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# Cryptocurrency Returns

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Additional information is available at the end of the chapter

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## Abstract

One of the most significant innovations in the world of finance has been the creation and evolution of cryptocurrencies. These digital means of exchange have been the focus of extensive news coverage, especially the Bitcoin, with a primary focus on the tremendous potential return and the high level of accompanying risk. In this chapter, we examine the risk-return pattern for an array of cryptocurrencies, contrasting the pattern with those of conventional currency and equity investments. We find the measures of cryptocurrency returns and risk to be a very high multiple of those of conventional investments, and the pattern is determined to be robust relative to the time frame. Consequently, cryptocurrencies are determined to provide an alternative to investors that involves tremendously high risk and return.

**Keywords:** cryptocurrency, bitcoin, returns, risk

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## 1. Introduction

This chapter is comprised of three sections. First, the risk-return characteristics of a broad array of cryptocurrencies are examined for a short holding period (i.e., the past year). Many of the cryptocurrencies are relatively new and were introduced at some point during the year 2017. Consequently, initially restricting the examination of cryptocurrency performance to the 2017 calendar year permits the inclusion of many of the new cryptocurrencies, which also provides a risk-return profile that is relevant to short-term investors. In addition, this provides an initial comparison of how these performance characteristics vary across the various cryptocurrencies. Second, the short-term performance of the largest four cryptocurrencies is contrasted with the performance of the largest four conventional currencies, and with the SP500 equity index. This provides a more focused performance profile of cryptocurrencies versus more conventional

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investments. Lastly, the risk-return profile is extended to the past 3 years to obtain a sense of the long-term pattern of performance. In this case, the examination is restricted to the only two cryptocurrencies that were publicly traded over this period; the Bitcoin and the Litecoin.<sup>1</sup> Again, the performance of the cryptocurrencies is contrast against the performance of the four major conventional currencies and the SP500 to provide a glimpse into the sustainability of the cryptocurrency risk-return patterns through longer periods of performance observation.

## 2. The cryptocurrency phenomenon and unconventional sources of risk

Through the cryptocurrency phenomenon, investors have been introduced to a whole new vocabulary consisting of terms such as block-chain, hash, nonce, proof-of-work, nodes, and other terms that apply to the cryptocurrency market structure [1]. The financial press addresses such topics as the irreversible design of cryptocurrency transactions (consensus protocol), the role of distributed cryptographic proof replacing the need for trust (i.e., the distributed ledger and transaction verification), privacy (i.e., anonymity), and the potential haven for transfers of illegally obtained funds, among others. Moreover, historically high returns offered by cryptocurrency investments over their limited lives have attracted the interest of speculating investors, as well as casual observers. The potential returns are enormous relative to those of more conventional investments, such as foreign currencies and the stock market, and the risks are commensurately higher.

Unconventional sources of risk also exist for the cryptocurrency market. Some researchers question the underlying foundation and source of value of cryptocurrencies [2–4]. The cryptocurrency market is also being pressured for adequate disclosure by the City of New York, targeted by the SEC, and more recently accused of market manipulation.<sup>2</sup> Even daytime talk shows have impacted the cryptocurrency market with negative comments by the world's most influential investor, Warren Buffett.<sup>3</sup>

Some studies suggest that the addition of cryptocurrencies to conventional investment portfolios may offer some diversification benefits [5], while other studies find limited diversification benefits to short-term investors [6], and some researchers question whether adding the Bitcoin to a conventional portfolio adds value [7]. Cryptocurrency investments are also observed to follow an asymmetric return pattern with fat distribution tails [8]. Furthermore, the largest cryptocurrency, the Bitcoin, is observed to be the most efficient of the cryptocurrencies [9].

Before proceeding to the examination of cryptocurrency performance, some of the more common names for the currency tickers are provided as a guide in navigating the graphics presented in this chapter (see **Table 1**).

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<sup>1</sup>One study finds the Bitcoin and Litecoin to be the safest of the various cryptocurrencies [10].

<sup>2</sup>See [11–13].

<sup>3</sup>See [14].

