TUNIS BUSINESS SCHOOL
UNIVERSITY OF TUNIS

FINANCIAL MARKETS PROJECT: STOCK MARKET INVESTMENT

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Introductory Note

We can proudly announce to our readers that we successfully *beat the market* after rigorous analysis ranging from theoretical learnings to practical field inquiries that shaped our journey throughout this educational project,

We present the following report detailing our strategies, findings, and performance. We included graphs, formulas, as well as *APA style referencing* for our sources,

You can find a comprehensive dashboard of all our technical analysis indicators when your run the python programs attached,

We hereby thank our dear professor Dr. Eymen Erraies for this top-notch course as well as the TAs for their availability and prompt assistance,

We finally express our fascination with this project that presented an unprecedented and unparalleled learning experience. We remain on the edge waiting for projects to come with the next courses of this major,

Enjoy reading this reports and our deliverables as much as we enjoyed writing and creating them,

Best,

Group 9.

I. Brokerage Account

As soon as we put our team together in August, we made the rounds of more than 5 stock brokers. After pitching our project to the most prominent brokers on the market and our learning goals, we secured three offers from BNA Capitaux with 0.08% transaction fees, MAC SA with 0.03% transaction fees and Tunisie Valeurs with 0.02% transaction fees. We eventually opted for Tunisie Valeurs as our broker for this project for the following reasons:

- Tunisie Valeurs is a market leader. Founded in 1991, Tunisie Valeurs is a financial institution specializing in asset management, stock market intermediation, financial engineering and Treasury securities. Since its creation, Tunisie Valeurs has focused its development on customer proximity. Over the last thirty years, it has built up teams and tools to provide its customers, both local and foreign, with high-quality services. Backed by a network of 9 branches and a team of 120 professionals, Tunisie Valeurs now ranks among the leading operators in the market.[1]

- Tunisie Valeurs fosters great encouragement to young investors, especially those majoring in finance. They have previously hosted TBS students to their premises in a company visit initiative, explaining the intricate inner workings of the financial markets and trading.[2] They welcomed us to the field and offered us prompt and enriching assistance.

[1] Tunisie Valeurs. *Qui Sommes Nous*. Notre Société. https://www.tunisievaleurs.com//qui-sommes-nous/notre-societe/

[2] Tunisie Valeurs. (2023, May). *Visite des étudiants de Tunis Business School à Tunisie Valeurs*. Tunisie Valeurs. https://www.tunisievaleurs.com/2024/05/06/visite-des-etudiants-de-tunis-business-school-a-tunisie-valeurs/

- The transaction fees of 0.2% offered are the lowest achievable, in line with the demands of our project

- We were distinctly interested with their Tunisie SICAV, a liquid open-ended investment fund which offered an annual return rate of 6.1% net of tax. This presents an opportunity to continue generating profits even when we were holding cash in our account waiting for buy signals.[3]

We officially opened our account on September 9th, 2024. The following article indicates the transaction fees agreed upon mentioned in our account contract :

3 : REMUNERATION DE TUNISIE VALEURS
En rémunération de ses services TUNISIE VALEURS applique sur le Client les tarifs figurant ci-dessous :
-Frais de tenue de compte au taux annuel **0.200** % Hors Taxes avec un minimum de quarante (40) dinars Hors Taxes et un maximum de trois cents (300) dinars Hors Taxes, par an. Les frais de tenue de compte sont payables par semestre.
-Frais de courtage en cas de transactions, au taux de **0.20** % Hors Taxes.
Le Client accepte, sans réserve, ces tarifs.

II. Investment Goal & Approach

Investment Goal

Our investment goal is to achieve significant growth within a one-month time frame, ending right before the end of the year. This excludes gains from dividends and focuses purely on capital gains through stock appreciation. Despite that, we are aware that the market conditions for our investment horizon are not favorable and can be quite unpredictable due to the events that are set to happen in said horizon. Our goal was then to maximize returns through minimizing risk.

[3] Tunisie Valeurs. (n.d.). *Tunisie SICAV : OPCVM Obligataires*. Tunisie Valeurs. https://www.tunisievaleurs.com/nos-produits/opcvm-obligataires/tunisie-sicav/

Approach and Rationale

Our strategy combines a top-down analysis of macroeconomic factors with a targeted bottom-up evaluation of individual stocks. This dual approach allows us to identify high-potential opportunities, often referred to as the "diamond" intersection between both approaches. Acknowledging the short-term horizon, we are willing to assume calculated risks aligned with the insights gained from our top-down analysis.

Under normal circumstances, the "diamond" strategy is when we perform both top-down and bottom-up analysis on the market and then combine the findings. We decided to do things a little bit differently. We first went for a top-down analysis to eliminate the stocks that are just plain bad: companies that have not yet posted their financial statements, companies that are performing very poorly in the past years, and companies who are not favoured by the current conditions. Then, when we had the stocks that could be considered an investment opportunity, we used bottom-up analysis to find the most promising returns and performances. We then selected the stocks for our portfolio with a formula that combines both analyses.

We will start with a macroeconomic analysis followed by an industry analysis leading us to security selection of the top 20 ranked stocks. The ranking will be based on our findings from the aforementioned analysis. The following step would be to conduct fundamental analysis, based on both general and sector-specific ratios, evaluating the corporation's standing both in the market and within the industry. After ranking the 20 stocks with normalized findings from the fundamental analysis, we will resort to running technical analysis on our final selection of 10 stocks, which remains subject to tweaking by switching out securities exhibiting bad signals by other securities from the 20 stocks selection. We will then invest in these final 10 securities after determining market entry points and weights. Additionally, we will actively monitor our portfolio and rebalance as needed to adapt to market conditions, ensuring that our investments remain aligned with our objectives. This approach enhances agility, optimizes risk management, and maximizes potential returns within the defined period.

III. Macroeconomic Analysis

A. National and International Context

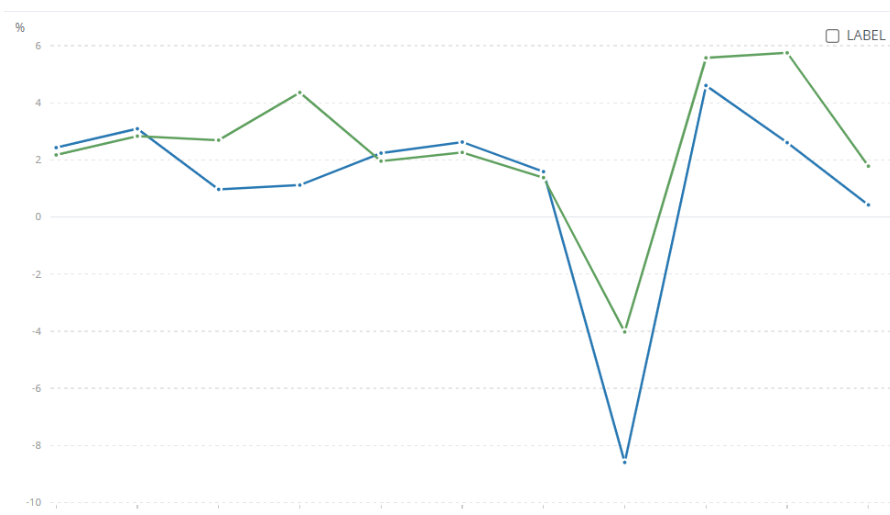
- **Post-Pandemic Recovery and Slowdown**: Many economies are still dealing with the aftermath of the COVID-19 pandemic. Although initial recovery efforts were successful, growth has since slowed in key regions like the Eurozone and the U.S. Persistent supply chain issues, labor shortages, and changes in consumer behavior continue to affect productivity and economic output.
- **High Global Inflation**: Inflation rates remain elevated globally due to ongoing supply chain disruptions, increased energy costs, and geopolitical tensions. In developed economies, inflation has pushed central banks toward more restrictive monetary policies (e.g., the Federal Reserve, ECB). Developing economies are particularly vulnerable as they struggle with currency depreciation and rising import costs.
- **Geopolitical Tensions and Energy Crisis**: The ongoing Russia-Ukraine conflict has severely disrupted global energy markets. Europe's dependence on Russian gas has diminished, but alternative energy sources have led to elevated prices. This has impacted both the cost of living and industrial production across regions. Additionally, tensions in other parts of the world, including the Middle East, create uncertainty for future energy supplies.
- **Slowing Global Growth**: Major institutions such as the World Bank and IMF have revised down their global growth forecasts for 2024. High borrowing costs, sluggish demand, and geopolitical uncertainties are weighing heavily on both advanced and emerging markets. Key sectors such as manufacturing and exports

are contracting in regions that depend heavily on global trade (e.g., China, Europe).

