcoin *private key*, or password, you have unique and absolute control over your funds.

Bitcoin proponents would hence argue that the crypto-asset may simultaneously serve as a hedge against inflation, against localised breakdowns of the financial system and against political risk.

The most disruptive innovation brought upon by blockchain technology is that it allows the Internet architecture to be levered in order to exchange value, whereas it has until now solely been used to exchange information. The internet is an extraordinarily efficient and powerful information exchange system; exchanging value is however trickier as you can’t allow it to be ‘copy-pasted’ over the place like any other piece of data. The genius of Bitcoin is to permit value to be transferred within the Internet’s pipes, effectively creating an ‘*Internet of value*’.

As such, it is our opinion that Bitcoin presents the theoretical qualities of a potential new value standard and value reserve – a disruptor to gold.

Besides this more fundamentally driven investment thesis there also is a quantitative and empirical case for this investment. In what follows we outline stylized empirical facts that help to better understand the risk and return properties of Bitcoin and we provide insights of its contribution on an asset allocation context.

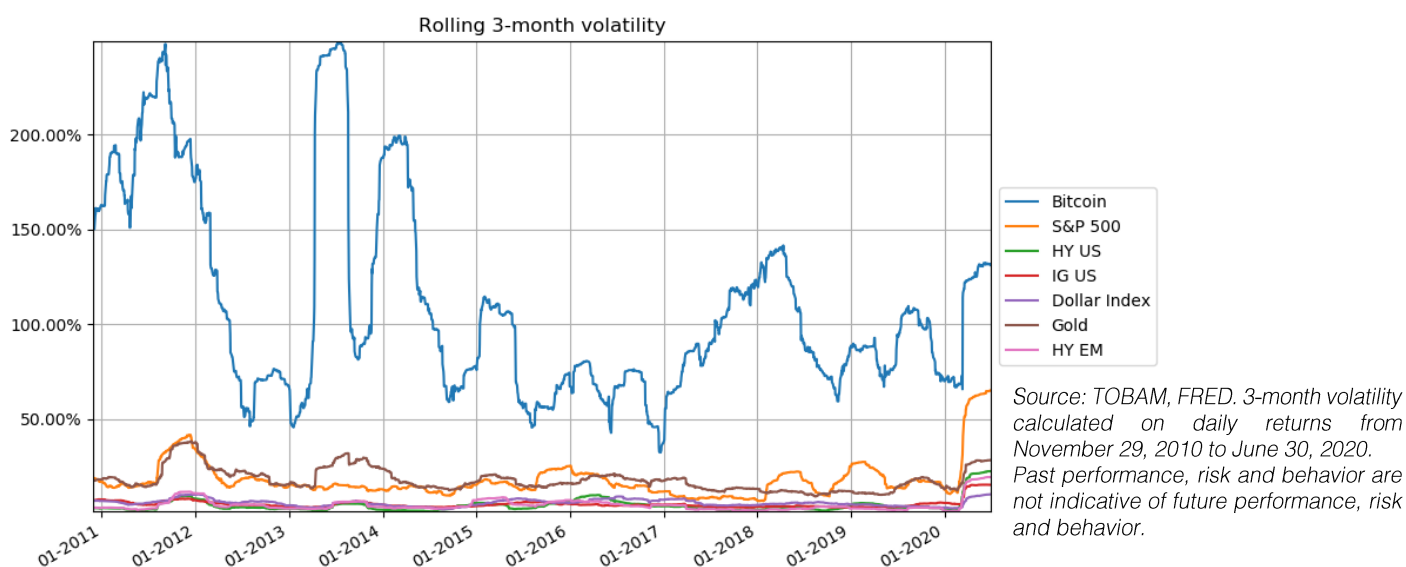
¹ Bitcoin rests upon Elliptical Curve cryptography, more info here for the technically inclined reader:
<https://medium.com/@blairmarshall/how-does-ecdsa-work-in-bitcoin-7819d201a3ec>

III Empirical findings

i) High Risk...