### 3. Short-term cryptocurrency performance comparison

Many of the cryptocurrencies only began publicly trading in the latter half of 2017 (refer to the inset in **Table 1** providing the month of initial trading).<sup>4</sup> Only the Bitcoin and Litecoin were in

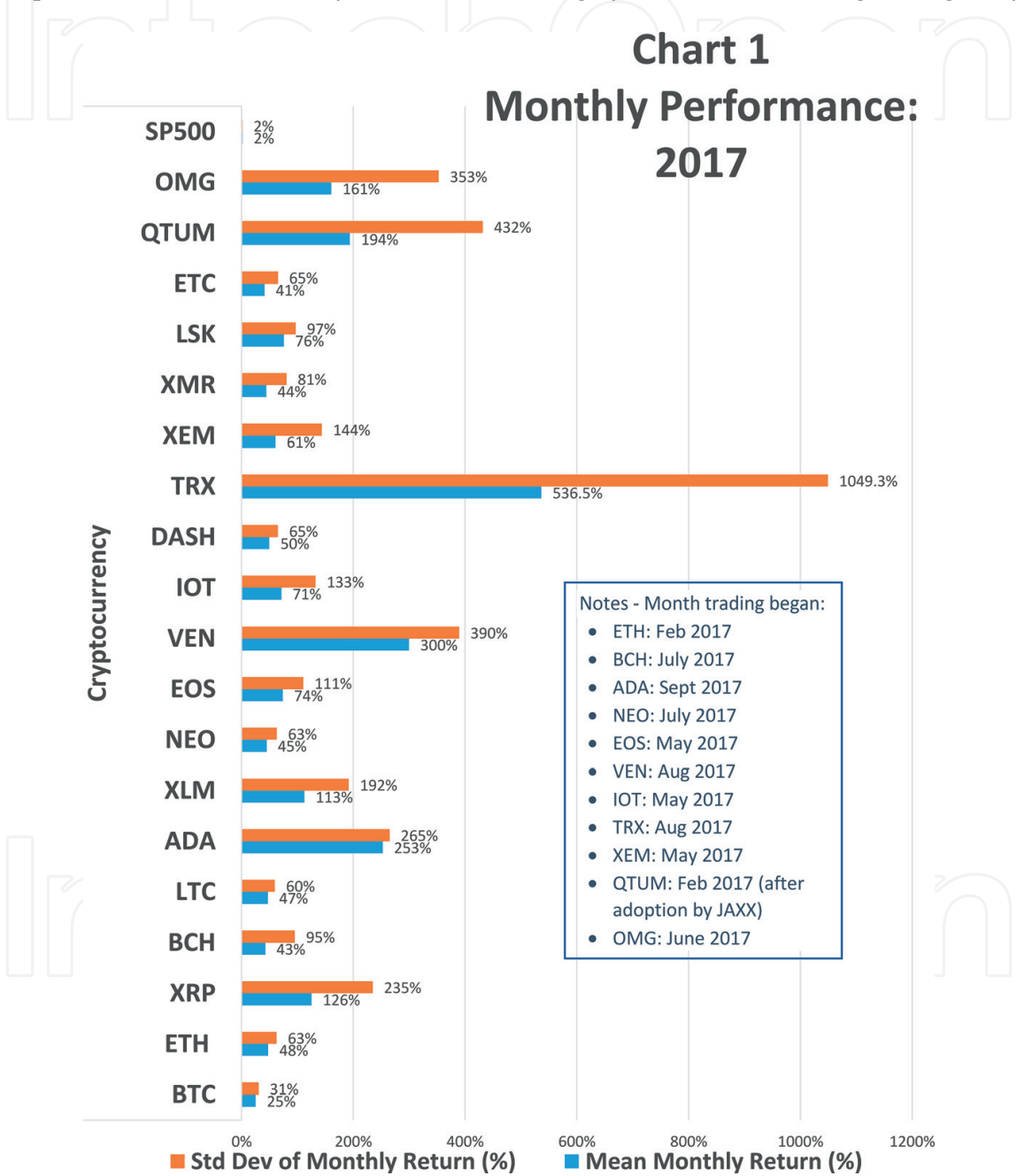
Cryptocurrency	
BTC	Bitcoin
ETH	Ethereum
XRP	Ripple
BCH	Bitcoin Cash
LTC	Litecoin
ADA	Cardano
XLM	Stellar
NEO	NEO
EOS	EOS
VEN	Vechain
IOT	IOTA
DASH	Digital Cash
TRX	Tronix
XEM	NEM
XMR	Monero
LSK	Lisk
ETC	Ethereum Classic
QTUM	QTUM
OMG	OmiseGo
Conventional currency	
GBP	British Pound
EUR	Euro
CHF	Swiss Franc
CAD	Canadian Dollar
Stocks	
SP500	SP500 Stock Index