- **Climate and Environmental Pressures**: Droughts, floods, and extreme weather events are affecting agricultural output and food security. Countries like Tunisia, which rely heavily on agriculture, are particularly vulnerable. This not only adds inflationary pressures but also threatens long-term economic stability.
- **Monetary Tightening in Developed Markets**: Central banks, particularly in the U.S. and Eurozone, continue raising interest rates to combat inflation. This has led to capital outflows from emerging markets, higher borrowing costs, and reduced access to credit for countries already burdened by debt.[4][5][6]

Tunisia is no stranger to these issues, as the country has been suffering from a persistent stagflation in the past years, where GDP has plateaued with unemployment rates and inflation going through the roof.

GDP Growth Tunisia vs MENA 2023



[4] *Global Economic Prospects*. (n.d.). World Bank. https://www.worldbank.org/en/publication/global-economic-prospects
[5] The World Economic Forum. https://www.weforum.org/
[6] TRADING ECONOMICS | 20 million INDICATORS FROM 196 COUNTRIES https://tradingeconomics.com/

GDP is still struggling with an expected 0,4% rise in 2024

B. Indicators Analysis

Our textbook[7] suggests in the industry and economic analysis section that the cyclical nature of the business cycle allows for some predictability. Short-term changes in economic activity can be predicted, measured, and interpreted with the use of a set of cyclical indicators that the Conference Board[8] has calculated. Economic series that typically increase or fall before the rest of the economy do are known as leading economic indicators. As their names imply, coincident and lagging indicators move alongside or slightly behind the overall economy. A popular composite index of key

A.	**Leading indicators**
1.	Average weekly hours of production workers (manufacturing)
2.	Initial claims for unemployment insurance
3.	Manufacturers' new orders (consumer goods and materials industries)
4.	Fraction of companies reporting slower deliveries
5.	New orders for nondefense capital goods
6.	New private housing units authorized by local building permits
7.	Yield curve slope: 10-year Treasury minus federal funds rate
8.	Stock prices, 500 common stocks
9.	Money supply (M2) growth rate
10.	Index of consumer expectations
B.	**Coincident indicators**
1.	Employees on nonagricultural payrolls
2.	Personal income less transfer payments
3.	Industrial production
4.	Manufacturing and trade sales
C.	**Lagging indicators**
1.	Average duration of unemployment
2.	Ratio of trade inventories to sales
3.	Change in index of labor cost per unit of output
4.	Average prime rate charged by banks
5.	Commercial and industrial loans outstanding
6.	Ratio of consumer installment credit outstanding to personal income
7.	Change in consumer price index for services

Source: The Conference Board, *Business Cycle Indicators,* November 2012.

[7] Bodie, Z., Kane, A., & Marcus, A. (2024). *Investments*. McGraw Hill.
[8] The Conference Board | Trusted Insights for What's Ahead ®. https://www.conference-board.org/us/

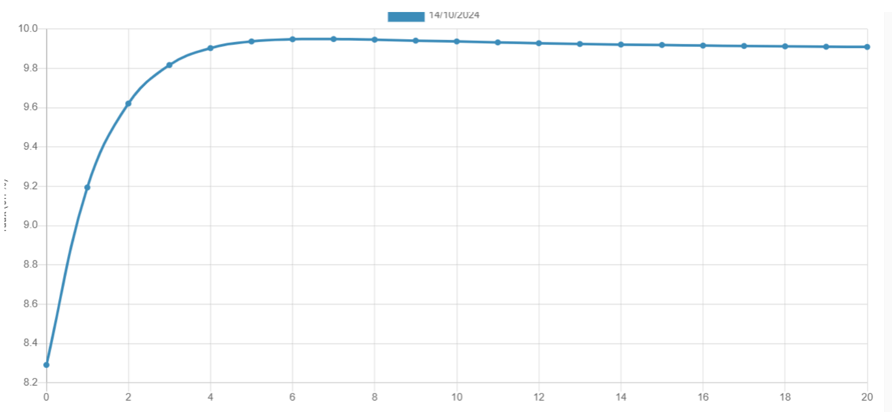
economic indicators is composed of ten series. Likewise, seven lagging indicators and four coincident indicators create distinct the following indices.

Our selection of indicators to analyze faced the constraint of unavailability of several indicators due to lack of recent or complete absence of data, leading us to the following list :

- **Leading Indicators** : Money supply growth - Yield Curve - TUNINDEX : The TSE index
- **Coincident Indicators** : GDP Growth - Retail Sales
- **Lagging Indicators** : Inflation - Unemployment

1) Leading indicators

The Yield Curve [9]



Analysis: The curve is upward sloping and presents two phases, the first is a steep increase in the interest rates (from 8.3% to 9.9% in approximately 3 years) and the second is a stabilization phase as the curve plateaus at nearly 10% from year 4 to 20.

Interpretation given the current economic state

The curve has risen 1.7% in just 2 years, which indicates two things as to where the economy is going:

[9] Yield Curve. https://www.tunisiayieldcurve.tn/public/

High xInflation: the steep increase in the IR can reflect the investors' expectation of a rising inflation, demanding higher short-term yields as investors demand compensation for the loss in purchasing power

Rising Government Debt: It's no secret that the Tunisian government is facing substantial debt obligation that is expected to increase to cover its budget deficit, consequently, bonds need to be issued at higher rates to attract bond buyers due to increased credit risk (CCC+ Fitch)

To confirm our hypothesis, we can look at the current monetary policy of the BCT, which is considered to be restrictive, fixing the interest rates at 8% to try to control the inflation, which means our analysis is correct.

Nevertheless, a rising yield curve also indicates a rise in the overall economy in the future, which makes sense since we are in a recovery phase, after the severe contraction due to the Covid19.

TUNINDEX: The TSE index

Analysis: The curve is steadily rising over the years with an exception of a decline in 2020 due the Covid19, as of October of 2024, the TUNINDEX sits at a high of 9919.7 (over the past 5 years).

We note that the graph shows some short-term volatility in 2023 but is still rising nonetheless, which is part of the bullish trend from 2022 to 2024 where the index is has risen significantly

Interpretation given the current economic state:

The upward trajectory[10] of the TUNINDEX from 2022 onwards likely reflects improving economic conditions, stronger corporate earnings, and renewed investor confidence in Tunisia. This could be a result of the global economic recovery, the resolution of pandemic-related disruptions, and potential structural reforms or policies that improved market conditions.

Changes & Growth Rate of M2

Changes in the money supply most likely signal future economic activity

The rates used below are calculated using the growth formula based on the date available in the following graphs/sources.

[10] NOTE: this was analyzed in September, the TUNINDEX has decreased dramatically ever since due to the current socio political condition in the country.

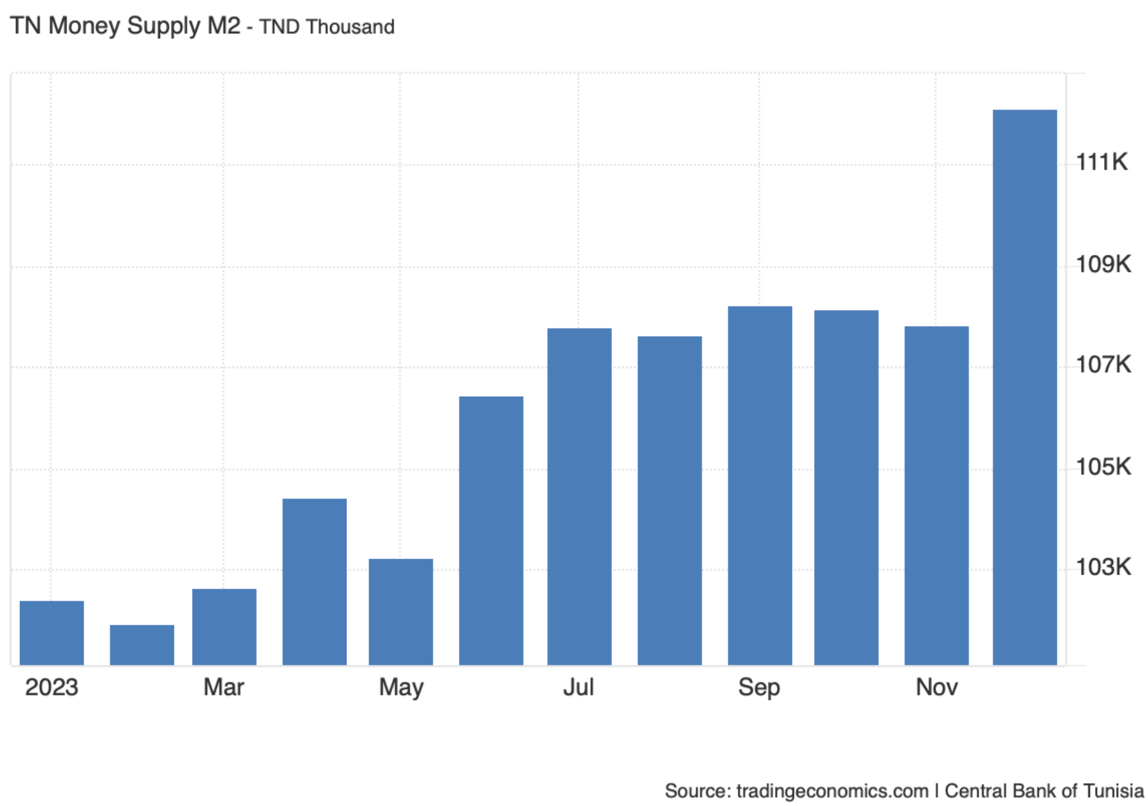
Graph:

