AN LCG PUBLICATION:

WHERE SHOULD YOU INVEST IN PAKISTAN

LUMS CONSULTANCY GROUP

Table of Contents

1. Introduction and Motivation

The student community throughout Pakistan is a crucial stakeholder for us at the LUMS Consultancy Group. Our report aims to assuage the dilemma of the dearth of reliable information that many young investors face in Pakistan. Authored by college students, this serves as a guide that answers fundamental questions for retail investors. The hope is that this report encourages a culture of intelligent investment in the country, leading to strengthening and deepening of our capital markets.

The report does not aim to provide any hard suggestions to young investors, rather it aims to provide them with a holistic understanding of the various investment options at their disposal. A full reading should equip the reader with tools to evaluate avenues for investments and economic conditions.

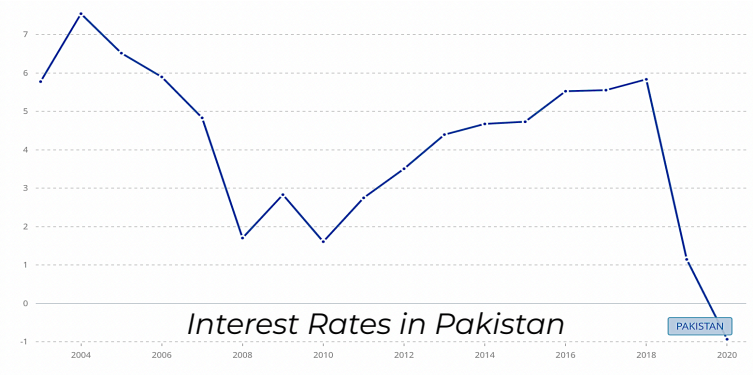
2. Executive Summary

The report exclusively focuses on three investment options in Pakistan: the Forex Market, Stock Market and the newly born Cryptocurrency Market.

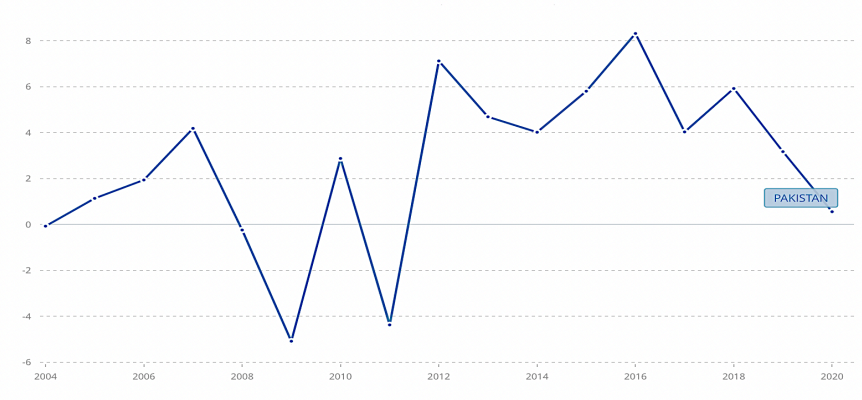
Forex Market

The Forex Market section provides an idea of how the currency market operates. It highlights major correlations between factors that determine the currency value in the international market. In essence,

Graphs 1 and 2 below show the correlation between GDP growth and Interest Rate.



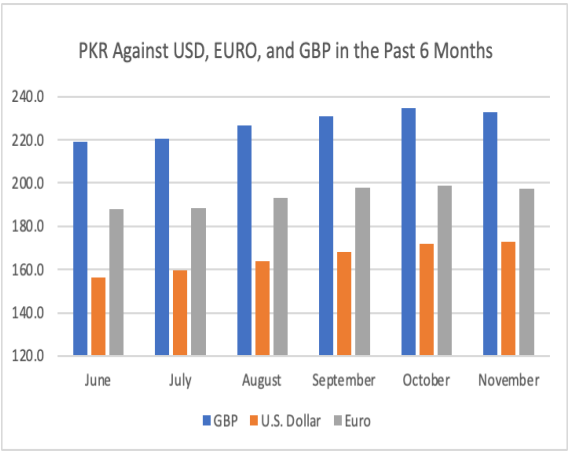
Graph 1: *Interest Rates in Pakistan*



Graph 2: *GDP Growth in Pakistan*

The focus then shifts to the risks involved in Forex trading and also the possible payoff for an investor.

Graph 3 shows the price of PKR against various popular currencies. The gradual rise can be a possible payoff for an investor who buys the foreign currencies at cheaper rates

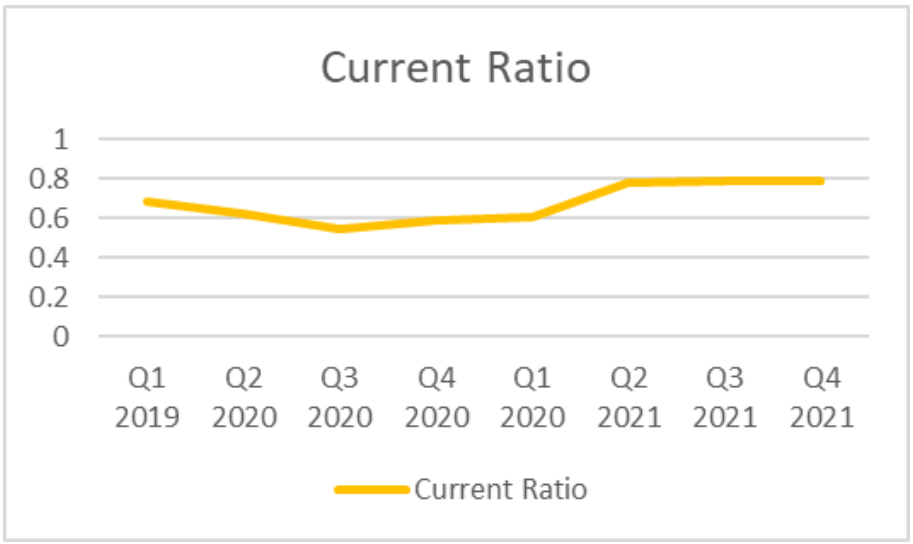


Graph 3: *PKR against 3 popularly exchanged currencies*

Stock Market

This section entertains the thought of purchasing equity in companies on the PSX (Pakistan Stock Exchange) as a means of an investment instrument.
Instead of providing the reader with names of "safe" stocks, the section provides the readers with tools to analyse the valuation of the shares and also of the risks associated with purchasing equity instruments (shares). These ratios help put the risk and reward of purchasing shares in a numerical perspective.

Exhibit below shows the Current Ratio for Shell - its ability to pay short term liabilities (loans and other incurred debts)



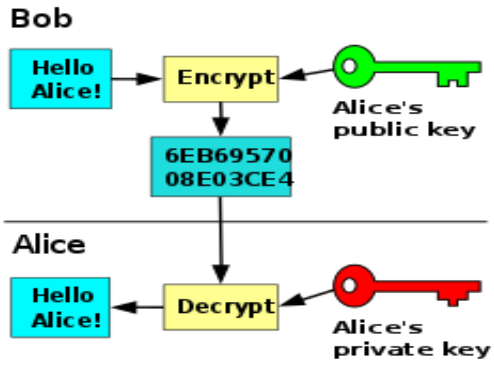
Graph 4: *Current Ratio for Shell*

Cryptocurrencies Market

Although the cryptocurrency sector has been a breeding ground for speculative trading as reflected by the extreme fluctuations in the prices of various coins, this section has taken a more technical view of the segment

An emphasis has been placed on educating the readers about the blockchain technology that has enabled bitcoin and other cryptocurrencies to come into existence. Naturally, encryption is also given a prime importance as it is a major differential of blockchain over other similar technologies.

Exhibit below shows the process of asymmetric encryption utilised in Bitcoin.



Graph 5: *Asymmetric Cryptography in Bitcoin*

An attempt at exploring the ever increasing number of factors affecting the price of cryptocurrencies have also been made. These factors give the reader an insight into evaluating the underlying value of the cryptocurrencies. Also, a comparison between bitcoin and gold prices has been made to provide a possible way of assessing the future value of Bitcoin.

Since the cryptocurrency market has been infamous for its volatility among investors, a prime focus has been placed on pegging the Return On Investment (ROI) against risk taken by the investor. This has been done through the use of Sharpe Ratio.

3. The Stock Market

3.1. What are stocks and exchanges?

A *stock exchange* is a secure and regulated environment where a 'stock' or a 'share' in the ownership of a company's capital, can be bought and sold. A company that sells shares of its equity in the public market is called a public company.

With the economy finally recovering, the topic of investment has been on everyone's mind, specifically where to invest. One potential choice is the shares market, specifically the Pakistan Stock Exchange (PSX). The PSX was established on January 11th, 2016 after the merger of the Karachi Stock Exchange, Lahore Stock Exchange and Islamabad Stock Exchange.

Companies issue stocks to raise money

So, why do companies enter the stock exchange? In simple terms, they need finance. Some companies use *debt financing* which is when a company raises money by selling debt instruments to investors in the form of corporate bonds. On the other hand, some companies raise finance through *equity financing* which means raising capital through the sale of ownership in the company. Equity-financing requires a company to register themselves as a public limited company so that they can sell their shares to the public on the stock exchange. After that, the company presents their *initial public offering (IPO)* which is the first time a company offers its shares for trading on an exchange. And then, well, it's up to the market forces of demand and supply to determine the share prices.

A stock means you own a piece of a company

After investing in a share, you become a shareholder and there are two ways a shareholder can earn from the stock market: dividends and capital gains. *Dividend* is money paid out from the company to the shareholder over a period of time while *capital gains* requires a more proactive approach as one has to monitor the market,selling and buying shares accordingly to gain a profit. In simple terms, one must buy at a low price and sell the share at a higher price, earning a profit by simply trading on the market.

However, before investing in a share, it is important to take risk and return into consideration through the following table:

Ratios Formulas		
	Ratios	**Formulas**
Return Ratios	Current Ratio	*Current Assets/ Current Liabilities*
	Debt to Equity	*Total Liabilities/Shareholder Equity*
	Debt-to-EBITDA	*Debt/(Operating Profit + Depreciation + Amortization)*
	Dividends per Yield	*(Dividend per Share / Share price)* 100*
	Earnings Per Share	*Net Income - Prefernce Dividends / Average Outstanding Common Shares*
	PE Ratio	*Share Price / Earnings per share*
Risk Ratios	Price to Book	*Market Price per Share/ Book Value per Share*
	Retun on Investment	*(Net Investment Gain/Cost of Investment) * 100*

Table 1: *Contains all the return and risk ratios that are applied for stock analysis in the report.*

3.2. Investing on the Pakistan Stock Exchange

Brokerage firms enable transactions for a service fee.