**Table 1.** Currency names.

<sup>4</sup>For example, the Ethereum cryptocurrency was introduced in late 2013, funded by an online crowdsale in 2014. However, the system did not go live until July 2015 [15].

existence and publicly trading prior to 2015.<sup>5</sup> For this reason, cryptocurrency risks and returns are examined for different time segments.<sup>6</sup>

We begin by reviewing cryptocurrency returns for the year of 2017 in table form (see **Chart 1**). The horizontal bar chart provides both an analog and digital view of the enormous monthly returns and risks associated with the various cryptocurrencies. For example, the Tronix cryptocurrency (TRX) provided a 1049% monthly return over its roughly 4 months of trading ending the year



**Chart 1.** Cryptocurrency Risk-Return Performance: 2017.

<sup>5</sup>Source [16].

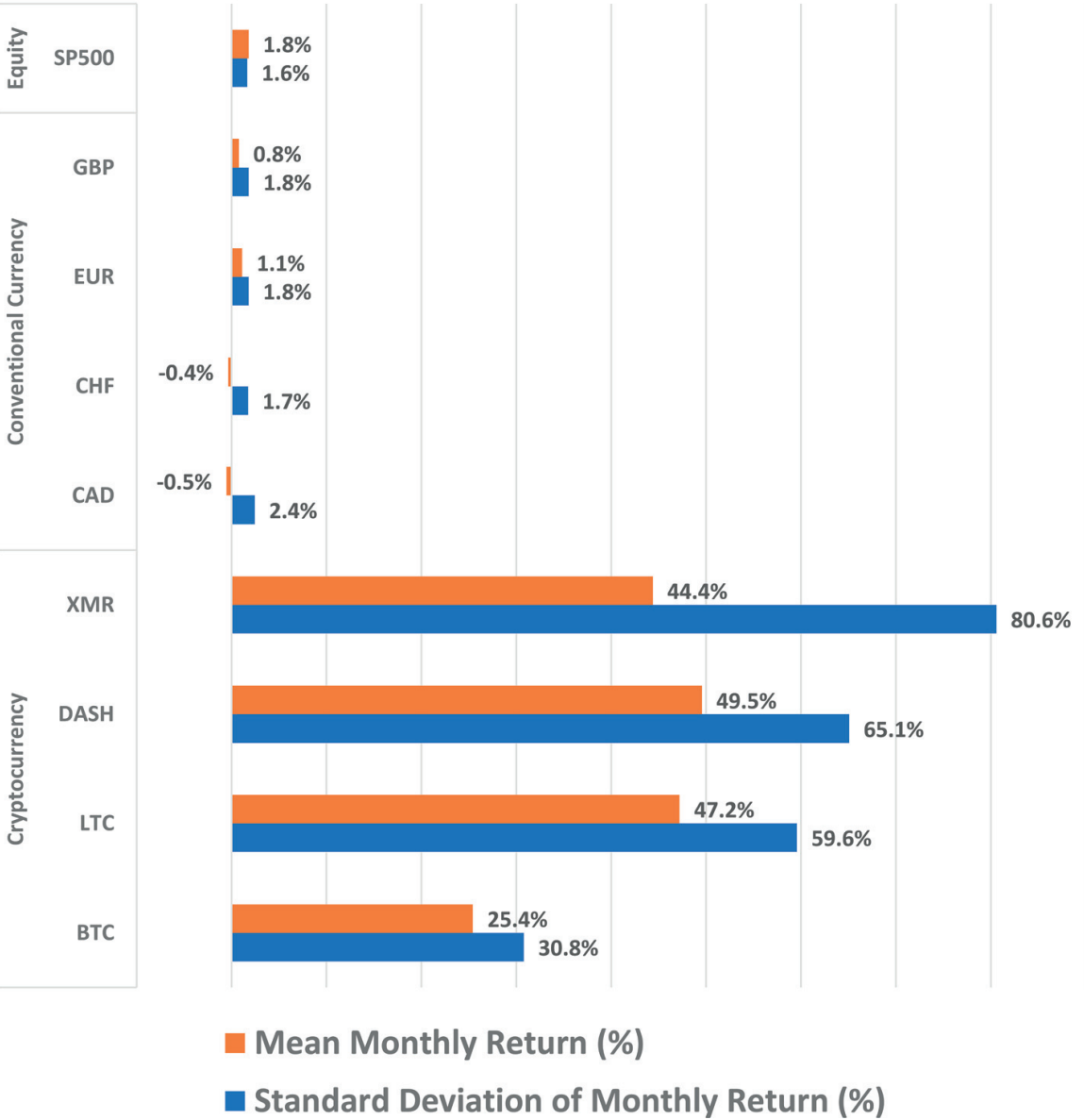
<sup>6</sup>All cryptocurrency, conventional currency, and SP500 returns are determined from adjusted prices obtained through [17].