Calculating % of Growth M2 in Tunisia :

Period	Initial M2 Supply	Ending M2 Supply	% Growth
31-12-20 => 31-12-21	86.1K TND Thousand	94.1K TND Thousand	9.29%
31-12-21 => 31-12-22	94.1K TND Thousand	102 K TND Thousand	8.39%
31-12-22 => 31-12-23	102 K TND Thousand	112K TND Thousand	9.8%
31-12-23 => 31-07-24	112K TND Thousand	117K TND Thousand	4.46%

An analysis of the past 3 years (January 21 to July 24 : High inflation - Covid19 recover - high government debt) can be divided into three major distinct trends[11][12] :

1. Rapid expansion of the M2 supply until early 2023. Mainly during 2021 and slightly lower in 2022. This reflects the BCT's accommodative monetary policy to encourage and support a much-needed economic recovery post-COVID. This contributed to rising inflation with more liquidity entering the economy
2. Slowed growth was starting to be applied from early 2023. By looking at the growth rate of the year that is quite high we might question the restrictive policy being applied, however by looking individually at the value changes we notice that they are kept quite low and stable until December 2023. The period from January to November shows an increase of only 4.9% whereas the yearly growth stood at 9.8%. This is most likely attributed to a supply injection needed to finance deficit.



[11] Central Bank of Tunisia. https://www.bct.tn/public/
[12] *Tunisia M2 Supply*. Trading Economics. https://tradingeconomics.com/tunisia/money-supply-m2

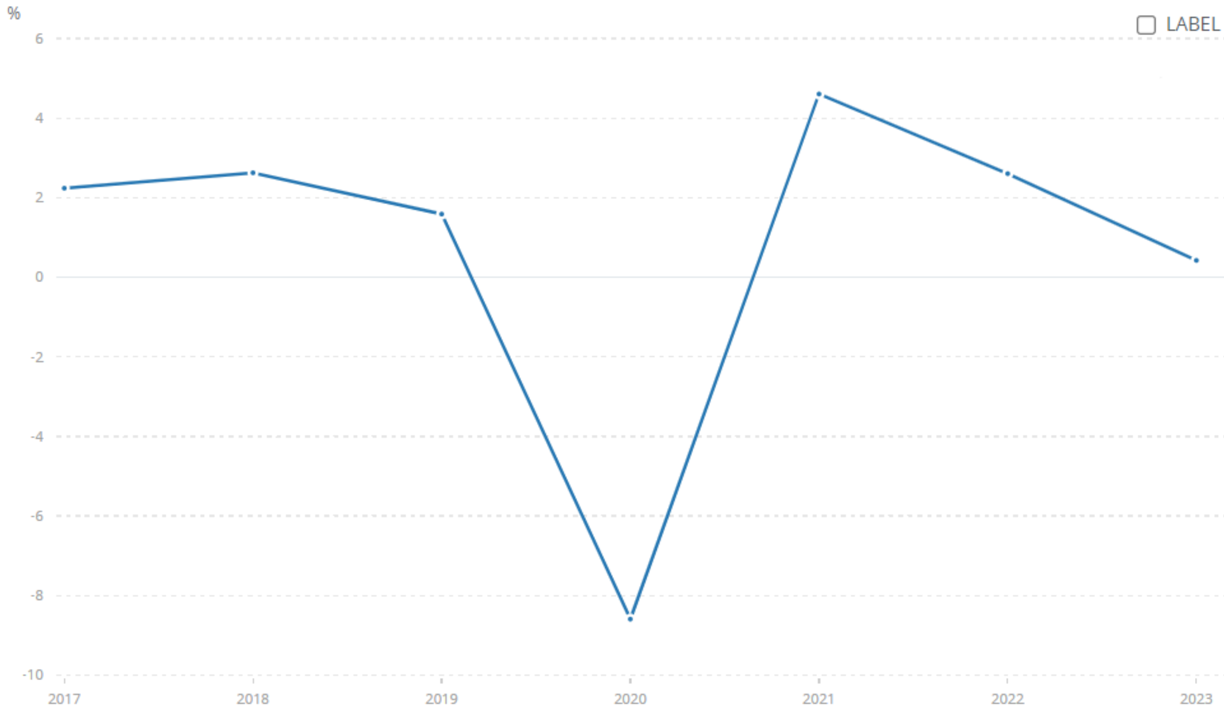
3. Slowed growth can be more clearly seen for the available data of 2024 (up to July) at a rate of 4.46%. This showcases a restrictive policy employed as an effort to combat forementioned rising inflation. However we are still at a risk of a surge in growth if money injections are needed to finance government debt.

Important to note:

- Despite this deceleration in M2 Supply growth following the central bank's tightening measures, it turns out the picture is a bit more complicated as there still is a need for government borrowing (to finance deficit) :
    - This led and will continue to lead to intermittent injections of liquidity when needed despite the bank's tightening stance
    - Investors are demanding higher interest rates on government bonds due to increased credit risk, adding pressure to M2 supply
    - We can still conclude that the restrictive policy is still being followed as it reflects efforts to balance liquidity needs with inflation control
- The BCT's restrictive monetary policy can be doubly confirmed by looking at the interest rates which are currently set at 8%

2) Coincident Indicators

Gross Domestic Product (GDP)



GDP growth in Tunisia from 2017 to 2024

Analysis: The GDP growth curve shows a phase of relative stability, then a severe decline of -8.6% in 2020 because of the global pandemic, then a rapid rise back to 4.1% in 2021 which is the peak of the curve as growth has been decreasing since then (0.9%).

Interpretation: we note first that even though the growth rate of the GDP is decreasing, it is still positive, which means we are still in a **recovery** phase, it's just that the recovery is sluggish[13]. Decline in growth between 2021 and 2023 can be explained by the various natural challenges the country has faced over the last years, mainly droughts[14] that

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[13] *Tunisia Overview*. WorldBank. https://www.worldbank.org/en/country/tunisia/overview#:~:text=The%20economy%20severely%20 contracted%E2%80%94 by,terms%20between%202019%20and%202022.

[14] Media Support Team. *Tunisia Running Dry*. Media Support. https://www.mediasupport.org/in-depth/environmental-reader/tunisia-running-dry/#:~:text=Most%20have%20lost%20all%20of,of%20coping%20with%20water%20scarcity.

negatively affected the agricultural sector which is one of the biggest sectors in the country[15].

Despite the decline in growth, the real GDP (B=2015) has been increasing the last years as shown in this table:

GDP (MID)	2017	2018	2019	2020	2021	2022	2023	2024e
	102011.5	112985.5	122969.3	119502.1	130915.4	138415.7	139661.4	142594.3

Retail Sales

Retail sales were our chosen indicator for its usefulness in providing a direct measure of consumer spending as it implies confidence in financial situation as spending increases whereas personal income does not give as direct of a signal to changes in consumer behavior. Higher income levels do not necessarily indicate higher spending shortly.

Important to note preliminarily :

1. Retail sales are very cyclical and sensitive to economic conditions and are directly linked to consumer goods, services, and non-essential spending (discretionary).
2. Retail sales usually rebound during recoveries as pent-up demand is unleashed. This is driven by demand that wasn't met due to uncertainty or financial constraints during tougher times

[15] O'Neill, A. *Tunisia: share of economic sectors in gross domestic product*. Statista. https://www.statista.com/statistics/524575/share-of-economic-sectors-in-the-gdp-in-tunisia/

We were unable to find conclusive data on retail sales 2023 and 2024. However, reports[16] on the 2021 & 2022 periods were available, with forecasts covering the following two years.