Between the investor and the exchange, there lies the intermediary of the broker. Brokerage firms play the role of facilitating trades and ensuring compliance with government regulation. You have to register with a broker to access their services. During the registration process, the firm carries out a process called “Know-Your-Customer” (KYC). They record relevant information about the individual to understand their financial standing.

Brokerage firms charge a fee for their services on the basis of transactions. In Pakistan, this commission structure operates within the rules set by the Securities and Exchange Commission of Pakistan. The minimum fee is 3 paisa per share or 0.15% of the transaction. The maximum is 2.5% of the transaction.
Beyond this, taxes and other fees also contribute to costs for the investor.

Can I even afford to buy stocks?

The minimum transaction is a “lot” of 500 shares for most equities. However, if an individual with lesser capital (likely someone like a student) wants to purchase fewer shares of a single company, they can buy them from the “Odd Lots” market. Your broker will facilitate this transaction as well.

A disadvantage of operating in the odd lots market is the lack of liquidity. Meaning, it is harder to sell smaller lots of shares than the regular size of 500 shares. This is usually seen in a wide *bid-ask spread*. A bid-ask spread is the difference between the highest buying price bid and the lowest demanded selling price. This is disadvantageous for when you wish to sell.

Brokers are judged on performance and research

The quality of research reports produced by brokerage firms is highly important. Most notable firms have research teams of qualified financial analysts. Another consideration is the experience of the brokers in the trading room. In Pakistan, some of the top-rated brokerage firms include, AKD, Arif Habib, and Topline Securities.

3.3. Seeking Returns in the Stock Market

We intend to make smart investment decisions with the highest possible return.

A good investment decision is taken by calculating certain metrics that are imperative to evaluate the potential return on stocks. It is necessary to analyse variables determining a stock's value. The value of a company’s stock reflects the overall value of a company as well as the conditions of the market. In financial analysis, *financial ratios* are used to conduct intercompany, intra-company, or industry average comparisons to construct a portfolio of various stocks. In this section, we will introduce some of these ratios.

3.3.1. Return on Investment

The most straightforward and simple tool to assess an investment is the calculation of the Return on Investment (ROI). ROI, as the name suggests, is a measure of the amount of profit or loss on an investment relative to the cost of that same investment. ROI is then a percentage of the cost of investment.

Primarily, the calculation involves changes in the value of investment. These are referred to as *Capital Gains*.

$$Capital\ Gains\ =\ Final\ Value\ of\ Investment\ -\ Initial\ Value\ of\ Investment$$

Then,

$$ROI = (FVI - IVI) / Cost\ of\ Investment$$

Approaches to calculate ROI can be modified and advanced according to the nature of the insights we are interested in uncovering. In the context of equity ownership, for a more accurate value for Return on Investment, we may include Dividends paid on the stocks owned, as well as the commission paid to the broker institution:

$$ROI = Capital\ Gains(\%) + Dividend\ Yield(\%) - Commission\ (\%)$$

ROI serves as a universal metric for analysing an asset. A key weakness of this metric is that it fails to consider how long an investment is held for. To accurately measure the opportunity cost of an investment, the time taken to attain a particular percentage of return should not be neglected. Further, the calculation does not reflect fluctuations within the time period.

Calculating Year-on-Year ROI						
	ROI (YTD*)	Purchase Price	Sell Price	Capital Gain (1 Year)	Commission	DY
LUCK	-2.525610457	696.2	678.37	-0.02561045677	2.5	0
APL	-2.581173059	337.92	310.49	-0.08117305871	2.5	0
FCCL	-2.665281625	21.66	18.08	-0.1652816251	2.5	0
SHEL	-3.084293231	281.28	116.93	-0.5842932309	2.5	0

Table 2: *Calculations of ROI Ratio for LUCK, APL, FCCL, SHEL*

3.3.2. Earnings per Share (EPS)

$$EPS = Net\ Income - Preference\ Dividends\ /\ Average\ outstanding\ common\ shares$$

Earnings per share is a liquidity ratio that defines an organisation's net profit and allocates the value to each outstanding share. This ratio indicates the amount of capital a company makes for each share of stock and is commonly used to determine corporate value.

Any company with a progressive, increasing EPS is known to be a more reliable investment.

The ratio can easily be calculated by subtracting preference dividends (dividend that is allocated to and paid on a company's preferred shares) from net income and dividing it by average outstanding common shares (shares of a company calculated after adjusting for changes in the share capital over a reporting period).

As useful as the ratio is, it still has its drawbacks. In an attempt to 'window-dress' their account values, corporations manipulate their EPS value by reducing the number of outstanding shares by 'buying back' their own shares. This inflates the

EPS value, given the same level of earnings. A change in accounting policy for reporting earnings can also alter the EPS compared.

Earnings per share				
Name	Date	Net Income	Average Outstanding Common Shares	Earnings per share
SHEL	FY 21 Q3	296,572	1,070,124	0.2771379765
	FY 21 Q1	202,409	1,070,124	0.1891453701
APL	FY 21 Q3	2,388,304	99,532,800	0.02399514532
	FY 21 Q1	4,919,632	99,533,000	0.04942714477
LUCK	FY 21 Q3	3,283,860	323,375,000	0.01015495941
	FY 21 Q1	14,070,189	323,375,000	0.04351044144
FCCL	FY 21 Q3	1,358,625	13,798,150	0.09846428688
	FY 21 Q1	3,471,351	13,798,150	0.2515809003

Table 3: *Calculations of EPS Ratio for SHEL, APL, LUCK, FFCL spread across two quarters of 2021*

3.3.3. Price Earnings Ratio

$$Price\ Earnings\ Ratio\ =\ Market\ Value\ per\ share/\ Earnings\ per\ share$$

The price-to-earnings (P/E) ratio links a company's share price to its earnings per share. There are two types of price earnings ratio – the first type is TTM, a Wall Street acronym for 'trailing 12 months', which signifies the company's performance over the last 12 months. The second type of EPS is present in the company's earnings release. The ratio forms the company's best-educated prediction of what it presumes to earn in the future.

The P/E ratio helps to evaluate whether the stock is overvalued or undervalued. The P/E ratio can also be benchmarked against other stocks in the same industry to gauge the company's performance in comparison to others. The P/E ratio indicates the amount an investor can invest in a company in order to receive $1 of the company's earnings. That is why the P/E ratio is known as the 'price multiple' since it assesses the amount that investors are willing to pay per dollar of earnings established on past and future earnings. A high P/E value implies that the stock price is high relative to its earnings and possibly overvalued.

The main limitation of P/E ratio when it comes to contrasting the ratio with different companies. The valuation and growth rate of other companies may broadly vary between different sectors, mainly due to different methods of earning money and different timelines employed by companies during which it earns money.

Companies should use P/E only as a comparative tool while analysing companies in the *same* sector since this is the only kind to yield a productive insight. For example, comparing the P/E ratios of a telecommunication company with an electronics company may lead to false evaluation that one of them is a superior

investment, which is not a reliable assumption. This concept must be applied while using any type of ratios.

PE Ratio				
Name	Date	Share Price (Rs)	Earnings per share	Price Earnings
SHEL	FY 21 Q3	144.64	0.2771379765	521.9060982
	FY 21 Q1	178.43	0.1891453701	943.348494
APL	FY 21 Q3	218.33	0.02399514532	9098.923849
	FY 21 Q1	270.65	0.04942714477	5475.736081
LUCK	FY 21 Q3	736.73	0.01015495941	72548.78824
	FY 21 Q1	925.05	0.04351044144	21260.41404
FCCL	FY 21 Q3	17.85	0.09846428688	181.2840022
	FY 21 Q1	24.15	0.2515809003	95.99297867

*Closing date - 18th June 2021 for the first quarter and 17th September 2021 for the second quarter

Table 4: *Calculations of PE Ratio for SHEL, APL, LUCK, FFCL spread across two quarters of 2021*

3.3.4. Price-to-Book (P/B) Ratio:

First - a bit on *value investing*. Value investing is an approach to investment frequently associated with figures such as Warren Buffet and Benjamin Graham. It prioritises analysis of companies over market forces, to assess potential for return. The aim is to purchase assets that are being offered at a price lower than the "intrinsic value" of the asset. Intrinsic value may be thought of as the price an asset 'deserves' to be traded at. Value investors observe that, in the short-term, assets may trade at prices that are different from their intrinsic value for any number of reasons. In the long-term, however, the market price and intrinsic value are expected to converge. It naturally follows that investors then search for stocks that are cheaper than their intrinsic value, buying low with an expectation of gain.

Price-to-Book ratio is one of the tools used by value investors to make informed purchase decisions. It computes the market value of an asset relative to its book value. For the stock market, P/B is calculated as:

$$P/B = (Market\ Price\ per\ Share) \div (Book\ Value\ per\ Share)$$

$$Where\ Book\ Value\ per\ Share = ((Total\ Assets - Total\ liabilities) - Preferred\ Equity) / Total\ Outstanding\ Shares)$$

Intuitively, the ratio indicates the amount an investor is required to invest to purchase a net of the assets of the company. Then, the higher that amount, the more overvalued a share is likely to be. Note that this is also how it differs from the Price to Earnings Ratio.

This ratio has its limitations. First off, the BVPS is usually a challenging computation for the average retail investor. It involves a careful reading of the balance sheet. Even so, it may be worth the effort if the aim is long term

investment. Another limitation is that there is no fixed notion of a high or low P/B value. These values are relative, and frequently vary across industries.

Calculating P/B Ratio						
Assets	Liabilities	Book Value	Total Shares	BVPS	Price	P/B Ratio
34052231000	10776560000	23275671000	1379815000	16.86868964	43.31	2.56747862
For Fauji Cement, June 14						

Table 5: *Calculations of P/B Ratio for FFCL*

3.3.5. Price-to-earnings Growth (PEG) ratio:

When the price to earnings (P/E) ratio relates the market value of a stock to the performance of the company, it provides only a snapshot view of the stock. It fails to account for trends in EPS and provide confidence for the future performance of the asset. The Price to Earnings Growth ratio factors in projected growth of a stock.

$$PEG\ Ratio\ is\ then\ =\ (P/E\ ratio) \div EPS\ Growth.$$

Calculating expected growth rate is a laborious task for any investor. Therefore, it is advised to seek analysis performed by professionals for this information, instead of attempting to calculate it on your own. Expected growth rate can be estimated for different durations of time, from one-year to five-year projections. Accordingly, there are different resultant values of PEG as well.