2017 (i.e., it increased eightfold in value over the 4-month period). The SP500 risk-return performance is also included as a source of contrast. Note how each of the cryptocurrency measures of return and risk massively exceed those the SP500 index for the year 2017.

	British Pound (%)	SP500 (%)	Bitcoin (%)
Monthly return	0.8	1.8	30.8
Standard deviation of return	1.8	1.6	25.4

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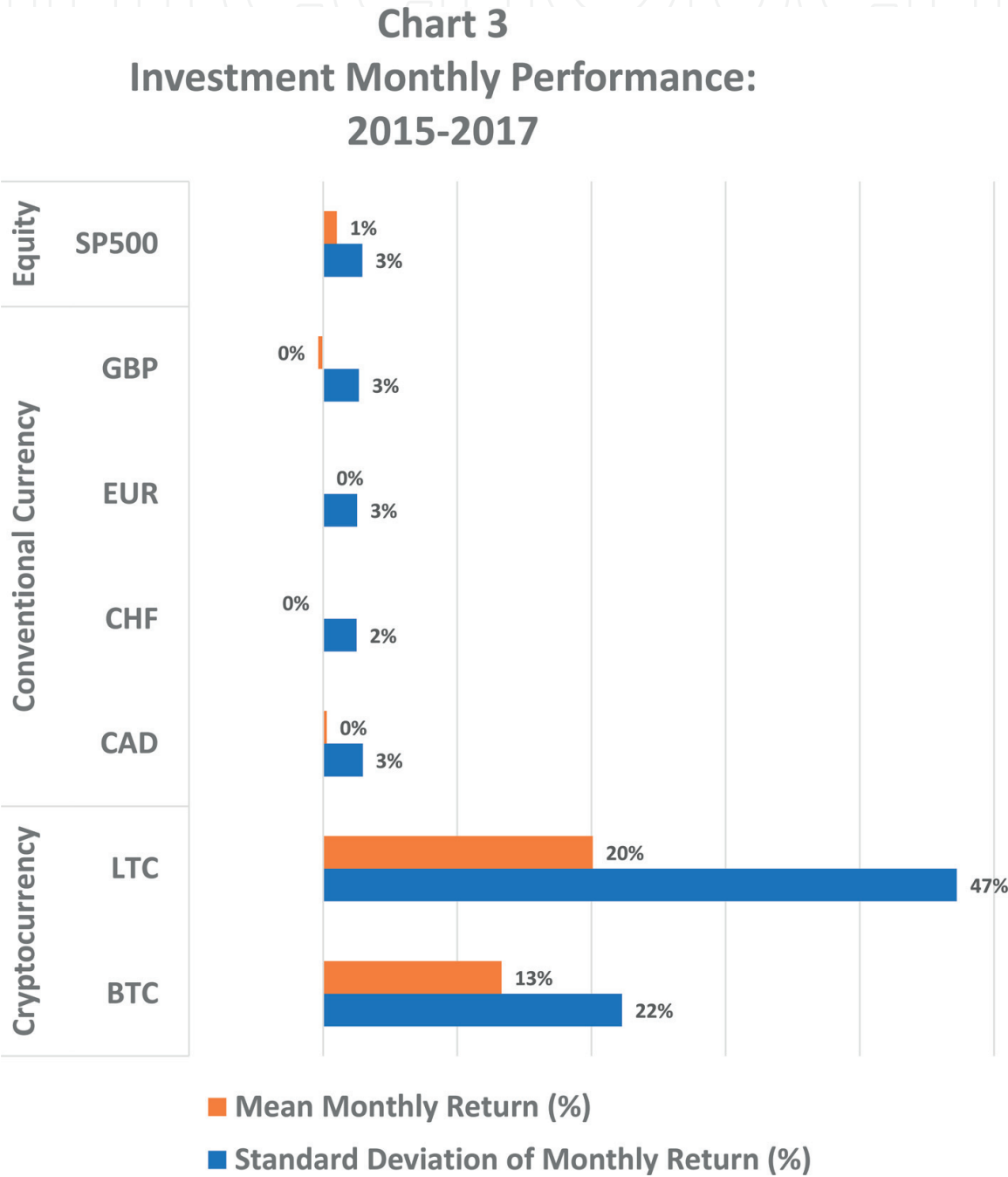
Chart 2  
Monthly Performance: 2017