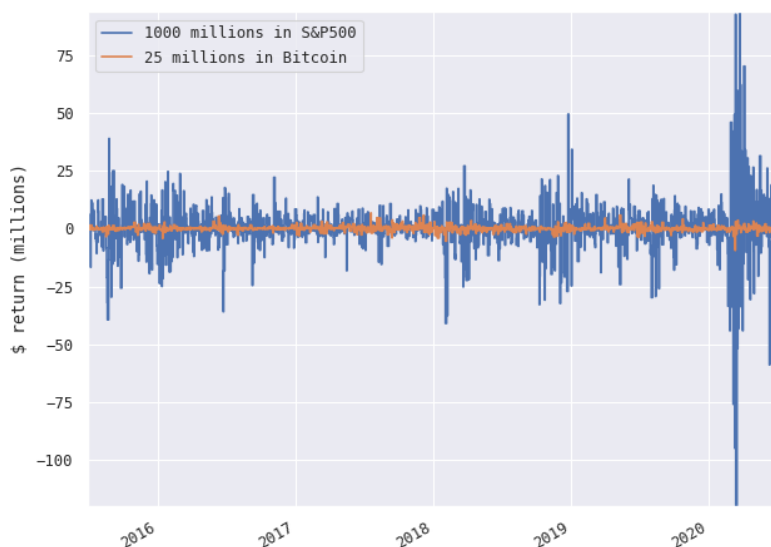
It is important to acknowledge the volatility of Bitcoin, which is indeed approximately an order of magnitude (10x) greater than for many other usual financial assets as depicted in *Figure 1*.

Figure 1: Rolling 3-month volatility (annualised)



Risk, in itself, should however have no bearing on the investment thesis and on the decision to invest or not. Investing is not a binary yes/no decision, everything is a matter of how risk is sliced and diced in a portfolio of assets. For instance, as depicted below (*Figure 2*), keeping US\$ 1000 million invested at 10% volatility is far riskier in USD terms than US\$ 25 million at 80% volatility.

Figure 2: Risk is a matter of scale



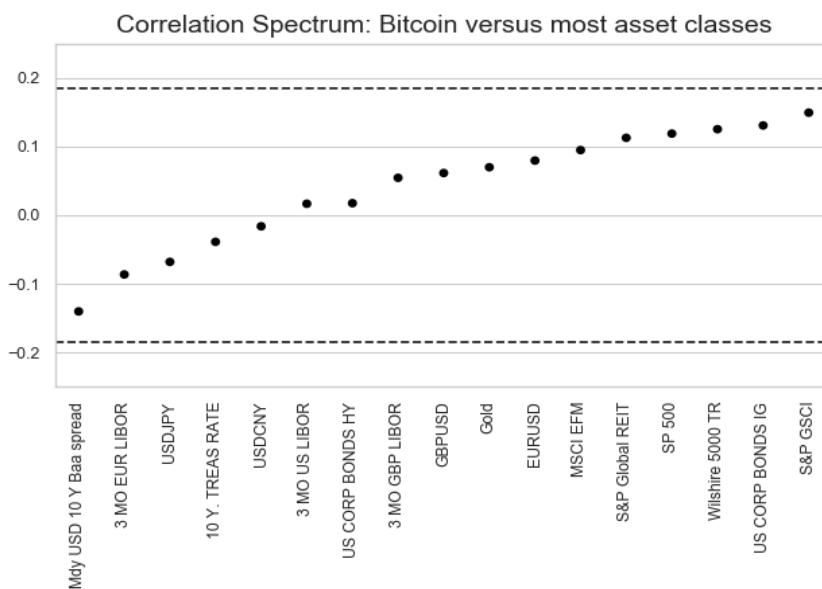
Source: TOBAM and FRED. Hypothetical returns from December 31, 2014 to June 30, 2020 provided for illustrative purposes. Hypothetical results do not represent the results of actual trading using client assets. Performance returns are shown gross of fees and do not reflect the deduction advisory fees and any other expenses that an investor may incur in the management of its investment advisory account. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested. Performance details do not include reinvested dividends.