The key distinction between P/E and PEG can be understood by considering undervalued companies. A low P/E may suggest a lower market price relative to intrinsic value. However, this may be misleading for an investment if future potential of the stock is dismal. A lower PEG, on the other hand, may then more fully indicate that a stock is undervalued.

3.3.6. Dividend per Yield Ratio:

$$PEG\ Ratio\ is\ then\ =\ (P/E\ ratio) \div EPS\ Growth.$$

Dividend per yield ratio is used to define the cash flows attributed to an investor from holding stocks or shares in a company. The ratio shows the percentage of dividends for every dollar of stock and is an approximation of the dividend-only return of a stock investment. Assuming the dividend is not raised or lowered, the yield will rise when the price of the stock decreases and conversely, the yield will fall when the price of the stock rises. Since dividend yield differs relative to the stock price, the ratio can appear unusually high due to the stock value that is falling quickly.

Because dividends are paid quarterly, many investors will take the last quarterly dividend, multiply it by four, and use the product as the annual dividend for the yield calculation. This approach will reflect any recent deviations in the dividend. If

the dividend calculation is performed after the large dividend distribution (if dividend is allocated annually), it will give an inflated yield.

While high dividend yields are appealing, it's possible they may be at the expense of the potential growth of the company. It can be presumed that every dollar a company is compensating in dividends to its shareholders is a dollar that the company is not reinvesting to grow and generate more capital gains. Even without receiving dividends, shareholders have the potential to earn higher returns if the value of their stock increases while they hold it as a result of company growth.

It's not advised that investors evaluate a stock based only on the dividend yield. Dividend data can be old or built on faulty information. Many companies have a very high yield as their stock is falling. If a company's stock experiences a decline, they may reduce the amount of their dividend, or eliminate it altogether.

Investors should exercise caution when evaluating a company that is deteriorating in value and has a higher-than-average dividend yield. Because the stock's price is the denominator of the dividend yield equation, a strong downtrend can increase the quotient of the calculation dramatically.

Dividends per Yield				
Name	Date	Dividend per Share	Share Price (Rs)	Dividend per Yield
SHEL	FY 21 Q3	1.722230321	144.64	1.190701273
	FY 21 Q1	1.722230321	178.43	0.9652134288
APL	FY 21 Q3	0.8427272216	218.33	0.3859878265
	FY 21 Q1	6	270.65	2.401256357
LUCK	FY 21 Q3	0.0004514882103	736.73	0.0000612827237
	FY 21 Q1	0.06005720912	925.05	0.00649232032
FCCL	FY 21 Q3	0*	17.85	0
	FY 21 Q1	0*	24.15	0
* No dividends were paid on ordinary shares				

Table 6: *Calculations of Dividends per Yield Ratio for SHEL, APL, LUCK, FFCL spread across two quarters of 2021*

3.3.7. Overall

Calculating return is important but it is not the only factor that should influence your decision to invest in the stock market. Although they significantly influence a share's price and value, other factors such as company's brand name and management or risk ratios must also be taken into consideration when deciding whether to invest.

3.4. Investigating Risks associated with the Stock Market

Quantifying the risk we take: Risk Ratios

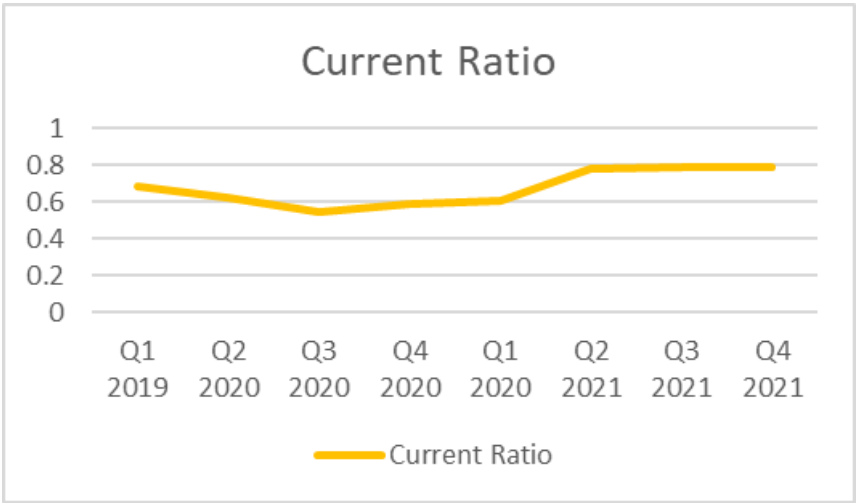
Calculating risk ratios is extremely important when deciding where to invest as it tells you the likelihood of a company to go bankrupt. It is essential to take these into consideration when investing to understand the risk associated with each investment and also make comparisons across various companies to decide the best stock to invest in.

3.4.1. Current Ratio

$$Current\ Ratio = Current\ Assets \div Current\ Liabilities$$

Current liabilities are a company's short-term debts and other financial obligations that are expected to be paid within a year. Current liabilities include short-term debt, wages, tax payables and account payables. Current assets are assets that are expected to be converted into cash within a year. Current assets include cash, inventory and receivables. The values for both current assets and current liabilities can be found in a company's balance sheet.

Current ratio is a liquidity ratio that measures a company's ability to pay short-term liabilities that are due within a year. If the value is < 1, it means the company does not have enough capital on hand to meet short-term debts and liabilities. Ideal value is 1.5 to 2 but essentially, a company's current ratio value should be in line or above the industry average. If it is below, it would suggest that the company is risky to invest in as they may fail to meet their financial obligations in the short-run. On the contrary, although a high ratio is ideal, an extremely high ratio may indicate that a company is not using its current assets efficiently or managing its working capital well enough.



Graph 7: *The graph illustrates Shell's current ratio over the course of 2 years. Throughout the time period, their current ratio value has been below 1, suggesting that the firm was unable to cover their short-term debts by their short-term assets. It also presents a fall in the value around the same time as the global pandemic, demonstrating the impact of external factors on such risk ratios.*

However, it is difficult to compare current ratios across various industries. Moreover, a company may also have a high current ratio but its inventory is damaged or has remained unsold for a long period of time, making the ratio unreliable. Hence, this ratio should not be the only determinant when deciding what company to invest in.

3.4.2. Debt-to-Equity Ratio

$$Total\ Liabilities\ \div\ Shareholder\ Equity$$

This measures the degree to which a company is financing its operations through debt versus wholly owned funds. It reflects the ability of shareholder equity to cover all outstanding debts in the event of a business downturn.

Shareholder equity is the owner's claim after subtracting total liabilities from total assets. If shareholder equity is positive that means the company has enough assets to cover its liabilities, but if it is negative, then the company's liabilities exceed its assets.

The values for total liabilities and shareholder equity can both be found on the balance sheet of a company. A high D/E ratio suggests high risk as it means a company's growth is being financed by debt. This is not always a bad thing considering it could result in high reward (greater than the debt's cost), but if managed ineffectively, it could result in great loss as well. Ideally, the value of this ratio should be around 1 to 1.5 but it varies from industry to industry. For example, a high D/E ratio in a slow-growth industry but with a stable income is acceptable. Hence, once again, it is difficult to compare this ratio across industries.

3.4.3. Debt-to-EBITDA ratio:

$$Debt\ \div\ EBITDA$$

This ratio measures the ability for a company to pay off its incurred debts. It compares a company's total obligations, including debts and liabilities, to the cash the company brings in. EBITDA stands for earnings before interest, taxes depreciation and amortisation.

Interest is the payment from a borrower to a lender above the repayment of the money borrowed. Taxes are a compulsory financial charge paid to the government. Depreciation measures the decrease in monetary value of an asset over time due to use, wear and tear or obsolescence. And, amortisation is when the book value of a loan or an intangible asset is periodically lowered.

The values for this ratio can be found in the income statement. To calculate the value of EBITDA, find the operating profit (also known as earnings before interest

and tax) and add depreciation and amortisation. To find the value of debt, add all of the company's long term and short term debt obligations. A high ratio would suggest that the company has a heavy debt load.

Some industries are more capital intensive than others so a company's debt-to-EBITDA ratio should only be compared to companies in the same industry.

In some industries a high value is acceptable while in others, the same value is considered too high. Generally though, the ideal value is < 3.

3.4.4. Overall

There is a risk in every investment we make - either we make a loss or a profit. With that being said, risk ratios are extremely useful to gain an insight on the company's performance and the value of the company in the stock market. However, fear of taking a risk should not stop us from investing in a certain market. Taking calculated risks can allow us to gain some sort of return even in the riskiest of markets.

3.5. Concluding Thoughts on the Stock Market

To conclude, the stock market is one of the many markets one can choose to invest in. A cost-benefit analysis is advised when deciding whether to invest in this market or not. The return and risk ratios give an in-depth insight on whether a company is worth investing or not but your analysis should not be limited to quantitative factors. Qualitative factors such as competitive advantage, company's reputation, changes in management culture and so on can impact a share's value just as much as the ratios can. Another factor worth considering is whether you are looking for long-term or short-term gain. This report is targeted more towards long-term gain as short-term gain strongly depends on the share prices and not much on other factors.

Holistically, if you are a risk-taker or good decision maker, this is the market for you.

4. Currency Market

4.1. Introduction to Forex

In this section we will concisely introduce the Forex market. Our focus will be on the ease of entering the market, how one can trade Forex and what are the most common currency pairs that you stumble upon from a global and Pakistani perspective.

Entering the Market

Interestingly, most readers of this report may be oblivious to the fact that they may have already entered the forex market at least once in their lives. Whenever we change our currency from one to another, we essentially are participating in the forex market. In economic terms, we are using the currency in our wallets to buy another currency from the market. Generally, we conduct these forex trades through authorised money exchanges (e.g. Western Union). These money exchanges can either be in the form of conventional physical buildings or more popularly, can also be online. In fact, the largest money exchange (FOREX) is an online platform.

Market Size

The Currency Exchange market (called forex) is a deceptively large market. Whenever one thinks of a large market with constant trading, usually stock exchanges such as the NYSE come to mind. However, according to the Triennial Central Bank Survey of 2019, the forex market experiences daily trade of around $6.6 trillion. To put this number into perspective: the New York Stock Exchange (the world's largest stock and commodities exchange) had an *annual* trade volume of only $169 billion.

Popular Currency Pairs

Since currency trading involves buying and selling of one currency with another, currency pairs become of prime importance. If you were to go on a currency exchange, you would see various abbreviations denoting currencies and a certain price to the side. For example, you are likely to see the following: "USD-JPY: 115¥". This notation simply means that if you wanted to purchase $1 using Japanese Yen, you would need 115 Yens to do so.