Graph 1. Major Cryptocurrency Risk-Return Pattern: 2017.

A different visual of the risk-return tradeoff across the various cryptocurrencies and the SP500 is presented in the form of a line graph (see **Graph 1**). As expected, there is a positive relationship between risk and return, with cryptocurrencies displaying higher monthly returns also carrying higher standard deviations of monthly return (i.e., higher risk). This graphic also depicts how the cryptocurrencies dominate the SP500 in terms of massively higher return and risk values.

Another contrast and sense of scale is obtained by comparing returns across different investment classes. For this purpose, we restrict our review to the four largest cryptocurrencies, the four



**Chart 2.** Major Cryptocurrency vs Conventional Currency Risk-Return Performance: 2017.

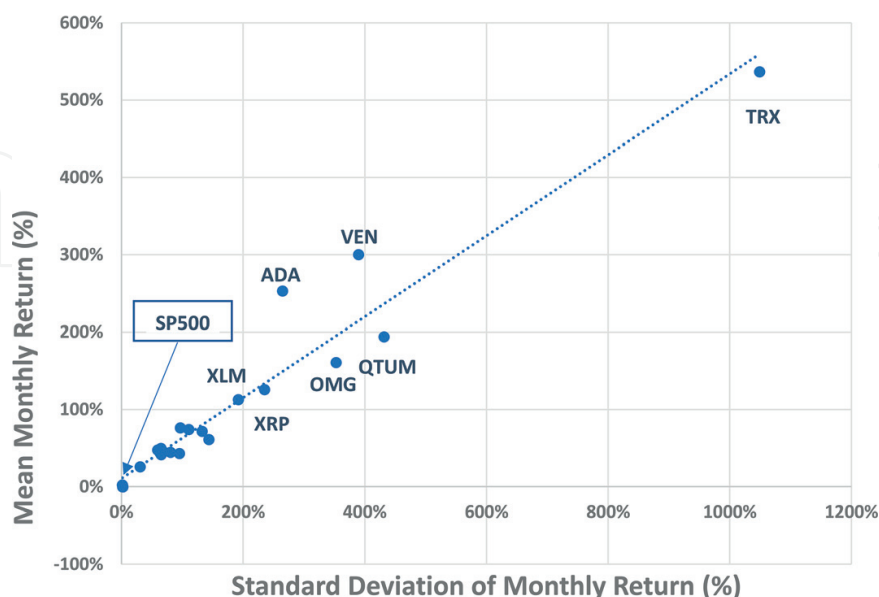
largest conventional currencies, and the SP500 stock index. The four largest cryptocurrencies by market capitalization (as of the end of 2017) are the BTC, LTC, DASH, and XMR. The four dominant conventional currencies consist of the British pound (GBP), the Euro (EUR), the Swiss franc (CHF), and the Canadian dollar (CAD). **Chart 2** presents the mean monthly returns and standard deviations of return for the 2017 calendar year for selected investments across different investment classes. Again, note how the risk and return measures for the cryptocurrencies dwarf those of other conventional currencies, as well as those of the SP500.