Therefore, we resorted to additional scattered sources focusing on 2023 and 2024 data.[17] [18]

We were able to conclude the following :

2021: Retail sales in Tunisia rebounded strongly in 2021 unleashing the COVID-19 pent-up demand. Grocery-segments were already resilient and continued to grow even during and especially lockdowns with a growth rate of around 8 to 10%. Non-grocery segments began to recover as restrictions eased. Despite these positive changes, parallel markets pose a significant challenge to formal retailers as many consumers turning to unregulated outlets even for essential goods

- 2022 : retail sales growth slowed as purchasing power went down due to
    - high inflationary pressures pushed consumers to prioritize essential items
    - Rise in the price of raw material costs + depreciation of Tunisian currency adversely affected non-essential goods
- 2023: retail sales decelerated further due to tight monetary policies and inflationary pressures
    - High interest rates of the BCT to counter inflation limited credit and disposable income affecting spending on non-essential goods
    - Essential goods remained stable almost mirroring the sales of 2022
- 2024: as of October sales remain sluggish due to high inflation and alleged weak consumer confidence.

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[16] Euromonitor. (n.d.). *Retail in Tunisia*. euromonitor. https://www.euromonitor.com/retail-in-tunisia/report

[17] Research & Markets. (n.d.). *Retail in Tunisia*. Research & Markets. https://www.researchandmarkets.com/reports/1203461/retailing_in_tunisia#product--toc

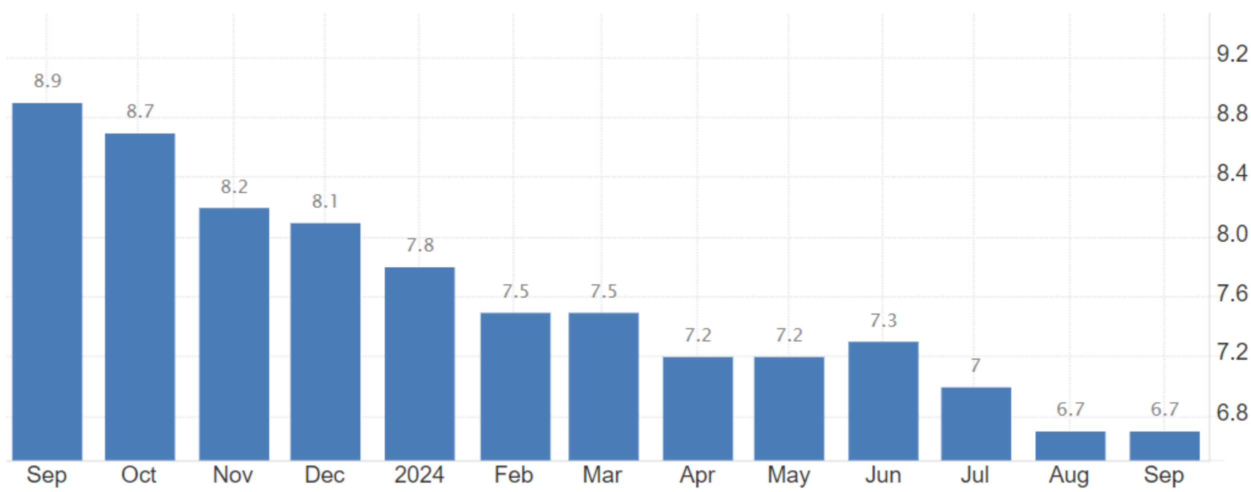
[18] Market Research. (n.d.). *Euromonitor International - Retailing Data Tunisia*. Market Research. https://www.marketresearch.com/Euromonitor-International-v746/Retailing-Tunisia-31258610/

- Essential retail is still expected to maintain the same modest growth
- Non-essential goods are expected to see minimal to negative growth
- overall retail sales are expected to reach a growth around 1.5/2.5% driven by essential sectors, grocery to be exact

In conclusion : Grocery retail is resilient, non-essential retail sectors face challenges due to declining purchasing power, inflation, and tightening measures of BCT constraining consumer spending.

3) Lagging Indicators

Inflation[19]



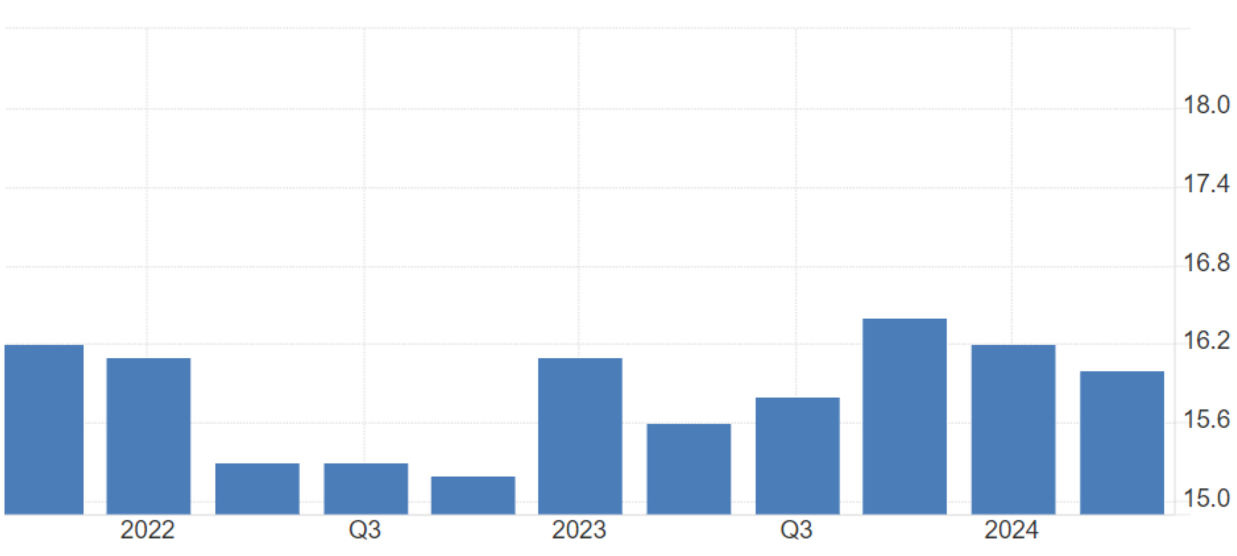
Analysis: Though the curve only shows the short term inflation (from Sep2023 to Sep2024), it is enough to confirm our position in the economy. Inflation has reached an unprecedented (last 5 years) high of 9.8% in 2023 and is now decreasing due to the

[19] *Tunisia Inflation Rate*. (n.d.). Trading Economics. https://tradingeconomics.com/tunisia/inflation-cpi

intervention of the BCT, sitting currently at approximately 6.5%. The inflation for 2024 is expected to be 7.6%, which is a 120-basis-point decrease from last year.

Interpretation: as we have already mentioned, we are looking to confirm our hypothesis that the economy is in a phase of recovery, and what better way to do that than to look at the inflation, which is still high despite it decreasing over the last months. This is the result of the severe recession in 2019[20], as companies took huge losses and are now raising the prices to compensate.

Unemployment rate[21]



Analysis: The unemployment rate remained relatively stable over the past few years, fluctuating between 15.2% and 16.4%

[20] Though it's safe to note that the high inflation in 2023 was due to difficulties in the water supply
[21] *Tunisia Unemployment Rate*. (n.d.). Trading Economics. https://tradingeconomics.com/tunisia/unemployment-rate

Interpretation: Nothing much to add, a developing economy recovering from a huge global recession.

Here's the revised conclusion incorporating stagnation with sluggish growth, and the potential for early recovery in 2025:

Relevant News :

The recently introduced Finance Law 2025 in Tunisia has sparked significant discussions. While aiming to boost state revenue, the measures have raised concerns about their impact on businesses, consumers, and the economy.

- ### Corporate Tax Hike

The corporate income tax (IS) rate will increase from 15% to 25%, with a further rise to 35% by 2026. This adds financial pressure on businesses, reducing their competitiveness and potentially raising consumer prices. Coupled with a high Money Market Rate (TMM) of 8%, these changes could affect market demand and growth.

- ### Impact on Middle-Income Households

Revisions to income taxes for middle-income earners are likely to reduce purchasing power and dampen consumption, a key economic driver. Without compensatory measures, this could lead to greater social dissatisfaction.

- ### Real Estate Sector Challenges

The increased Value-Added Tax (VAT) on property transactions adds to the sector's struggles, already hit by high interest rates. This may slow down activity, worsen the housing crisis, and deter investments.