There are a few currency pairs on the market which are classified as strong. The main factor which comes into consideration when declaring the currency pair as strong is the liquidity of the pair (i.e. how often and how easily could you buy one currency using the other) and the economic stability of the currency to which each currency pair belongs. Strong currency pairs include the following: USD-JPY, EUR-USD, GBP-USD, USD-CAD etc. USD is common to all these currency pairs because it is the global currency of trade. Moreover, according to the International Monetary Fund, 60% of all central bank funds around the globe were composed of the USD.

Pakistan's Forex is influenced by Overseas Pakistanis

From a Pakistani perspective, forex is an integral part of the country's economy. Currency inflows to Pakistan generally occur through the Overseas Pakistanis who work in foreign countries. Therefore, the countries in which the greatest number of Overseas Pakistanis reside, they become the prime currency pairs for the Pakistani Rupee. The most popular currency pairs in Pakistan are the following: USD-PKR, GBP-PKR, AED-PKR, SAR-PKR etc.

4.2. Ease of Investment

FOREX investments can be done online as well as at in-person institutions and both are very popular mediums of trading. There are many reputable FOREX trading apps/websites where you can easily conduct trading in a matter of minutes without having to visit banks or currency exchange outlets. The following steps are common for almost all online trading apps:

1. Sign up on the app.
2. Verify your account by providing an official identity proof.
3. Link your forex account to your bank account to deposit funds in your forex wallet.
4. Transfer a minimum deposit.
5. Check the trends of different currencies on that app and also conduct your own analysis from external research.
6. Purchase a foreign currency; trading will require your verification.
7. Keep looking out for the value of the currency you purchased.
8. Sell the foreign currency when you are satisfied with your return on investment.

These are some universal processes involved in any online forex trading. Each platform may charge a different percentage of commission on each trade or require a different amount of minimum deposit. Following are some of the well-known online forex trading apps:

A. FOREX.com
B. TD Ameritrade's thinkorswim
C. eToro
D. Nadex

These apps differ in terms of the convenience they provide to the user but if you are a beginner then FOREX.com is the go-to option for you since it is very beginner-friendly and offers tips and guidance for initial transactions although its fee is slightly higher than the industry average and it requires a minimum deposit of $100. On the other hand, eToro is brilliant for handling portfolios that span across forex and cryptocurrency, whereas thinkorswim requires a minimum deposit of $0.00.

On the other hand, banks and financial institutions like money exchanges facilitate in-person forex trading through their retail outlets. The steps are much

simpler there as the investor just walks in the bank/exchange, checks the selling price and purchasing price of the base currency, calculates the spread, and purchases or sells the base currency after providing a national identity proof (e.g: CNIC).

However, in some cases, the amount of base currency which the investor wants to purchase may not be readily available at the retail shop. Therefore, the investor will have to wait for a few hours or a day until the requested currency is available again. In Pakistan, it is also important to check the paper notes of the base currency you are purchasing since a weary and torn note or a note with something written over it may not be accepted when you sell that currency.

Overall, there are three ways to trade forex:

A. Spot Trading
B. Forward Trading
C. Futures Trading

However, most beginner to intermediate investors do spot trading where exchange rates are determined by the forces of demand and supply and currency pairs are swapped in real time, whereas the forward and futures markets are primarily used by forex traders who want to speculate or hedge against future price changes in a currency. Above-mentioned apps facilitate all 3 types of trading.

Above steps cover the entire logistical process of investing in the forex market. If you combine this with the analysis that will follow, chances of doing the wrong investment are minimised.

Moreover, the accessibility and convenience of forex trading is unmatched as it operates 24/7 online. The diversity allowed by the ability to build a portfolio of currency investments also helps spread the overall risk and reduce the impact of an investment's failure.

4.3. Seeking Returns in the Forex Market

4.3.1. Introduction

We analysed the rates of returns for 24 currencies against the Pakistan Rupee. For ease of understanding, we will be denoting pairs by Foreign or Base Currency / Host or Quote Currency; for example, USD/PKR means how many Pakistani Rupees are needed to purchase 1 US Dollar. As the value of USD/PKR begins to increase, it means that the Pakistani Rupee is depreciating against the US Dollar, or in other words, the US Dollar is appreciating against the Pakistani Currency. The fundamental principle of bullish and bearish markets guides the investment

strategy in the FOREX market and our analysis of historical data on currencies will help us learn to identify these key time periods to conduct currency transactions.

One of the key benefits of forex trading is the opportunity it offers traders in both bullish (favourable economic conditions) and bearish (worsening economic conditions) markets. This is because forex trading is always done in pairs, when one currency is weakening the other is strengthening thereby allowing you to take advantage of rising and falling markets. Returns in FOREX investment can be earned in two ways. The first way is to purchase currencies in a bullish market when the foreign currency is appreciating against the domestic currency and then later sell that currency when the valuation is high enough for the owner to earn a high profit margin. The second route is to sell currencies in a bearish market at reasonable rates and then purchase currencies later when they are at the minimum/lower valuation.

4.3.2. Methodology

To analyse the returns on these currencies, we used a combination of descriptive and inferential statistical techniques. These enabled us to study the exchange rate data in depth and identify the underlying trends of FOREX trading. We obtained the data from the State Bank of Pakistan's website. The data consisted of currency rates of Pakistani Rupee against 27 other currencies for the past 50 years. We analysed the rates of return on 10 of these currencies out of which 4 seemed more promising than the others in the past 5 years. These were the U.S Dollar, the UK Pound, Euro, and UAE Dirham.

We then cleaned this data by removing missing values and using a universal format. To find the average returns of each currency for each month and each year since 2018, we made pivot tables on Microsoft Excel which showed us average monthly and annual values of each currency's valuation. This allowed us to identify currencies which maintained a stable appreciation rate against PKR and also point out periods where these currencies depreciated against PKR.

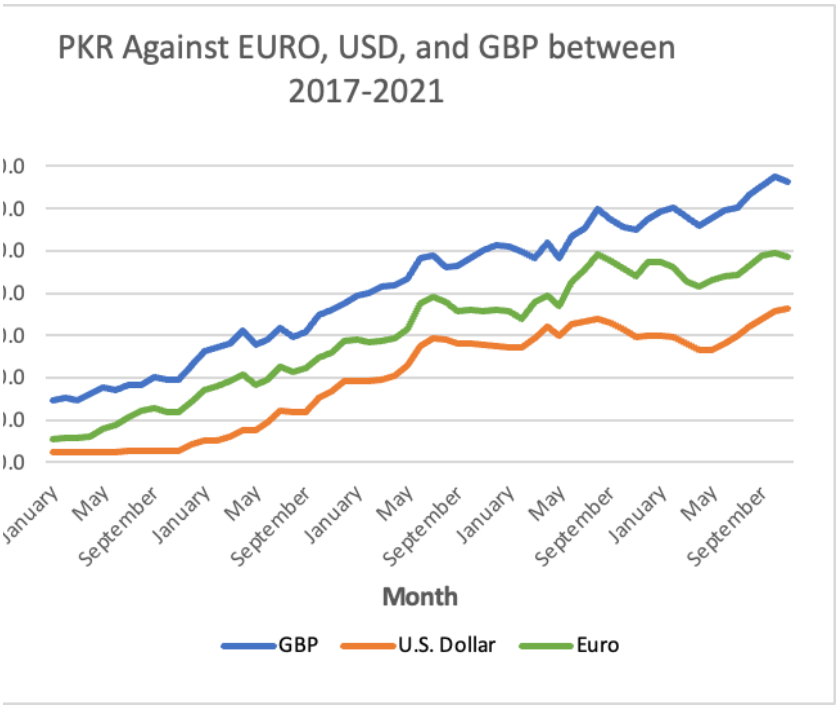
Finding average, maximum, and minimum value of a currency for the past 6 months can give a fair idea of how the particular currency is behaving and the percentage change in the value of currency between now and 6 months ago tells us the nominal profit margin or rate of return. For example, if a person purchased $100 (U.S Dollar) for Rs.15,000 (Pakistani Rupee) in May 2021 and sold these $100 for Rs.17,500 in November 2021, then they earned a nominal return of Rs.2,500 on an initial investment of Rs.15,000. This means that the person earned 16.67% return on investment in USD after 6 months of investment. In our analysis described below, we have used the data for the past 9 months as early as March 2021. However, it is important to note that this rate is not adjusted for inflation so the real rate of return is lower than the nominal rate which we calculated as we have not adjusted the purchasing power.

This is a standard method of analysis that anyone can universally use to calculate the rates of return of investing in multiple currencies. Therefore, you can also use this methodology to investigate various FOREX investments' profit margins in isolation of other factors like monetary policy, government regulations, oil prices, etc.

4.3.3. Results

Year	Average of UAE Dirham	Average of UK Pound	Average of U.S. Dollar	Average of Euro
2017	28.72	136.82	105.45	119.72
2018	33.33	162.39	122.40	144.03
2019	40.99	192.04	150.58	168.36
2020	44.09	208.35	161.96	185.65
2021	43.70	221.87	160.50	191.02

Table 7: *The line graph below is for exchange rates from January 2017 till November 2021*



Graph 8

Graph 8 above summarises the trend in currency rates against PKR since January 2017. It is clearly evident that each of the four currencies as noticeably appreciated against the PKR with some minor fluctuations in between which can be attributed to Pakistani interest rate, global oil prices, and other determinants that are explained in detail above. *Graph 8* is more useful for long-term investors who may have sufficient savings to purchase currencies for a period of 2-3 years and then trade it back for PKR when the market seems bullish or bearish.

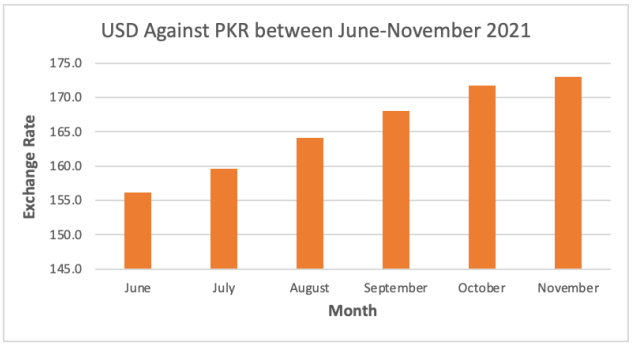
Table 7's data also corroborates the trend shown in graph 8 as we see that the averages of each currency's value against the Pakistani Rupee has appreciated consistently and with stability in the past 4 years. In just the last 2 years since 2019, the Pound has appreciated on average by Rs.29 from Rs.192 to Rs.221, giving an average return of 15% over 2 years. Similarly, the average rate of return for USD/PKR is 6.7% between 2019 and 2021. However, we know that these are just averages and not absolute values of currencies at each date. The closing value of

USD/PKR at 31st December 2021 was Rs.180, which would give an investor a return of 20% after investing in 2019. We have used the mean values of these exchange rates.