For the sake of a brief, but more focused and isolated contrast, consider the returns and standard deviations of return solely on the Bitcoin, the British Pound, and the SP500 below for 2017:

While the Bitcoin return is roughly 17 times that of the SP500, its risk in terms of the standard deviation of monthly return is also commensurately higher. Note that the SP500 and the British pound are relatively sedate investment alternatives when compared to the Bitcoin, and the Bitcoin is the most conservative investment alternative among the cryptocurrencies.

The relationship between risk and return across these investments in different asset classes can be displayed in the form of a line graph (see **Graph 2**). Again, observe the positive relationship between risk and return. Moreover, note that the positive risk-return relationship is clearly present within the cryptocurrencies themselves, with the most well-known cryptocurrency, the Bitcoin, demonstrating the least volatility and lowest average return among the cryptocurrencies displayed.

**Graph 1**  
**Monthly Performance:**  
**2017**



**Graph 2.** Mean monthly return (%) among investment group alternatives: 2017.



4. Long-term cryptocurrency performance comparison

The potential sustainability of the risk-return pattern offered by cryptocurrencies is examined by observing a longer period of performance. The risk and return of cryptocurrencies, conventional currencies, and the SP500 stock index are presented for a 3-year period, 2015–2017 (refer to **Chart 3**). Since the Bitcoin (BTC) and Litecoin (LTC) were the only cryptocurrencies trading throughout the 2015–2017 time period, only these two cryptocurrencies are included in this long-term performance compared to more conventional investments.<sup>7</sup>

Note that while the differences in performance between cryptocurrencies and other investments for this 3-year period are somewhat less striking than for the explosive year 2017, there still exists an enormous performance gap. Returns on the two cryptocurrencies (BTC and LTC) are roughly 10 times those of the comparative investments, and likewise, the levels of risk (i.e., standard deviation of monthly returns) are comparably higher.