To state the obvious, Bitcoin needs to be properly scaled in order to become useful from a portfolio construction perspective; which brings us now to how Bitcoin behaves in a multivariate setting, i.e. to correlations.

ii) ...low correlations

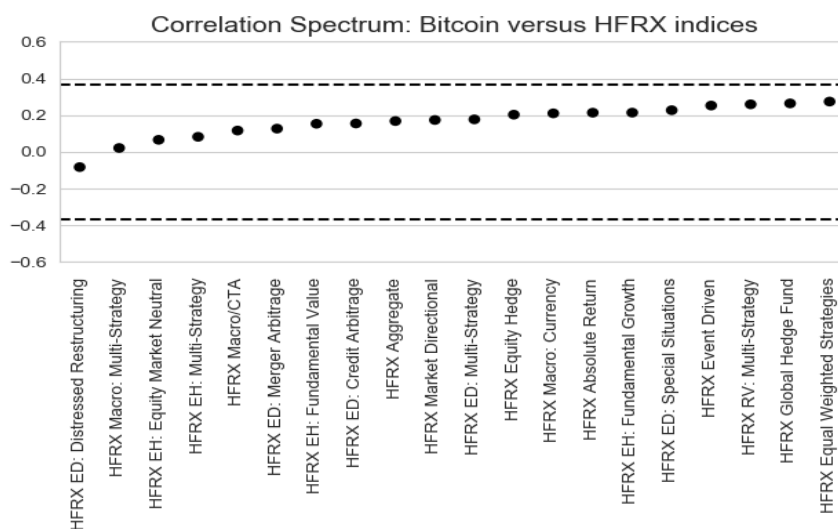
Apart from its more fundamental investment case, Bitcoin is indeed an extremely potent portfolio diversifier; its correlation to all the traditional financial assets that you may usually find in an investor's portfolio is non-significant (Figure 3), Bitcoin being temporarily affected during a liquidity crisis (see below commentary on the Covid episode) interestingly doesn't translate into meaningful correlations² (Figure 3), even with HFRX indices – which we recall aim to represent hedge fund universes (Figure 4).

Figure 3: Correlation Spectrum, Bitcoin versus most asset classes



Source: TOBAM and Bloomberg. Weekly correlation with BTCUSD, 2-tailed deflated 95% confidence intervals around 0 (log normal assumption) Correlation calculations made from June 30, 2014 to June 30 2020. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested.

Figure 4: Correlation Spectrum, Bitcoin versus Hedge Fund 'HFRX' Indices



Source: TOBAM and Bloomberg. Monthly correlation with BTCUSD, 2-tailed deflated 95% confidence intervals around 0 (log normal assumption) Correlation calculations made from 30/06/2015 to 30/06/2020. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested.

² True in average and in extremes (when looking at the joint distribution of returns) – this information is available upon request

Given that Bitcoin seems to be correlated to nothing in the traditional asset space, it is interesting to consider its contribution to diversification in the context of a multi asset portfolio.

iii) A very diversifying mix

Simulating a hypothetical 60/40 balanced portfolio of equities and bonds and adding only 1% of Bitcoin to this portfolio shows that the diversification benefits of Bitcoin have historically contributed to higher absolute returns with no adverse impact on volatility or maximum drawdown as illustrated below. Adding an asset that has a low correlation and positive returns helps to make the portfolio more efficient as can be seen below with the portfolio moving higher up in terms of returns and lower in terms of volatility, i.e., moving closer to a higher hypothetical efficient frontier.

TOBAM Research: Hypothetical 60/40 Balanced Portfolio¹

5-Year Period 2015-06-30 to 2020-06-30.

Diversification benefits of adding 1% of BTC

Summary Statistics	Balanced Portfolio	Balanced Portfolio with 1% Bitcoin	Difference
Annualized Return	6.67%	7.58%	0.91%
Annualized Volatility	9.9%	9.9%	0.0%
Sharpe Ratio	0.60	0.69	0.09
Max Drawdown	26.00%	26.00%	0.00%

¹60% MSCI ACWI / 34% ML US Corporate + 6% ML US HY Index

Source: TOBAM, MSCI and FRED. Hypothetical returns from June 30, 2015 to June 30, 2020 provided for illustrative purposes. – daily rebalancing Hypothetical results are for information purposes only. These hypothetical results are gross of tax and exclude costs of transaction and fee assumptions. Warning: Past performance is not an indicator or a guarantee of future performance. The value of your investment and income received from it can go down as well as up and you may not get back the full amount invested. Performance details provided are in USD and do not include reinvested dividends. Performance returns and/or charts illustrating performance provided on this page are Gross of management fees, sales charges and other commissions, other taxes and relevant costs to be paid by an investor are not included in the calculations.