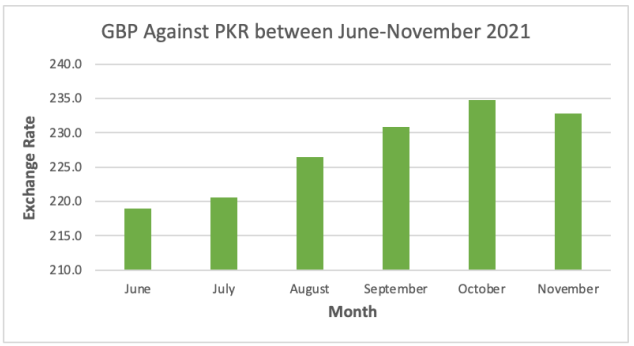
We can extrapolate this rising trend in each currency for a further of approximately 3 months till February 2022; this is crucial for investors in calculating their risk and rate of return based on the period of investment before they invest in a portfolio.

Graphs 9, 10, 11 and 12 show the trend of USD, GBP, EURO and AED against PKR individually for the past 9 months as early as March 2021. Each of these graphs show that the general trend has been increasing which means purchasing the foreign currency right and selling it for a higher price later seems a suitable investment option.

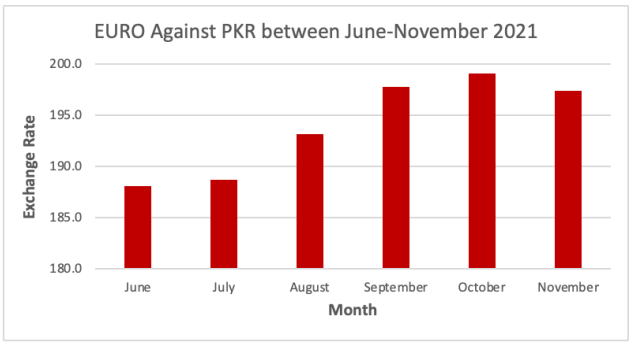
Graph 9



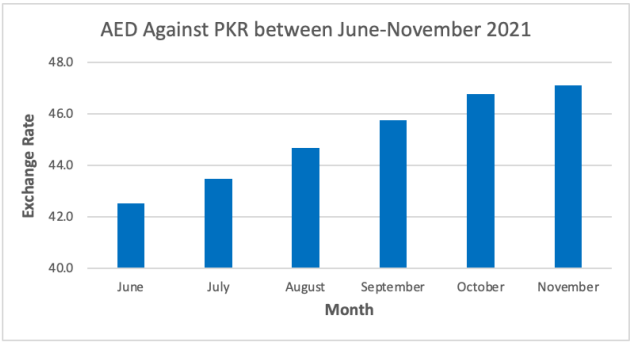
Graph 10

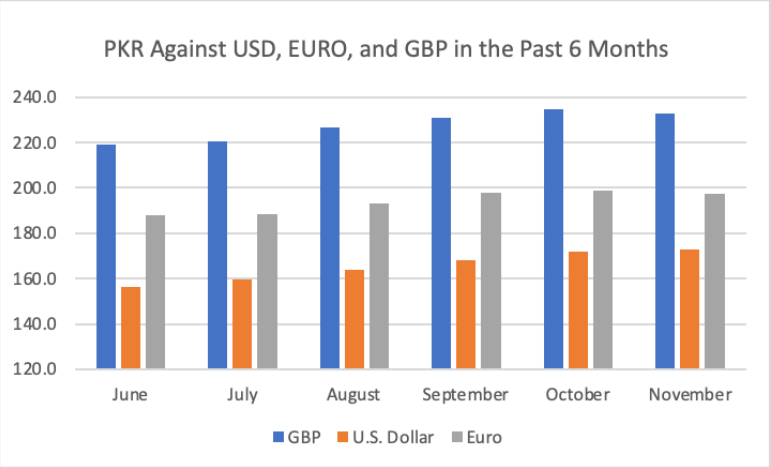


Graph 11



Graph 12





Graph 13

4.4. Risks Of Trade

In this section, we will skim over the various risks that new and even experienced forex investors are bound to face. This section only focuses on introducing the risks and not avoiding them.

4.4.1. Leverage Risks

Margin accounts:
These special accounts enable users to "leverage" the power of the existing money in their account by borrowing money from their broker or another authorised party

Maintenance Percentage:
To insure themselves from the risk that you might default on the payment of the loan amount, the broker will ask you to make a "down payment" known as the maintenance margin

Margin Call:
If your account value starts to decline below a certain set value (called the Maintenance Margin Requirement MMR), the broker may ask you to deposit additional money towards the MMR. The account value below which the margin call is triggered is calculated as:

$$account\ value\ = \frac{margin\ loan}{1-MMR}$$

Let's consider an example in which a person establishes a margin account with 100,000 PKR as their initial account balance out of which, 50,000 PKR is their own share while the other 50,000 PKR are borrowed from the broker. The broker sets an MMR of 30%. Since your initial share of the account balance is at 50%, you are above the MMR and can start trading.

If you were to purchase USD using the margin account with a long call (i.e., you want the USD to appreciate with respect to the PKR), the margin call will be triggered if your account balance falls below 71,428.57. The broker who lent you the money will now have the right to liquidate the assets in your account to recover the MMR amount. This risk of liquidation is the leverage risk, and many beginners and experienced traders alike are susceptible to it.

4.4.2. Counterparty Risks

Counterparty risks in forex arise during spot or forward contract trading. In this type of trading, no banks or authorised forex exchanges are involved. Instead, two or more parties arbitrarily decide the amount at which they would like to exchange currency at a future date. These types of trades are not widely used by the general public (such as students) but are useful for bigger businesses for hedging because of their ability to end uncertainty of currency prices in a long-term transaction.

Counterparty risks occur when one of the parties involved in the trade are unable to pay their due amount.

4.4.3 Transaction Risks

The forex market only functions during the working days. Over the weekend, the market remains closed however, the factors affecting the market continue to function. At times, a certain change in government's monetary policy may occur over the weekend, significantly affecting the currency price upon re-opening of the market. If a trade is left hanging over the weekend, then the people involved in the trade expose themselves to these transaction risks.
Other risks such as the interest rates, the inflation percentages and other monetary factors will be discussed in the following sections.

4.5. Influential Factors in the Forex Market

In this section we will be focusing on the causes of fluctuation in currency values with respect to other currencies. Specifically, the focus will be on Interest Rates, GDP growth percentage, Inflation Rates, and the Current Account Balance.

As a preface to this section, I would like to inform the readers that the real-world economy (especially the exchange rates) is regarded as a chaotic system. Meaning that changing any condition while analysing the data can lead to massive changes in the eventual outcome of the analyses. So, in this and the following section, the market scenarios will be idealised to simplify the analyses.

4.5.1. Interest Rate

It is the percentage of the money borrowed from the bank which you will have to return to them in addition to the principal amount borrowed. It is also the rate at which you can expect to get a return on your deposits in a savings account. The percentage of Interest Rate is set by the country's Central Bank (e.g., State Bank of Pakistan).

Increasing interest rates generally mean that the government is trying to reduce the flow of cash in the market by making it more difficult (expensive) to borrow money while making it more profitable to deposit money into savings accounts. Higher interest rates are an indicator of a defensive economic policy through which a government is trying to prevent the depreciation of their currency in the global market.

4.5.2. Inflation Rate

Inflation rate represents the increase in the cost of goods or services over a given period (usually a fiscal year or quarter). Rising inflation rates represent a surplus of a given currency in the market therefore causing a greater competition for limited goods. This rise in demand for goods due to the excess money leads to rising cost of goods.

Rising inflation generally causes the weakening of the currency in the global market. Governments usually combat increasing inflation by boosting the interest rates. In a real-time economy, interest rates and inflation rates are highly correlated.

4.5.3. GDP Growth Percentage

The GDP represents the value of all the goods and services within the borders of the country. A negative GDP growth is indicative of a shrinking economy while a rising growth percentage is indicative of a burgeoning economy. Rising GDP growth is usually accompanied by rising inflation (inflation is ok if it is not rising uncontrollably) and lower interest rates. Rising GDP generally leads to the strengthening of the country's currency in the global market as it represents a stable economic environment which is likely to attract greater local and foreign investment.

4.5.4.Current Account Balance

It represents the economic transactions of a country. The Current Account Balance (CAB) is a great measure to gauge a country's economic activity especially in comparison to another country. A negative CAB indicates a deficit in the county's Balance of Payments while a positive indicates a surplus.

A negative CAB generally indicates that a country is in debt and has some payments due. This essentially devalues the country's economy on the global market.

A positive CAB generally denotes that a country is a net lender to other countries and expects to receive payments on the money it lent. Positive CAB usually strengthens a country's currency.

Most of the factors described above work in highly sophisticated, intertwined manners. Hence, when considering the currency of choice to invest in, we must look at the cumulative effect of all these factors.

4.6. Case Study of The Pakistani Rupee

In this section, we will try to briefly review the economic landscape of Pakistan over the last few years. This section aims to portray to the readers how a real-life currency is affected by various factors discussed in the previous sections.