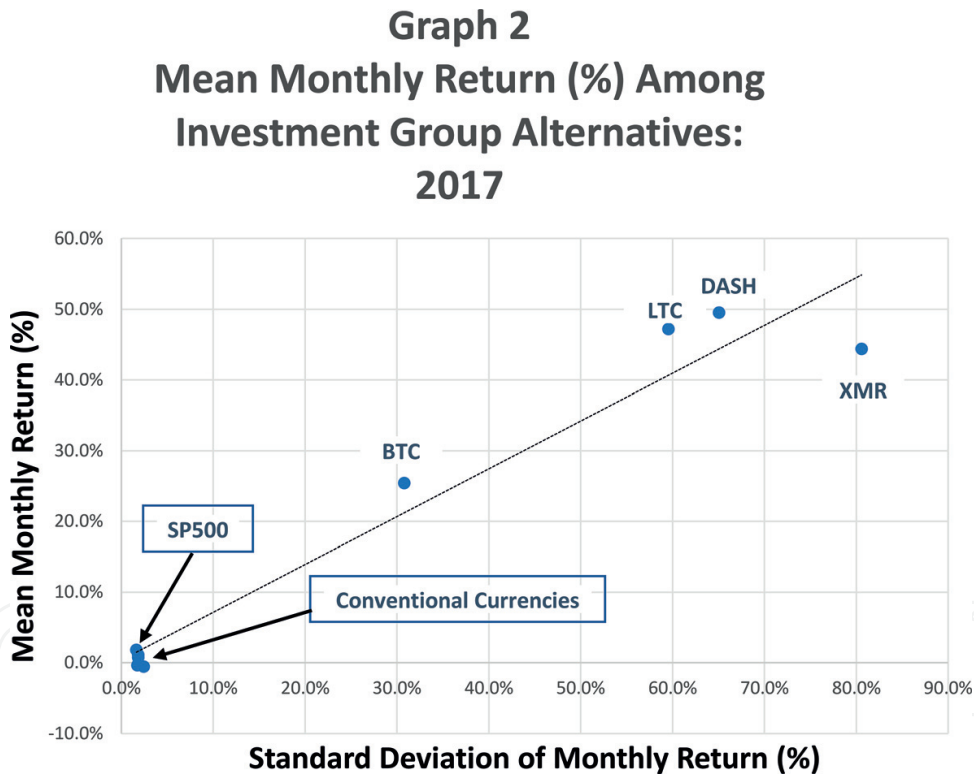
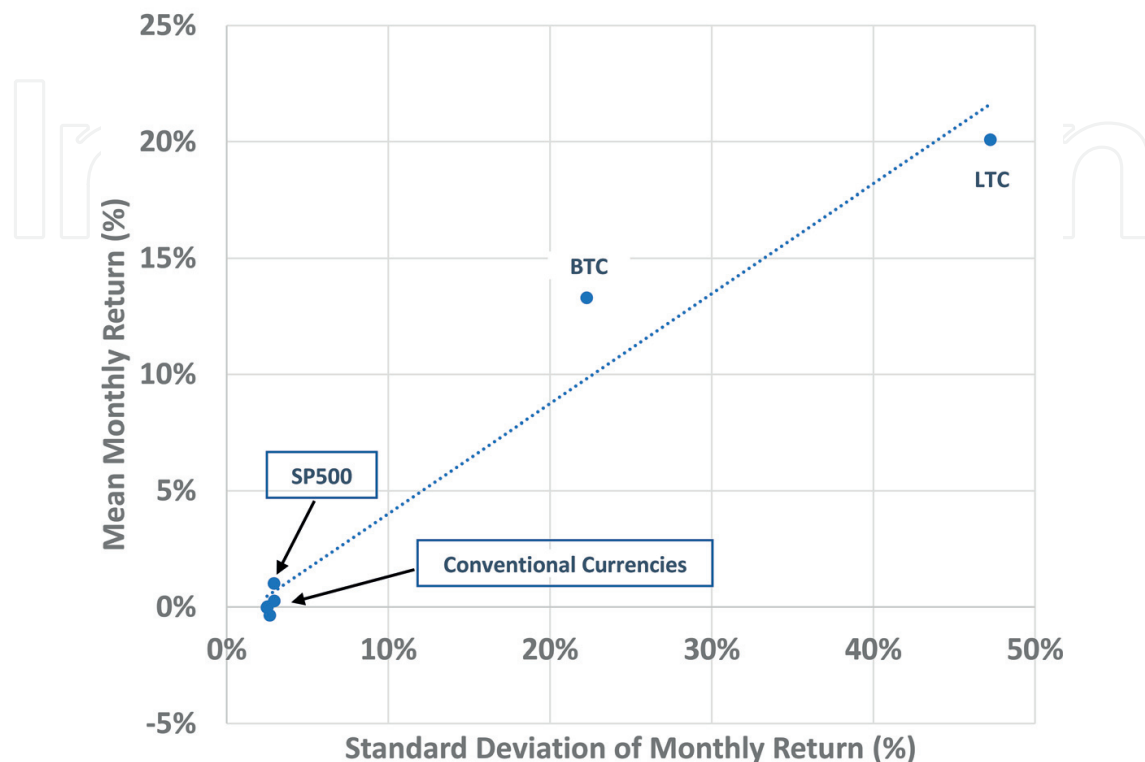


Chart 3. Investment monthly performance: 2015-2017.

<sup>7</sup>The Bitcoin and Litecoin began publicly trading on February 5, 2013.

**Graph 3**  
**Monthly Performance:**  
**2015-2017**



**Graph 3.** Monthly performance: 2015-2017.

The long-term performance contrast is also presented in the form of a line graph (see **Graph 3**). Note that the two cryptocurrencies (BTC and LTC) display risk and return values that are high multiples of those of the SP500 or conventional currencies.

## 5. Summary

Whether examining performance for the explosive year 2017, or for a longer period, cryptocurrencies offer another alternative to investors that involves considerably higher risk and commensurately higher return than typical of conventional investments. Compared to the high average returns and standard deviations of return of cryptocurrencies, investment in conventional currencies or the stock market (SP500) appears relatively sedate by comparison. Cryptocurrency returns have averaged a level equal to roughly 20 or more times those of conventional currencies or equity investment. Although cryptocurrencies offer the attraction of enormously high returns, cryptocurrency investment is also accompanied by substantially higher risk.

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