- **Higher Social Security Contributions**

Rising social security contributions for employers and employees will increase labor costs. Businesses might reduce hiring or workforce numbers, further aggravating unemployment.

- **Macroeconomic Risks**

Businesses may need an 11.76% price increase to offset costs, fueling inflation and lowering purchasing power. This could trigger higher TMM rates, weaken consumption, and reduce state revenues, undermining fiscal goals.

- **Strategic Considerations**

The Finance Law 2025 balances fiscal needs with economic risks. Policymakers must introduce reforms and incentives to minimize negative impacts, support vulnerable sectors, and encourage investment to sustain economic momentum.

- **Other Events**

Other political events (most notably, the elections) certainly have some effect on the market. The problem is that we were not in a position to determine such an effect, this is just to say that the market is partly unpredictable.

General Conclusion

Tunisia's economy faces stagnation, characterized by sluggish growth, high inflation, restrictive monetary policies, and structural challenges like rising government debt and external shocks such as droughts. While consumer spending remains constrained, essential sectors like grocery retail show resilience.

Despite these hurdles, signs of recovery are evident in positive GDP growth and a rising TUNINDEX, reflecting renewed investor confidence. If inflationary pressures ease and structural reforms are implemented, Tunisia could enter an early recovery phase by 2025, paving the way for more robust economic growth.

This recovery is not, however, as sign that the TSE market will have positive returns, as (a) we believe that the beginning of the year will be difficult due to the sociopolitical complications, and (b) the stocks listed are not representative of their industries, so even if we expect a recovery, that doesn't mean we will see it in the stock returns.

IV. Industry Analysis

For the purpose of this analysis, we define an industry as a group of companies offering similar products or services to customers using comparable methods. This definition serves as the foundation for evaluating suitable industries for investment.

The industry analysis is our **first phase of stock selections** which will focus mainly on eliminating poorly performing stocks and industries[22] (segment S, etc).

[22] When we say industries, what we mean is their representation in the TSE. An industry can be thriving and at the same time have one stock representing it on the stock exchange that is performing poorly. This can be misleading, so clarifying is indispensable.

Methodology

Our approach employs a top-down analysis, starting with a macroeconomic overview and progressing to a detailed examination of industries represented on the Tunisian Stock Exchange (TSE). Given the inefficiencies of Tunisia's stock market and the limited representation of industries by market capitalization, additional factors such as competition from foreign products and sector-specific risks are incorporated into the evaluation.

Framework for Analysis

Industries are assessed based on their alignment with macroeconomic conditions, growth potential, and resilience to external risks. This evaluation combines qualitative and quantitative methods, including Porter's Five Forces Model : Rivalry, Threat of New Entrants, Buyer Power, Supplier Power, Threat of Substitute, with the addition of a sixth force, complements, as suggested by recent studies.

Objective

By integrating traditional analytical models with market-specific insights, this evaluation delivers a structured pathway for identifying sectors with the highest potential for sustainable returns. The focus will remain on industries in the growth or maturity stages, as they offer the most balanced risk-return profiles in alignment with Tunisia's current economic conditions.

Presentation of Findings

This report provides a general overview of conclusions for each sector and subsector evaluated. For more detailed insights and metrics, refer to the accompanying project Excel sheet.

A. Basic Materials

1. Chemistry :

The chemistry sector in Tunisia is currently underperforming, with declining profitability (-6.5% in S1 2024 vs. 2023) and unreliable revenue growth data due to incomplete disclosures. Despite some barriers to entry and low substitution risks, the sector faces significant challenges, including dependency on imported raw materials, high buyer sensitivity to pricing, and weak profitability trends. The sector's poor performance over the past year (-31.3% value decrease in 2023) further underscores its struggle to adapt to the economic recovery phase.

Given these factors, we have decided to reject the chemistry sector as a viable investment option.

2. **Raw Material** :

The sector exhibits promising growth potential, as indicated by its current position in a growth phase and the observed stability in market performance. Despite a 10.2% decline in revenue in Q2 2024 versus 2023 and a slight profitability reduction of -3.3% in the first half of 2024, the sector's low volatility and macroeconomic alignment reinforce its attractiveness for investment.

The cyclic patterns in the index, combined with stable growth movement in late 2024, make this sector a strong candidate for investment. After evaluating all factors, we accept this sector as a viable investment opportunity due to its growth potential and stability.

B. Financial Institutions

1. Banks

The Tunisian banking sector stands out as a resilient and promising investment opportunity, demonstrating consistent long-term growth and adaptability to economic challenges. Despite global economic shifts and regulatory changes, the sector has maintained stability and shown moderate profitability gains, supported by strong fundamentals and strategic innovations in digital banking.

While short-term volatility persists, the overall upward trend in revenue and profitability, coupled with its ranking in the first segment of macroeconomic analysis, reinforces its position as a viable area for investment. Targeted strategies focusing on top-performing banks with robust financial health and adaptability to market dynamics will be essential to maximizing returns while managing risks.

We accept the banking sector as a viable investment opportunity due to its resilience, consistent growth, and promising long-term outlook.

2. Insurance

The insurance sector in Tunisia shows strong long-term stability and growth, particularly recovering well from the COVID-19 crisis and performing better by 2024. Its resilience, despite economic challenges, makes it a solid investment, though its volatility requires careful consideration. In the short term, the sector demonstrates steady growth in 2024, with a recovery from a temporary dip in August, but remains sensitive to regulatory and economic changes. A 10.0% revenue growth in Q2 2024 highlights strong business generation, though a 1.5% decline in profitability points to rising costs and competitive pressures. The sector benefits from a regulated environment that limits new entrants, but competition and dependence on reinsurance suppliers remain challenges. Strategic opportunities like bancassurance and digital distribution enhance growth potential. While attractive, the sector requires a selective investment approach, focusing on high-performing companies with strong fundamentals and adaptability.

3. Financial Services

Leasing

Leasing companies, although offering stable growth and consistent dividends, are ill-suited for short-term investment strategies. Their stock prices generally experience slow, modest growth, with limited responsiveness to short-term market movements. Unless external events, such as regulatory changes or unexpected earnings surprises, occur, the potential for rapid gains is minimal. As our strategy prioritizes quick, short-term returns, leasing stocks would typically be excluded from our portfolio. However, given the recent stability and a slightly positive market outlook, we opted to retain leasing stocks in our portfolio as a hedge against broader market volatility, as they may provide a buffer during uncertain periods.

SICAR-SICAF

SICARs - Sociétés d'Investissement en Capital-Risque- and SICAFs -Sociétés d'Investissement à Capital Fixe- are designed for medium- to long-term growth. While SICAFs provide stable, diversified portfolios, they do not offer the rapid price fluctuations required for short-term strategies. SICARs, which focus on private equity and venture capital, involve high-risk, early-stage investments that need time to mature. Additionally, both SICARs and SICAFs have lower liquidity compared to publicly traded stocks. Despite this, we have decided not to eliminate SICARs from our portfolio due to their potential for substantial returns once they begin to yield results. As the investment horizon extends beyond the immediate short term, SICARs are expected to contribute significant value, balancing the portfolio with high-growth potential.

While rejecting this subsector preliminary, we stay open to the potential of incorporating one stock for this category for diversification purposes.

C. Consumer Services

Distribution

The Distribution Sector has demonstrated resilience and steady recovery post-COVID-19, returning to stability and showing promise for continued growth by late 2024, despite occasional fluctuations. Short-term analysis for 2024 indicates modest growth, following a brief decline earlier in the year, with expectations for sustained growth barring major disruptions. The sector faces moderate to high entry barriers due to stringent regulations and capital requirements, while supplier power remains moderately high due to reliance on imports and exchange rate fluctuations. The bargaining power of buyers is also elevated, especially from large retail chains and price-sensitive consumers, with intense industry rivalry and some threat from substitutes like informal markets and e-commerce. Despite these challenges, strong performance in the first half of 2024 suggests effective navigation of obstacles. The sector offers low-to-moderate risk and stable growth prospects, making it a suitable addition to a balanced portfolio focused on steady growth and risk reduction.

Travel

We reject this sector automatically given that TUNISAIR, the only listed company, is failing to deliver the required reports and financial statements.

D. Health

The health sector has shown mixed performance recently, with profitability driven by UNIMED's strong results, contributing to a 13.3% sector profitability. However, SIPHAT, a key player, faces challenges with a significant 20.5% revenue decline and rising debt levels. Their first-quarter 2024 report revealed a 21% drop in overall revenue, including a 60% fall in their pharmacy division, and a 12% increase in debt, raising concerns about their financial stability. Despite a small sector-wide revenue increase of 5.8%, driven largely by UNIMED, the growth rate remains modest, and limited data complicates a clear long-term assessment of the sector's trajectory. Given these factors, we recommend rejecting the health sector for inclusion in the portfolio at this time, opting for a bottom-up analysis of individual companies later for a more accurate assessment.