Exchange Rate Mechanism

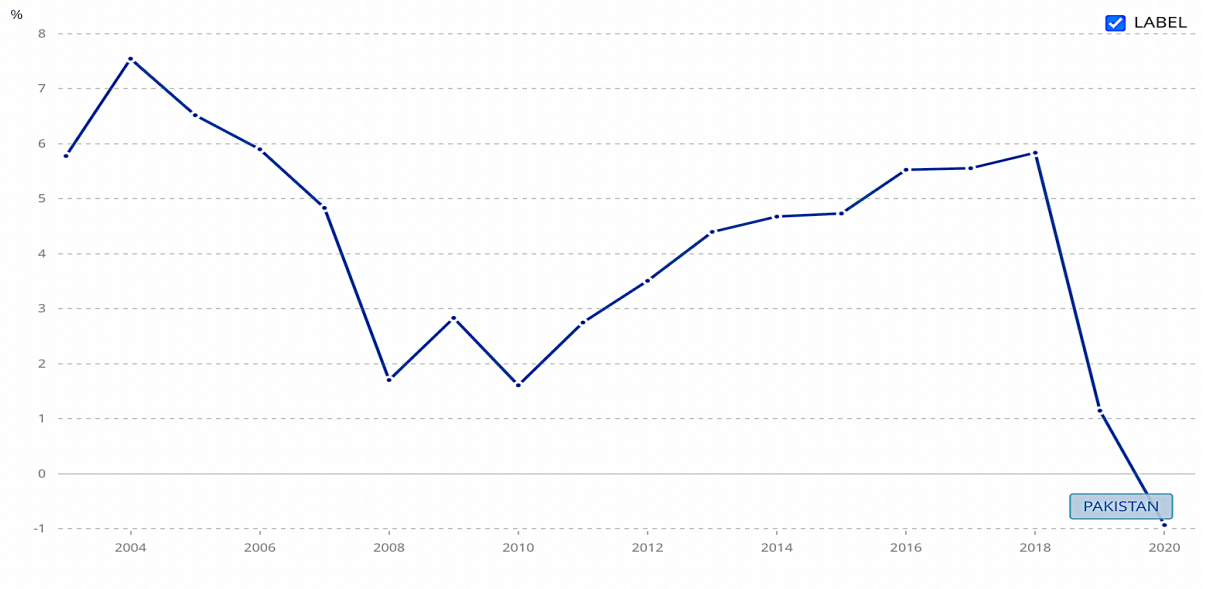
The Pakistani government over the years preferred a fixed exchange rate with respect to the USD. A fixed rate is usually preferred when the country is assured that it has no near or long term balance of payment issues and generally when a country has a positive *CAB*.

However, after the 1980's, Pakistan gradually started to suffer BOP issues and eventually the CAB dwindled towards the negative side. Since the early 2000s, the Government of Pakistan has used a floating exchange rate system in which the currency is not bound to a certain pre-decided exchange value. Since 2019, the Imran Khan government has used a market based floating system to sort its balance of payment issue.

The Market Based Floating exchange rate means that the value of the rupee with respect to other currencies depends upon the supply and demand fluctuations within the market (needless to say, rupee value is also dependent upon domestic monetary policies).

Economy in 2020

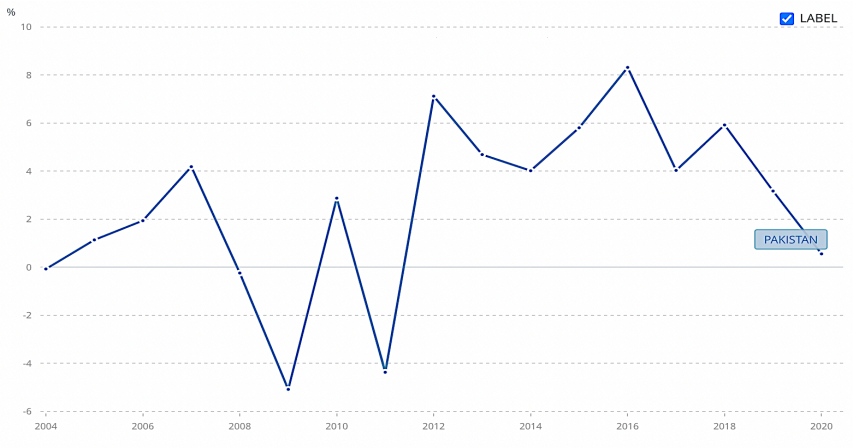
2020 was an eventful year for the economy of Pakistan. Unsurprisingly, the GDP growth was negative in 2020 at -0.935% but much less than expected since the GDP growth had decreased much more significantly from 5.836% in 2018 to just 1.145% in 2019.



Graph 14: *GDP growth chart from World Bank*

Since the GDP growth was on a downward trend during this period (2018-2020), we expect the interest rates to be also decreasing as the government would want to make it easier for people to borrow money during this period to stimulate economic activity. The expected trend in interest rates was followed as shown by the graph below:

Graph



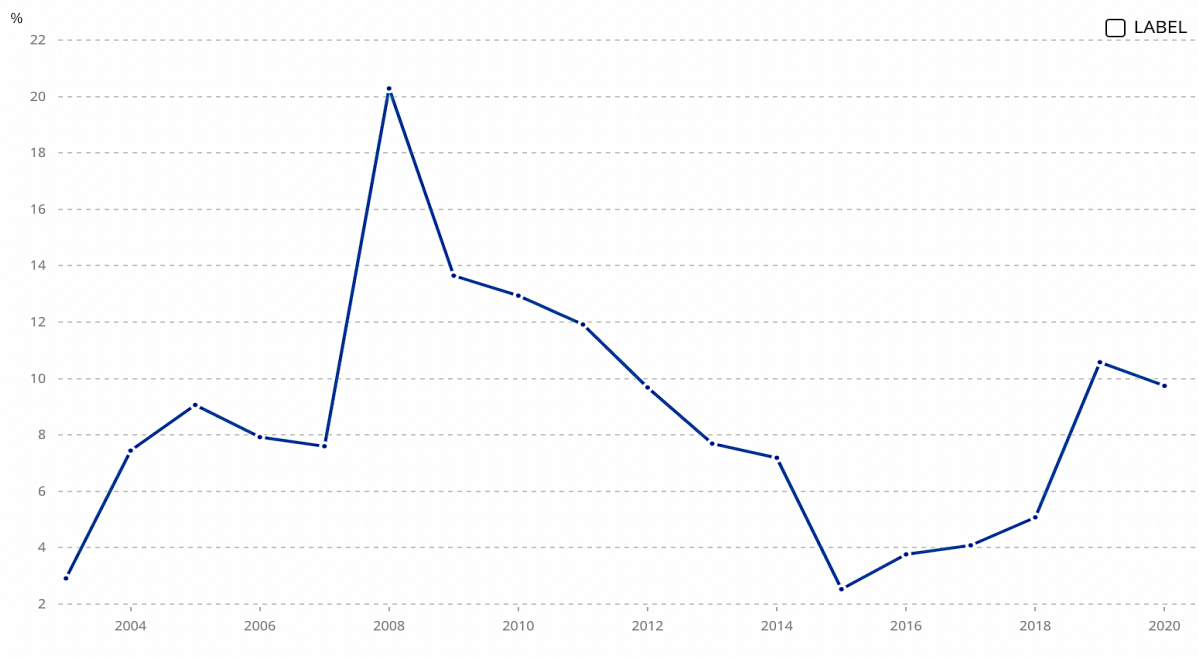
Graph 15: *Interest Rate chart from World Bank*

Notice how the fluctuations in the interest rate look like a more pronounced version of the trend observed in the GDP growth %. A shrinking rapidly shrinking GDP automatically raises the concern about the underlying economy in a country. Since most of the leading economies of the world (barring China) experienced a greater reduction in their respective GDPs during 2020, Pakistan's performance seems relatively better.

However, for Pakistan the period between 2018 and 2020 is a significant breakaway from the trend of gradually rising GDP over the last decade. This downward slump raises questions over the overall state of the economy in the last couple of years.

Peaking inflation has also been a prime factor in the shrinking of Pakistan's GDP since the start of 2018:

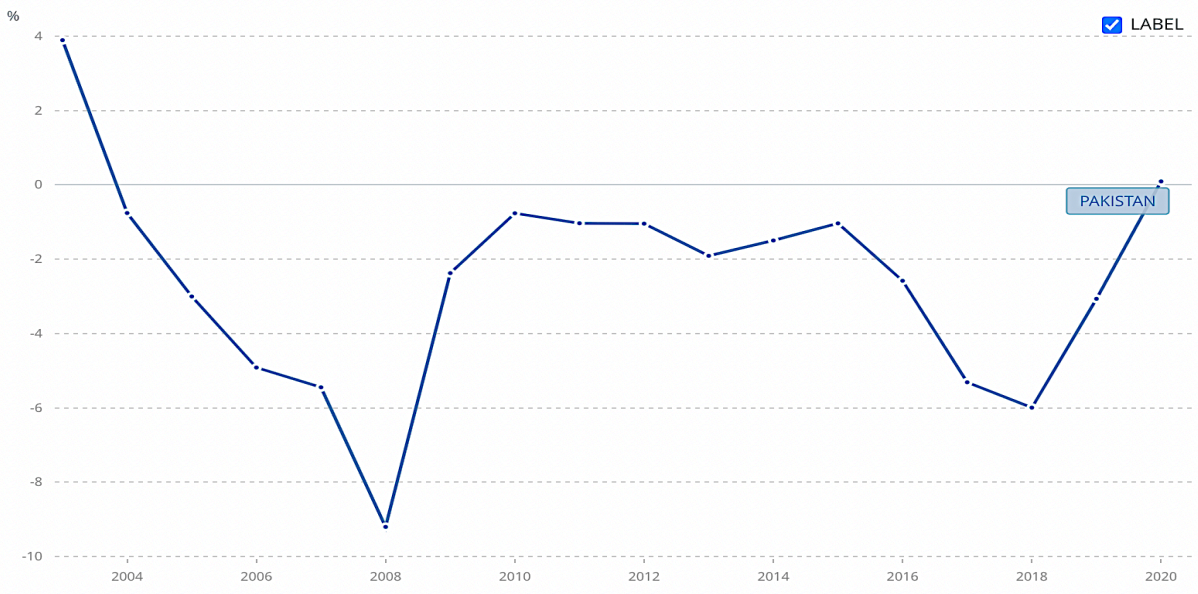
Graph



Graph 16: *Inflation Rate chart from World Bank*

From the graph above, we can decipher that the inflation had been gradually rising since the start of 2015 while interest rates were being reduced annually during this period (barring 2016 -2017). This tells us that the decline in GDP was a result of the collapsing CAB and depreciation of the rupee. The lowering of the interest rates between 2018-2020 further worsened the inflation in the country which rose at such an unprecedented rate for the first time in over a decade.

Since coming to power, the Imran Khan government has taken various initiatives to boost foreign remittances to Pakistan. These remittances have always been a saving grace for the country's economy during its multiple BOP crises in the past. The government introduced the Roshan Digital Account as a measure to amp up the remittances to Pakistan and the effect can be seen in the graph below:



Graph 17: *Current Account Balance as a percentage of GDP from World Bank*

The year 2020 witnessed unprecedented increase in the remittances received from abroad thus making Pakistan's CAB net positive for the first time in 17 years.

4.7. Conclusion

The sharp decline in the GDP growth and the ever increasing inflation are red signs for any economy. As discussed in the preceding sections, these economic indicators combine to determine the overall strength or weakness of a currency. Along with many other factors, the slump in GDP and the unabated escalation in inflation has led to an unprecedented depreciation of the PKR. The trend followed by the PKR against the dollar is shown below (comparisons with other currencies are shown in the following sections):

Graph 18: *USD to PKR chart from xe.com for the last 5 years*

To conclude, the currencies market of this section must be regarded as a minimalistic guide on forex trading. There are several risks involved, but the intelligent investor overcomes all.