➡ The addition of 1% of Bitcoin in a balanced portfolio improved returns by 0.9% with no increase in risk or max. drawdown over the period

Seen from this perspective, Bitcoin's high volatility is a rather positive characteristic as it pleads in favor of its diversification power: An investment in Bitcoin provides a high level of additional diversification for a minimal capital immobilization.

A Discussion of Bitcoin's behaviour during the ongoing Covid19-related market crisis is warranted at this point.

IV Bitcoin and the Covid19 crisis

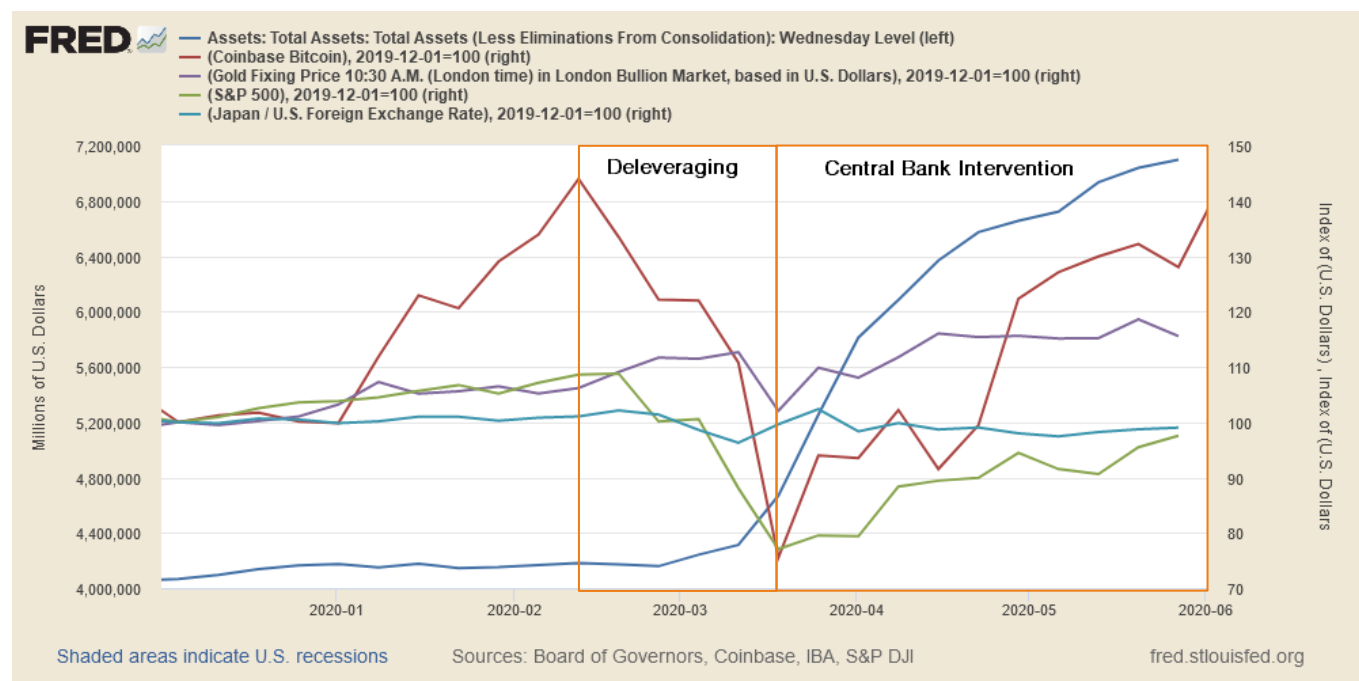
The end of February and the beginning of March 2020 were marked by a violent crash of global financial markets in response to the COVID19 epidemic gaining steam. The immediate financial stress was then subdued under the joint impact of unprecedented monetary and fiscal intervention.