E. **Consumer Goods**

1. Automobile :

The automobile sector in Tunisia presents significant volatility, which offers both high potential returns and increased risks, driven by factors such as inflation, interest rates, and external market forces. To better understand the sector's movements and predict its future performance, we performed a regression analysis. This was necessary due to the limited and inconclusive data available, particularly post-COVID-19. By analyzing the correlations between the BIENS DE CONSOMMATION index and interest rates, we aimed to identify key drivers of the automobile sector’s performance and forecast its trajectory for 2023 and 2024.

Despite high entry barriers and moderate supplier power due to a large number of suppliers, the sector faces a considerable threat from substitutes like ride-sharing services and the introduction of electric vehicles. Additionally, the market is experiencing fluctuating demand, as evidenced by the drop in vehicle registrations during 2024. While the government’s new strategies to boost the sector provide some optimism, the lack of conclusive and consistent data on the sector’s performance, particularly following the post-COVID-19 recession, makes it difficult to accurately forecast future growth with confidence.

Given the absence of sufficient data to validate long-term trends and risks, we have decided to reject the automobile sector for inclusion in the portfolio at this time. Further information and analysis will be necessary to make a more informed decision in the future.

2. Agro-food

The food and beverages sector in Tunisia has shown stability in recent years, maintaining steady growth despite challenges like the COVID-19 crisis and high inflation rates in late 2023. However, the sector is now in a mature stage, with signs of stabilization and slight decline. Short-term trends indicate volatility, likely due to seasonal factors and shifts in consumer demand. Despite a decline in overall revenue growth, the sector's profitability remains strong, with companies like Delice Holding showcasing exceptional management and high profitability. However, challenges such as the high bargaining power of suppliers and consumers, dependence on raw materials, and the rise of healthier food alternatives present ongoing risks. Intense industry rivalry, driven by numerous brands and competitive marketing strategies, further complicates the sector's outlook. Given its slow and declining growth, coupled with these challenges, we have decided to reject the food and beverages sector for inclusion in the portfolio.

3. Household goods

The Household Products and Personal Care sector in Tunisia has shown resilience and stability, despite external challenges like inflation and the COVID-19 pandemic. Transitioning from a growth phase to a more mature and stabilized one, the sector has experienced moderate growth, with impressive profitability driven by key players such as SAH-Lilas and Eurocycles. In the first half of 2024, the sector saw a modest 5.7% revenue increase compared to 2023, while profitability surged by 139%, indicating significant potential for profitability despite slow growth.

The Six Forces model highlights barriers for new entrants due to regulatory complexities, brand loyalty, and high capital requirements. Suppliers hold high bargaining power, and buyer power is moderate, influenced by price sensitivity and social media. The threat of substitutes is low to moderate, with eco-friendly and DIY options gaining traction. Competition remains high, driven by numerous brands.

Given the sector's slow growth and lower ranking in macroeconomic performance, we will reject the sector for inclusion in the portfolio. However, due to strong profitability shown by some companies, a bottom-up analysis will be conducted to identify specific investment opportunities.

F. Technology

The technology sector in Tunisia has shown resilience and steady growth, benefiting from increasing digitalization and government initiatives aimed at fostering innovation. Despite fluctuations in revenue, the sector continues to contribute significantly to the national economy, with more than 1,800 companies active in various areas such as digital finance, telecommunications, and multimedia.

However, due to insufficient data on revenue growth, a clear conclusion cannot be drawn at this time. Based on the Six Forces model, the sector exhibits moderate to high competitive rivalry, a moderate threat of new entrants, and low to moderate threats from substitutes. The bargaining power of buyers is high, while the bargaining power of suppliers is moderate, primarily due to the reliance on imported hardware and specialized software. The influence of complementors, such as telecommunications and education sectors, is high, further enhancing the growth prospects of the technology industry.

In conclusion, while the sector remains stable and moderately growing, it presents a stable investment opportunity, though more data is needed to assess its future trajectory accurately.

G. Petrol and gas

The Oil and Gas sector in Tunisia presents significant challenges that make it unsuitable for inclusion in our investment portfolio. With only one publicly listed company in the sector, it lacks the diversity seen in other industries. Additionally, the sector has experienced a 12% decline in oil production in July 2024 compared to the previous year. This production decrease, coupled with a market capitalization of only 0.3% in 2023, places the sector at the bottom of the rankings. The negative revenue growth of -10.2% and a profitability drop of -37.5% in Q2 2024 further underscores its declining performance. Given these factors, we will reject the Oil and Gas sector as it is not aligned with our investment strategy.

H. Telecom

SERVICOM has been delisted from the main stock market and transferred to the Off-Exchange market as of April 30, 2024, signaling a decline in its market position. Despite this, the telecommunications sector, led by major players like Tunisie Telecom, Ooredoo Tunisia, and Orange Tunisia, remains competitive and stable. The sector benefits from a well-established infrastructure and strong technological innovation, which minimizes the threat of substitutes. The market is characterized by high bargaining power from both consumers and large corporate clients, but the bargaining power of suppliers is mitigated by the presence of multiple global equipment providers. Additionally, government initiatives such as "Digital Tunisia 2020" further bolster the growth potential of the sector.

We have decided to accept this sector for its overall stability, high competition, and strong market performance. However, the delisting of SERVICOM serves as a reminder to carefully monitor smaller entities in the industry.

IV. Second Phase of Selection

Up until now, the only elimination we did is eliminating sector S and non-tradable stocks, eliminating industries that have been performing poorly, and eliminating stocks that cannot compete within their industry. Now, for our **second phase of selection**, we need to narrow down our selection to only 20 stocks.

To do that, we came up with a formula that not only considers the company's liquidity and performance but also takes into account its current position within its industry and within the general macroeconomic situation. The aforenamed indicators are used in our scoring function:

1) Volume traded (0.3)

Volume traded is a sign of liquidity which is crucial for us, short term investors. That's why this factor has the highest coefficient and is given the most importance.

2) Net Profit Margin (0.27)

Translating the percentage of revenues that turns into net income, net profit margin is a straightforward measure of profitability that is used in our formula and given a relatively high coefficient.

3) Market Capitalization (0.2)

Market capitalization reflects the overall size of the company within the market. We used this indicator for what it offers in diversification, as we acknowledge implicitly that larger companies offer more diversification opportunities.

4) Industry Grade (0.13)

To ensure more diversification within the portfolio, we gave more weight to the stocks that perform better within their industries. We acknowledge that some sectors outperform others, and by adding this into our formula, we are sure that we will have the best of each industry.

5) Macroeconomic Grade (0.1) [23]

Finally, we used the macroeconomic analysis to try and forecast which companies (or industries) might perform better than others. Analyzing the general trends proves beneficial in most cases especially when it comes to financial markets. This indicator is given the lowest importance because despite our detailed analysis, the **stocks listed on the TSE are not representative of their industries**, thus it's harder to see the expected change in the abnormally small sample we have**.**

SECTORS RANKING DURING RECOVERY

G1 Early recov
Banks
Building and construction material
Industrial goods and services
Technology

G2 Mid recovery
Financial Services
Oil and Gaz
Raw Materials
Distribution
Telecommunications

G3 Late recovery
Health
Insurance
Food and beverage

G4 Slow growth and defensive secors
Household products and personal care
chemistry

[23] We have already determined that we are in an economic recovery. The attached table shows how we've grouped industries based on their position in the current macroeconomic conditions.

Outcome:

The outcome of this selection phase in a narrowed-down sample of only 20 stocks that align with our investment goals. This is the foundation on which we will build our future more complex analysis.

This is the equivalent of cleaning up the workbench, now, we are starting the real job.

V. Fundamental Analysis

After we've selected the stocks that we wanted to work on, we are now left with the companies that can be considered as good investment opportunities under the current circumstances. To narrow down the selection to only 10 stocks, we performed a bottom-up fundamental analysis on our sample.

To make it fair, our criteria for rating the stocks is not the same for all sectors, which makes sense, it is not logical to compare a company that operates in retail for example with a financial institution using the same data and ratios. That is why we used two types of ratios in our analysis: **Universal ratios** that give insight about the company's well-being, and **Sector-specific ratios** that give more information about the company's performance.