5. Cryptocurrency Market

5.1. Introduction to Blockchains

This section provides a simplistic definition of the blockchain technology

It is a public peer to peer network which allows decentralised addition on lines to ledgers (known as blocks) which are stored in form a continuous record (chain). The lines are added to the ledger (blockchain) after verification from certified nodes on the system.

5.1.1. Ledgers

This section succinctly introduces the concept of ledgers in the context of blockchain

Since the dawn of civilizations, humans have made use of writing, whether in the form of familiar or unfamiliar symbols, to keep track of the interactions they have with each other. Monetary interactions led to the creation of the first forms of written records in human history. Humans would keep track of the amount lent or owed on objects known as ledgers. This method is still relevant to this day and blockchains are no different from these ledgers.

In case of cryptocurrencies, these ledgers contain the history of all transactions conducted via the cryptocurrency with time stamps, wallet addresses and other relevant information. Blockchain in effect is a technological sophisticated successor to the ledgers of the past.

5.1.2. Encryption

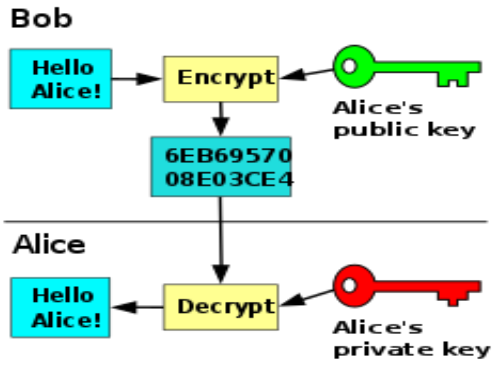
This section introduces the concept of asymmetric cryptography with a brief example on transferring funds on the Bitcoin cryptocurrency

For any digital service over the internet, it is crucial to be secure from unwanted intrusion for it to thrive. Security becomes ever important for a service such as blockchain being used in cryptocurrencies.

The method of security used in cryptocurrencies is encryption. Encryption involves codifying information to prevent it from being used by malicious parties in case of interception. For the cryptocurrencies built on the blockchain platform, encryption involves the use of public and private keys.

Public key is available to the owner of the cryptocurrency wallet and to other people on the blockchain network. The public key is used to generate a corresponding *private key* (through hash functions which will be discussed in detail in the upcoming section) which is only known to the owner of the wallet.

Consider the example of two users who want to conduct a transaction over the blockchain: the sender of funds will mention the amount and the wallet address of the receiver. For a bitcoin transaction, the wallet address is generated after running two hash functions (SHA-256 and RIPEMD-160) on the public key. The receiver of the funds will then need to enter their private key to confirm that these funds were meant for them. A verification function takes the private key of the receiver as the input and then outputs the public key entered by the sender. If the key output from the verification function matches the one entered by the sender, the funds are then added to the receiver's account.



Graph 19

5.1.3. Hash Functions

This section introduces the concept of hash functions and emphasises their importance in the context of Bitcoins

They are mathematical functions which take any sized input and convert it into an encrypted message which is a random series of characters of a specified size.
In Bitcoin, the two hash functions are used on the public key to generate the bitcoin address. Bitcoin address is a code which represents the location of the bitcoin on the blockchain. SHA-256 and RIPEMD-160 are the 2 hash functions run to generate the bitcoin address.

The SHA-256 generates a 256-bit encrypted code while the RIPEMD-160 further reduces that encrypted code to a 160-bit encrypted code. Even if the public key becomes known to a malicious person or party on the blockchain network, the odds of guessing the bitcoin address are around once in 250 thousand attempts.

5.2. What is Cryptocurrency?

A cryptocurrency is a virtual currency based on a network that is distributed across a vast network of computers. The decentralised structure permits them to operate without the control of any central authority or government and the security provided by cryptography makes it almost impossible to counterfeit. The term crypto itself means ‘concealed’ or ‘secret’, referring to the various encryption algorithms and cryptographic techniques that safeguard the techniques. Most of the cryptocurrencies are networks based on blockchain technology — a distributed ledger enforced by a unique network of computers, as mentioned earlier in the report.

5.2.1. Procedure of Acquiring Cryptocurrency

Cryptocurrencies can be mined or purchased from cryptocurrency exchanges. Bitcoin mining is the process by which new bitcoins arrive into circulation; it is the way that new transactions are established by the network and is a critical component of the maintenance and development of the blockchain ledger. "Mining" is performed using sophisticated hardware that solves complex computational problems. The first computer to obtain the key to the problem is awarded with the next block of bitcoins and the process repeats. Through mining, you can earn cryptocurrency without allocating any money to it. The Bitcoin reward received by the miner proves to be an incentive that encourages individuals to assist in the primary purpose of mining: to legitimise and monitor Bitcoin transactions and ensure their validity. Because these responsibilities are spread among many users across the network, Bitcoin is a "decentralised" cryptocurrency. Bitcoin miners receive Bitcoin as a reward for concluding "blocks" of verified transactions, which are added to the blockchain.

5.2.2. Types of Cryptocurrencies

The skyrocketing value of cryptocurrencies has made them popular as trading instruments. To a limited extent, they are also used for cross-border transfers. The most popular and valuable type of cryptocurrency is Bitcoin. As of November 2021, there were over 18.8 million bitcoins in circulation with a total market cap of around $1.2 trillion. Due to Bitcoin's success, many other cryptocurrencies, known as ‘altcoins’ have been launched. Some of these are replicates of Bitcoin, while others are new currencies that were initially built from the beginning. They include Ethereum, Dogecoin, XRP and Litecoin. By November 2021, the aggregate value of all the cryptocurrencies in existence had reached over $2.1 trillion—Bitcoin represented approximately 41% of that total value.

5.3. Exploring Factors for Returns

5.3.1. Social Media

The decentralised nature of cryptocurrencies means that it mirrors the access to social media. Social media narratives are largely influenced by popular handles, often associated with well-known personalities. Elon Musk, CEO of Tesla and SpaceX, has referred to cryptocurrencies multiple times on his Twitter account, especially during 2021. The figure below demonstrates notable peaks in bitcoin (BTC) value that follow some of Musk's tweets.

Socialite influence on these values is generally speculation. However, figures such as Musk do have a role to play in legitimising the adoption of cryptocurrencies as both a store of value and a medium of exchange.

Even so, the impact of social media is limited. For example, in the same study, there was no observable correlation between the value of dogecoin and Elon Musk's tweets.

For an investor, this means that social media trends are important to watch out for. This is because they may present a large return over a very brief period. At the same time, social media trends expose the speculative nature of crypto pricing.

5.3.2. Government Regulation

Governments across the world have reacted differently to the advent of blockchain technology, in particular to cryptocurrencies. There are three broad approaches.

Firstly, some countries have decided to outrightly discourage or ban cryptocurrencies. Pakistan is one of them. This owes to both a lack of understanding of the technology to be engaged with at a policy making level, as well as a fear of misuse of this technology to facilitate illicit flows.

A second approach is to utilise blockchain technology to issue national digital currencies. The third way adopted by some countries to regularise flows has been to impose a tax upon the conversion of national currency into cryptocurrencies via the credit card transfer to the bitcoin wallet.

5.3.3. Trade Activity

Cryptocurrencies are purchased through exchange platforms, explored further in the report. The availability of a coin on multiple platforms will increase access to that coin. This would mean fewer exchanges across platforms to purchase a particular coin. This translates into lower costs of investments in the form of transaction fees. This is likely to result in greater trade volume in the coin.

5.3.4. What do these factors mean?

The above factors are difficult to isolate. At any given moment, a multitude of factors are at play in the market. This is similar to the forex market. The difficulty lies in unearthing familiar economics for cryptocurrencies, whereas we have a developed understanding of the economics of international trade using national currencies.

5.3.5. Do Cryptocurrencies move with other market indicators?

There are many tools used by investors to read the pulse of markets. For equity, debt and currency markets, these tools include the likes of the S&P 500, the Yield Curve, and the US Dollar Index (USDX), among others. We asked the question of whether cryptocurrencies move in sync with any of these indicators. To this end, we chose to investigate whether Bitcoin (BTC) shows any correlations.

A correlation between bitcoin and gold and stock markets has emerged in the past two years. According to research by VanEck, an investment management firm, the surge in demand of bitcoin since late 2019. The following table from VanEck shows Pearson Correlation Coefficients.

Calendar Year Correlation to Bitcoin (Pearson Correlation Coefficient)	**2020**	**2019**	**2018**	**2017**	**2016**	**2015**	**2014**	**2013**
S&P 500	0.22	-0.09	0.04	-0.01	-0.01	0.01	-0.03	-0.12
U.S. Bonds	0.07	0.00	-0.03	0.04	0.04	-0.06	0.04	0.10
Gold	0.34	0.14	-0.02	0.01	0.07	0.04	-0.08	-0.04
U.S. Real Estate	0.17	-0.09	-0.03	0.04	-0.03	0.01	0.01	-0.10
Oil	0.23	0.02	0.00	0.06	0.03	0.00	0.00	-0.03
Emerging Market Currencies	0.25	-0.02	0.07	-0.04	-0.07	-0.04	-0.03	-0.07
Source: Morningstar								

Table 8: *Pearson Correlation Coefficients*

The interpretation of these numbers is quite straightforward. A correlation value lies between -1.0 and 1.0. The farther the value from zero, the stronger the relationship. In the above table, we observe a rising, positive value of the correlation. This means the relationship between the price of bitcoin and the mentioned asset-classes is strengthening. We recommend staying up to date

with figures of correlation with other asset classes to predict the movement of bitcoin on the basis of the assets with the strongest relationship.

The uncertain nature of the movement of cryptocurrencies compared with other markets is reflected in recent statements by Joey Krug of Pantera Capital, a hedge fund focused on cryptocurrencies:

"But if you look at crypto specifically, when the traditional macro markets go down, crypto tends to be correlated with them for a period of roughly 70 days, so a bit over two months, and then it begins to break its correlation. And so we think over the next number of weeks, crypto is basically going to decouple from traditional markets and begin to trade on its own again."