During these fateful weeks, Bitcoin lost about half its market value; a turn of events, which prompted many to impair the investment thesis of bitcoin-as-a-hedge³. Our interpretation of these events is, however, different, and we regard this acid test as a success, indicative of the ongoing financial integration of Bitcoin.

Let us take a look at *Figure 6* below, where are plotted from December 1, 2019 to June 2, 2020:

- The size of the Federal Reserve's balance sheet (blue line – left axis)
- The price of bitcoin – normalised at period start (red)
- The price of gold – normalised at period start (purple)
- The S&P500 price index – normalised at period start (green)
- The JPYUSD exchange rate – normalised at period start (cyan)

Figure 6 : Federal Reserve balance sheet and financial asset returns during the Covid19 market crisis



Source: TOBAM, FRED. weekly data from December01, 2019 to June 02, 2020
Past performance, risk and behavior are not indicative of future performance, risk and behavior.

³ See for instance <https://twitter.com/Nouriel/status/1236966288347537410?s=20> or <https://www.bloomberg.com/news/articles/2020-03-13/bitcoin-not-such-a-safe-haven-now-amid-epic-two-day-tumble>

The period of deleveraging bears all the marks of a liquidity crisis as we observe a joint and violent fall in market value of the S&P500 and gold (a traditional risk-off asset) coupled with a marked strengthening of the Japanese Yen against the Dollar, which is a tell-tale of carry-trades being unwound.

With the Federal Reserve massively intervening in March in an outspoken attempt to drown the virus under printed money⁴, market liquidity eased, which caused gold and Bitcoin to jump off their lows with the S&P500 being stabilised.

The pattern similarity between gold and Bitcoin during this period is striking. The price decrease of Bitcoin during a liquidity crunch can be explained by levered agents being forced to sell it as they scramble for liquidity. More than two years after the introduction of the first Bitcoin futures contracts, this is a clear sign of the crypto-assets being traded by more institutional agents, and hence good news for Bitcoin adoption.

Let us finish this section with the observation that while the Federal Reserve's balance sheet virtually doubled since August 20, Bitcoin 'quantitatively tightened' with its marginal rate of emission halving on May 11, 2020. As mentioned above, actual protocol rules state that the maximum amount of existing bitcoins is of 21'000'000. To achieve this target, the rate of bitcoin emission is periodically halved. With 18.4 million bitcoins currently in existence, the marginal inflation rate is of 1.46%.

The 'halving' process being clearly stated within public protocol rule, the application of the efficient market hypothesis would imply its effects being already priced-in. Nevertheless, many investors believed that this immediate reduction in supply would positively impact Bitcoin's price. This still remains to be seen.

V Conclusion: What next?

In this short article, we have shown that from a pure risk perspective, Bitcoin is highly potent portfolio diversifier, its zero-correlation to all tested financial assets and design insularity from the traditional financial system endorse it with objective hedge-like properties, which make it a valid candidate to all who want to increase the diversification of an already well diversified portfolio.

From a return perspective, the name of the game rests in the correct evaluation of its chances of overcoming regulatory hurdles, technical stumbling blocks such as its scalability and new challenger *alternative crypto-assets* and harnessing adoption so as to become the new safe haven. The unprecedented frenzy of monetary and fiscal stimuli we are currently witnessing is in our opinion casting an ever darker shadow on the future of fiat currencies such as USD or EUR, in such a context, the value proposal of Bitcoin as gold 2.0 could appear more pertinent than ever.

⁴ <https://www.reuters.com/article/us-health-coronavirus-usa-fed/fed-aims-bazooka-to-backstop-coronavirus-hit-economy-idUSKBN21A1U2>



For more information

TOBAM is an asset management company offering innovative investment capabilities designed to increase diversification. Its mission is to provide rational and professional solutions to long term investors in the context of efficient markets.

The Maximum Diversification® approach, TOBAM's flagship investment process founded in 2006, is supported by original, patented research and a mathematical definition of diversification and provides clients with diversified core exposure, in both the equity and fixed income markets.

In line with its mission statement and commitment to diversification, TOBAM also launched a separate activity on cryptocurrencies in 2017.

TOBAM manages US\$7.3 billion (at June 30, 2020). TOBAM's team is composed of 47 professionals.

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