Universal Ratios

a) Net Profit Margin

As we mentioned earlier, this remains a straightforward indicator of profitability which cannot be overlooked when performing a fundamental analysis

b) Return on Equity ROE

This shows how efficiently the company uses shareholder equity to generate value. This is important to us because it indicates how the company will use our money to maximize our wealth.

c) Current Ratio

A liquidity ratio indicating the company's ability to meet its short term liabilities. This interests us as short-term investors.

d) Debt to Equity Ratio[24]

An indicator of the capital structure of the company that measures how the company finances its activities. Here, we are giving more weight to companies

[24] Giving leveraged companies more weight can seem to go against the whole "*minimize risk to maximize return"* strategy, but we trust it is the correct approach especially when paired with the current ratio and return on equity.

with higher leverage because we are looking for near-term gains. We should note that this indicator is given a lower coefficient because we recognize that **debt makes good things better and bad things worse**, meaning that if a company is already performing well according to the other criteria, being more leveraged will only increase its probability of being selected in our final portfolio.

e) Price to Earnings Ratio

The P/E ratio helps short-term investors identify stocks that are either undervalued or positioned for growth-driven price appreciation.

f) Asset Turnover Ratio

The asset turnover ratio indicates how efficiently a company generates revenue from its assets, signaling strong operational performance that could drive short-term gains.

Sector-specific Ratios

a) Industrial Goods and Services

Indicator	Reason behind choice
Operating Margin	In a sector that manages a high portion of fixed costs, OM is a good measure of efficiency in the management of these costs.
Return on Capital Employed	This shows how well the company generates returns from its long-term investments which constitute a big percentage of assets in this sector.

b) Building Materials

Indicator	Reason behind choice
Gross Margin	Construction relies on managing costs for materials and labour. A strong gross margin indicates control over these expenses.
Price-to-Book ratio	Construction companies own significant tangible assets like land and equipment. A low P/B ratio could signal undervaluation of these assets[25].

c) Telecom

[25] We do not want these assets to be undervalued. It may indicate underlying asset impairments, inefficiencies, or market skepticism about the company's ability to generate returns from its assets.

Indicator	Reason behind choice
EBITDA margin	Telecoms operate with high fixed costs for maintaining infrastructure. A high EBITDA margin shows effective cost control.
Capex-to-revenue ratio	Indicates how much of the revenue is reinvested into infrastructure and technology, essential for telecom growth[26].
EV/EBITDA	Telecoms often carry substantial debt to fund infrastructure. This ratio evaluates valuation while accounting for leverage.
Revenue Growth	Highlights success in expanding services or user bases, crucial in a competitive[27], subscription-driven sector.

d) Banks

[26] One might say that this doesn't concern us as short-term investors, but we disagree. In such industries, future prospects for growth indicate that the company is already performing well.
[27] Despite having only one company here, telecom is considered to be one of the most competitive industries in the country.

Indicator	Reason behind choice
Net Interest Margin	Reflects how well the bank uses shareholder funds to generate profit, essential in a capital-intensive sector.
P/B Ratio	Banks are asset-heavy institutions. A low P/B ratio might indicate undervaluation[28] relative to their loan portfolio.
Cost-to-Income Ratio	Shows operational efficiency. Lower values mean banks effectively manage expenses relative to income.
Return on Assets	Shows how efficiently the bank generates profit from its assets. A high ROA indicates the bank is using its resources effectively to generate earnings.
Provisioning Coverage Ratio	Indicates how well the bank is prepared for loan defaults. A PCR above 70% is considered safe[29].
Liquidity Coverage Ratio	Ensure that banks maintain a liquidity buffer on their balance sheets which can be liquidated quickly during a period of liquidity stress.

e) Financial Services

[28] Again, we do not want undervalued assets.
[29] We are giving more weight to higher PCR.

Indicator	Reason behind choice
P/B Ratio	Evaluates whether the company is undervalued or overvalued relative to its balance sheet assets.
Return on Assets	Shows how efficiently the bank generates profit from its assets. A high ROA indicates the bank is using its resources effectively to generate earnings.
Dividend Yield	Provides insights into how much of its earnings are distributed.

f) Household Products

Indicator	Reason behind choice
Gross Margin	High margins indicate effective cost control in manufacturing and the ability to charge premium prices in a competitive consumer market.
Inventory Turnover Ratio	Shows how quickly goods are sold and replenished, critical for avoiding stock obsolescence in fast-moving consumer goods.

g) Distribution

Indicator	Reason behind choice
Price to Sales Ratio	Evaluates valuation in a revenue-driven industry, where topline growth is critical.
Inventory Turnover Ratio	Demonstrates how efficiently inventory is moved, essential for avoiding markdowns in retail.
Quick Ratio	Measures liquidity excluding inventory, critical for managing cash flow in retail[30].

h) Food and Beverage

Indicator	Reason behind choice
Gross Margin	Reflects the ability to manage raw material costs like grains, sugar, and milk, while maintaining competitive pricing.
EBITDA Margin	Highlights profitability in managing operations like production and logistics.
Revenue Growth	Indicates success in market expansion or launching new products, crucial in a saturated consumer market.
P/B Ratio	Food and beverage companies invest heavily in production facilities, making asset valuation critical.

[30] Retail and distribution are strongly correlated, as one could not survive without the other.

i) Raw Materials

Indicator	Reason behind choice
Operating Margin	Measures profitability in an industry where revenues fluctuate due to volatile commodity prices.
Return on Assets	This sector invests heavily in tangible assets like mines or refineries. ROA evaluates how effectively these assets generate profit.
EV/EBITDA	This ratio accounts for the capital-intensive nature of the industry, adjusting for debt and cyclical valuation.
Asset Turnover Ratio	Reflects how well assets like equipment and plants are used to generate revenue.

j) Technology

Indicator	Reason behind choice
Gross Margin	Reflects pricing power in an innovation-heavy industry where R&D can drive low-cost scalability.
R&D expense / Revenue	Highlights the company's commitment to innovation, crucial in a fast-evolving, competitive market.
Revenue Growth	Demonstrates the company's ability to scale quickly, critical in the tech industry where market share is key.

How Does the Formula Work?

For each stock, we performed a financial statement analysis for the last three years from which we built a database and computed the needed ratios. Then, we computed a weighted average for each ratio based on its latest value plus its annual and semi-annual variance. This is an attempt to try and predict what its current value will be, since our investment is short-term and we cannot afford to wait for the next financial statements to be posted.

We then multiplied these average by their respective coefficients[31] and then added them together to calculate the score. This was done to both universal and sector-specific ratios. The final score is a weighted average of the two giving a slight advantage to sector-spe.

Important Considerations

- Sometimes, a universal ratio is given twice the weight because of its importance in a particular sector, this is just to show that during our screening, we tried to make companies look the best they could for fair comparison.
- Finance has different ways to express the same thing. That's why we can use different ratios or margins for the same reasons. For example, when analyzing fixed costs management efficiency, we can use Gross Margin or EBITDA margin. The choice changes depending on the industry and what makes the company look better.
- If you check the actual application of this strategy, you can't help but notice large differences between the scores when we go from sector to sector, so one might ask, how did we compare them? Put shortly, we just used the ratios to see if the

[31] All data and coefficients are included in the excel sheet attached

stocks “qualify”[32], and then choose the best of each sector[33]. This is done for diversification purposes, minimizing correlation risk to nearly 0[34].

VI. Adjusted Return

Concerning the adjusted returns, we’ve met a difficulty when our broker went on vacation at a very inconvenient time and was only able to send us the adjusted returns for 3 stocks. We had to compute the adjusted close by ourselves for the most part. We have encountered two types of corporate actions that require adjusting the closing price: Dividends and Stock Splits. When it came to dividends, what we did was[35]:

1) Determine all the dates and values of past dividends in the last 10 years
2) Calculate the dividend impact which was:

$$[1 - \frac{\text{Dividend}}{\text{Closing Price}}]$$

3) The adjusted close was then simply the Dividend Impact multiplied by the closing price. An important consideration is that every time we adjust for a new dividend we need to account for all the past dividends in the equation. Otherwise, it will not be correct.

For stock splits, the process is simpler:

1) Determine the split date and factor

[32] Since we are choosing stocks by eliminating other stocks, the safest approach is to put a certain threshold and see if a stock qualifies or not, this has been used in almost all of our phases of selection
[33] There have been instances where we choose two or even three stocks of one sector, this is because these stocks are very performant and their return far outweighs any potential risk in correlation in our judgement.
[34] We are still bearing market or systemic risk
[35] We used the yahoo finance method: https://www.youtube.com/watch?v=yVB71LL0LnE

2) Divide the closing price by the factor

To check if our calculations are correct, we compared with the adjusted closes that the broker sent us. A sheet containing all the calculations and comparisons is included in the attached excel.