- Joey Krug, Co-CIO at Pantera Capital
February 17th, 2022

5.3.6. Mathematical Tools to Calculate Returns

5.3.6.1. Return on Investment:

Like for any investment, calculating the rate of returns and measuring the feasibility of the investment is essential. The most simple and basic method for measuring this return or profit is called the return on investment, more commonly known as ROI. The formula for ROI is:

$$RoI = (Pv - Ic) / Ic \, x \, 100$$

Where:

$Pv = Present\ Value\ of\ Investment$
$Ic = Total\ Cost\ of\ Investment$

For example, if you invested Rs. 100,000 in a cryptocurrency like Bitcoin in 2021 and now you sell that Bitcoin for Rs. 130,000, then your ROI would be 30%. However, if you sold that investment for Rs. 80,000, then your ROI would be -20%. A limitation of using ROI to measure returns is that it does not take into account the time period for which an investment is made. For example, an ROI of 30% might be good if the investment was held for one year but it may be below par if the investment was for 5 years. ROI is a way to measure an investment's performance barring any time considerations. Additionally, it's also a great way to compare the profitability of investments in different cryptocurrencies. Naturally, an investment with a higher ROI is better than an investment with a lower (or negative) ROI.

5.3.6.2. Sharpe Ratio:

Another measure of calculating the volatility and risk of investing in cryptocurrencies is the standard deviation of the value of that currency over a period of time. The standard deviation is the spread of a group of numbers from the mean. A cryptocurrency with a higher standard deviation would mean that the currency is volatile and this could either mean rapidly falling valuation of currencies or sudden increases in their values. Usually, these are meant to be short-term investments in which people invest to earn quick returns if the market trend is favourable. However, standard deviation does not tell us about if the value of the currency is fluctuating in a positive direction or a negative direction since these are absolute numbers.

The Sharpe Ratio is one of the industry-leading tools for looking at risk-adjusted returns. The Sharpe Ratio measures the risk to reward of a portfolio/asset. It does this by looking at the excess return of the portfolio and dividing it by the volatility of the portfolio.It is calculated using the given formula:

$$Sharpe\ Ratio\ =\ (Rp\ -\ Rf)\ /\ \sigma p$$

Where:

S = Sharpe Ratio
R_p = Expected return
R_f = Risk-free return
σ_p = Standard deviation

The higher the Sharpe Ratio the higher the reward per unit of risk that you are taking on. Assuming a risk-free rate of return of 1%, we can calculate the Sharpe Ratio for the following 3 cryptocurrencies and evaluate their returns to risk ratio as follows:

Currency	**Expected Return**	**Standard Deviation**	**Sharpe Ratio** (using formula)
Bitcoin	3.18%	4.76%	0.458
Ethereum	6.58%	8.06%	0.692
Cardano	6.95%	11.07%	0.537

Table 9: *Sharpe Ratio for Cryptocurrencies*

This means that Ethereum over that time period offered the largest reward per unit of risk as its Sharpe Ratio of 0.692 is higher than Cardano's 0.537 and Bitcoin's 0.458.

However, to have a higher confidence in these results, it is also necessary to consider a larger dataset of the historical prices of each cryptocurrency to get a good idea of the the volatility of each currency through their standard deviation.

5.4. Is the Cryptocurrency Market a Risky Investment?

Although cryptocurrency may potentially become the most common medium of exchange in the future, there are several risks associated with it:

A. It is technically *unregulated*. Since it is a decentralised currency, there is no third-party intervention involved. No government or financial institution is backing up this currency and hence they cannot directly influence its value. Since there is no authority involved, there is no one who will take interest in investor safety or ensuring everything is run in a fair and just manner.

B. It is prone to *hacking* and *phishing scams*. Since cryptocurrencies are traded digitally, they are susceptible to hacking – although it is difficult to hack due to the blockchain technology, it is still possible. People are often sent fake "confirmation emails" that ask for personal details like private keys to their wallets; it is an easy way to gain access to someone's online wallet especially if they do not have two-step verification.

C. It is quite *volatile*. Since the value of cryptocurrency is based on the basic principles of demand and supply, the value of the currency can fluctuate quite a lot. You could invest a great deal and lose a great amount in a matter of seconds if the price immediately falls. Moreover, the lack of asset-backing makes it even more volatile as there is no way to immediately stabilise the price levels if they suddenly fall. Its illiquid nature makes it highly volatile – it is all based on speculation, making it a very risky investment.

D. If you *lose* your crypto wallet, there is no way to recover your assets. If you store your wallet on your laptop or in a USB and it becomes corrupted or it crashes, you will permanently lose all your assets. This can cause major investors to lose all their wealth, driving them to bankruptcy.

Overall, cryptocurrencies are becoming more and more popular but are still not exactly mainstream. Hence, not all of these risks have solutions. It is at the discretion of the investor whether the risks are worth the investment or not.

5.5. Ease of investment

Regardless of the complexities that revolve around investment in Cryptocurrency within Pakistan, the Crypto market is perhaps one of the most accessible investment markets available for the interested parties. Thus, the ease of investment in the Crypto-market stems from the following steps which when followed helps one invest very smoothly:

5.5.1. Choosing a reputable exchange

An exchange is the platform that one opts for when buying, selling, or storing the cryptocurrency. In Pakistan, the top three exchange include:

1. Binance - the world's largest cryptocurrency exchange by trading volume that processes more than $1 billion on a daily basis. Binance is the most commonly-used exchange within Pakistan since 28,600,000 users have been using this exchange for crypto. Additionally, the ease of use is *MEDIUM*, the fees are *LOW*, and the verification process takes *1 day*.

2. Kraken - Kraken is one of the big three cryptocurrency exchanges in the global market with millions of active users, access to an international market, and strategic investors on board. Kraken allows buying and selling with 3 forms of payment. Additionally, the ease of use is *EASY*, the fees are *AVERAGE*, and the verification process takes *2-3 days*.

3. CEX.io - a multifunctional exchange which is trusted by half a million users accepts users and payments from 178 countries across the globe. Additionally, the ease of use is *EASY*, the fees are *HIGH*, and the verification process takes *1 day*.

Choosing the Cryptos for investment

While 7500 cryptos exist, the frequently used cryptos for investment are Bitcoin (BTCUSD) followed by Ethereum (ETH), Dogecoin (DOGE), and Binance Coin (BNB).

Decide the amount of Crypto to buy

Ideally, it is better to start off small, thus, stick with 10% or 5% for your portfolio.

Choosing the best way to Store your Private Keys in a Wallet

There are 2 types of wallet: the Hot Wallet and the Cold Wallet.

Since the Hot Wallet allows one to trade and access Crypto with ease and the security measures that protect this wallet are better, one can easily store their private keys in the Hot Wallet for a starter.

One who buys a large amount of Crypto, it is ideal to use the Cold Wallet i.e., offline wallet such as a USB or a Hard Drive because the amount is significant and long-term holders.

5.5.2. Maintain your Crypto investment

The most important step is the maintenance of your crypto investment which is doable when one takes the following steps:

1. Continues to self-educate on new Cryptos and Blockchain implementations

2. Monitor legal changes being made within the Crypto market by governments in different countries (for example, be on a look-out for news relating to Crypto ban in Pakistan may be)

3. Add your Crypto to your main investment dashboard to monitor your own performance overtime

Once these 5 steps are followed, one may willingly want to invest in the Crypto market because of its ease of investment which does take precedence over the returns that Crypto offers due to its volatility. However, one may be tempted to invest in Cryptocurrencies due to the growing popularity of this investment option coupled with the ease of investment that it offers, alongside the massive returns that one can acquire overtime.

6. Comparing Markets and Market Conditions

In this section, we posit the question of when one should invest, and how to decide which market to invest in. With the constraint of capital you are willing to invest, the ease of investment is also a factor to consider when investing. The potential of earning a return in the markets fluctuates with the overall economic conditions. For our purposes, we can think of two kinds of environments: risk tolerating and risk averse.

What are risk taking and risk averse environments?

The former is usually associated with large amounts of money being invested in productive capital (read: stock market), low interest rates, a positive outlook for the future, and economic growth. The latter is when investors fear losses, high interest rates, volatility in the markets, and looming recession.

When an investor becomes more risk-averse, they tend to “hedge” their investments. This means they park their money in low-risk, and low-return assets. Generally speaking, shifting to the debt market is considered a “flight to safety”.

Then which market do I choose?

The answer to this question has two parts.

First: it is always a good idea to diversify your portfolio. Diversification means spreading your investment across different markets. You may hear financial advisors aptly using the phrase: “Don’t put all your eggs in one basket.” Spreading investments spreads risks across different assets. If you put all your savings from your TA-ship income in Pakistan’s cement sector sometime in June 2021, you would be miserable right now. However, if your savings were spread across a basket of different assets, each with varying risk and return combinations- you would be in a much safer position. That said, the amount you allocate to each component will vary according to the position of the markets.

This brings us to the second part of the answer. Here, we will use some tools to reach some rudimentary conclusions about when to invest and where.

Interest Rate

Interest Rates are largely influenced by the Central Bank Interest Rate. As part of the monetary policy, the Central Bank of a country determines the interest rate. An increase in interest rate, as is probably evident by now, is usually to slow down economic growth and inflation and vice versa.

Whenever the State Bank of Pakistan announces interest rates after its meetings, there is wide coverage. The most followed interest rate policy is of the U.S. Federal Reserve, as it has massive implications for capital markets around the world. This then makes it relevant even to retail investors in Pakistan.

Equity-Risk Premium

Equity-risk premium is simply the return that investors gain compared to the risk they take by purchasing a stock. ERP is not often calculated and reported though, especially not in Pakistan. In the U.S. though, some calculate it as the difference between the S&P 500 index and the yield on inflation protected Treasury bonds. We have not discussed the bond market in this report, so yields may also be a foreign concept for some.

In spirit though, a high ERP would mean an investment in the stock market is a better idea.

7. Concluding Remarks

Given the diverse investment options within Pakistan, it is imperative to narrow down the variety of options into the top preferences depending on two significant aspects - *Ease of Investment* and the *Rate of Returns* on the investment. In accordance with the current market trends and popularity, the three markets which the youth might be interested to explore include the Forex Market, the Stock Market, and the Cryptocurrencies Market. Each market has an ease of investment coupled with its rate of returns which can vary depending on a host of different factors such as the volatility of the market, the initial requirements for investing into each market, and the current market trends. One may be able to understand the most suitable market for investment in Pakistan only when the operational dynamics of each market are fully understood. Therefore, this guide assists you in selecting the best market for investment by providing you a comprehensive description of each market from the grass-root level. However, for any rational investor, the ultimate investment decision for investment in either of the markets will be contingent on two significant determinants i.e., ease of investment and the rate of returns.

8. Annex

There are two main types of shares: *ordinary or common shares* are those that are sold on the stock exchange whereas *preference shares* are those that have dividends paid out to shareholders before common shares are issued.

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