Now, we have our final stocks, and we have their historical data, which means we can move to the portfolio construction and optimization.

VII. Portfolio Construction and Optimization

This part is very straightforward as it's mostly computerized. Nevertheless, we still performed some extra analysis to further optimize the portfolio in a realistic feasible manner as well as try and forecast how the portfolio will perform in the investment horizon.

Initial Markowitz Analysis

The Markowitz model takes as an objective function the minimization of the nonsystemic risk, which, if we don't put constraints on the minimum weights, can lead to the model giving us only 2 or 3 stocks to invest in and assign 0 to the remaining stocks. However, if we do put minimum weights arbitrarily, it can lead to a random portfolio that is not necessarily the best. What we did was try to refine the model from the beginning by checking the return combinations and trying to find the one that allows it to have the least downside risk and most diversification. In the attached excel file, you will find that we stuck with the portfolio that generates 12.5%[36] revenue as our initial portfolio. Put simply, we couldn't go to the portfolio that matches our risk aversion through Markowitz, so we brought the portfolio to us.

Refinement of the Model

As we all know, Markowitz is limited by its constraints that are sometimes very far from reality, that's why, in order to have the best portfolio, a refinement of some kind is needed. We did three kinds of refinement:

a) **Judgement**

We used this when something did not feel right to us. For example, suppose that BIAT made it through the final selection and the model told us that we need to buy 5 for maximum returns. BIAT, having a price of over 100 dinars, would simply drain out all of our capital. We have used this type of refinement mainly when we felt like the capital allocated to a certain stock is a little bit too much.

b) **Capital Asset Pricing Model**

This is probably the most controversial part of the project, as not only it focuses on the returns rather than the risk, but it also focuses on long-term investment goals and has limited use in the short term scale. Yet, we've found that CAPM can serve as the perfect[37] refinement method for Markowitz as it provides a systematic way to simulate returns on the stocks through the formula:

$$[E(R_i) = R_f + \beta_i \cdot (R_m - R_f)]$$

[36] Does this mean that the portfolio will generate 12.5%? This is not likely as Markowitz is very limited by its constraints that are sometimes not realistic, but the returns here are the only way that we can tell the portfolios apart. This is like the minimum-variance portfolios plot.

[37] The model has to be refined in some way, and doing it through another model is ideal as we don't want to go to the extent of coming up with our own models. We will do that someday, just not on our first experience.

This is huge as it allows us to manipulate the returns directly and even use them as constraints for our Markowitz model. It is way easier to find the optimal risk-return position when you have a solid estimate of the returns.

Furthermore, CAPM allows us to compute the Sharpe ratio of the stock that serves as another risk-return measure that will ensure our model gives out the most optimal result. The formula would be:

$$[\text{Sharpe Ratio} = \frac{E(R_p) - R_f}{\sigma_p}]$$

c) Technical Analysis

This will be discussed more in detail in the next section. Technical analysis have helped us identify the right market entry points, and, if a stock has made it through the last selection and still doesn't have a clear buy signal for us to make profit off, we would simply "put it on the shelf" and pursue other investment opportunities such one of the final 20 stocks or a share in the collective-investment vehicle SICAV if the money allows it.

What we should take away from this is that we can add and remove stocks to the model based on their technical analysis, which serves as some kind of refinement.

VIII. Technical Analysis

After selecting our stocks and determining the weight of each stock, now came the time for determining the optimal market entry point. For that, we used technical analysis as we are able to make it focus on recent performances which will allow us to capitalize on short-term trends.

The aforenamed tools have been used in our technical analysis

Simple Moving Average

Despite being mainly used in analyzing long-term trends, SMA has proved useful for us as it gives us insight about the current trends and does show some crossover signals on the short-term if we put in the right parameters. We did not accord this tool much importance but it has served as extra evidence to support our analysis as well as the basis for other tools like the Bollinger bands.
We used a short-term SMA of 50 days and a long-term SMA of 200 days[38].

Moving Average Convergence Divergence

This paired with the Bollinger bands was our main focus in the analysis as they provide the most insight when it comes to short-term trends. MACD does that by enabling us to perform **momentum analysis** by looking at the difference between the MACD line and the price line. Furthermore, it helped us find the most optimal entry point by analyzing trend reversal signals, divergences and quick adjustments. We have used a slow EMA of 26 days, a fast EMA of 12 days, and a signal line of 9 days. This aligns with our short-term investment horizon.

Bollinger Bands

[38] Again, we are aware that even the time frame we've chosen is for a long-term investment, but it is the most widely used and does give us some insight as supporting evidence.

As we mentioned earlier this has been our main focus during this analysis for what it provides when it comes to short-term investments. Bollinger bands have been used to assess the volatility of the stocks, determine the overbought/ oversold stocks, and identify the breakout signals from the bands that can be a profit opportunity as it indicates a strong directional move.

We used bollinger bands for 20 days.

Relative Strength Indicator

This has been another supporting[39] indicator to confirm that our analysis is correct, though this one focuses mainly on the momentum analysis which makes it suitable for our investment horizon. RSI gives insight about overbought/ oversold stocks, and helps with the short-term timing for its sensitivity to recent price action.

We have used 14 days as a parameter for RSI.

What was Technical Analysis used for?

We've used technical analysis tools for two things:

a) Markowitz Refinement

As we mentioned earlier, technical analysis has proved very useful when it comes to the Markowitz refinement.

b) Market entry

Technical analysis tools have proven very useful when it comes to market timing, giving us the needed buy and sell signals to optimize our returns. Market entry was further confirmed later using the **Tval Japanese Candles** that aligned with our analysis.

[39] BB and MACD were the basis of this analysis on which we made our decisions, RSI and SMA were there to confirm that these decisions are correct. Like in mathematics, when you know there is more than one right answer, you use a second method to confirm that the result is correct.

c) Portfolio rebalancing

Will be discussed in detail further, but it goes without saying that TA helps us determine when to close a position.

A full interactive dashboard made especially for technical analysis is available when you run the attached python script. Additional details about the technical analysis and their use are included in the attached excel sheet.

IX. Market Entry and Orders

Market Entry

As we said earlier, we have used technical analysis to find the best possible market entry points and to rebalance the Markowitz analysis we performed. We first found a good entry point on 3 of 10 stocks, and invested the rest of our proceeds in SICAV shares.

Orders

In the first days of investment, we used orders to try and enter the market at optimal prices, then, we noticed that prices experience the most volatility[40] When the market opens each day, we carefully analyze the order book at the end of each trading day and try to find good selling or buying opportunities through buy and sell orders. Usually what happens is that we sell a stock for a profit and then buy it back the same day for a cheaper price: we've basically found some kind of arbitrage opportunity.

We have also used orders to cut our losses through stop loss orders.

[40] There are price jumps at the beginning of each trading day because buy and sell orders are executed

X. Portfolio Rebalancing

Now, we have invested our funds and are carefully monitoring our portfolio returns. Now, normally, one that invests for only 30 days would want to buy and hold, but we wanted to go the extra mile: portfolio rebalances.

This helps us concretize our capital gains and limit our losses. As we all know, despite our thorough analyses, the Tunisian stock market's efficiency[41] is weak[42], so the most optimal way to make money (or cut losses) is through technical analysis and some decisions based on our judgement.

a) **Rebalances through technical analysis**

As we've said earlier, technical analysis has been our main reference in our portfolio rebalancing decisions. We've updated our data each day and looked for investment opportunities and sell signals. Moreover, if we feel that a stock is not performing as it should be and another stock is on the rise according to RSI and MACD, we lose the first position and try to ride the trend. Under normal circumstances, we would not do this, but since we're trying to make money in a short period of time, this seems to be like the most rewarding strategy.

[41] https://www.researchgate.net/publication/281823596_Market_Informational_Efficiency_of_Tunisian_stock_market_the_contribution_of_Shannon_entropy

[42] It is improving in some ways, but it is still very far from other markets like the US or Europe

b) Rebalances through judgement decisions

Sometimes, we feel like a stock price is spiraling out of control or is doing exactly the opposite of what it should be doing[43], so we just close the position and look for an investment opportunity elsewhere. Again, this is done only because it matches the investment horizon, we cannot afford to wait for the stock to regulate, especially when the market lacks efficiency.

Performance Evaluation

For our performance evaluation, we used KPIs and KRIs to further understand our position and its implication.

Return Analysis

For the returns analysis, we used a comparison between time weighted and money weighted returns. Doing this enabled us to remove the noise that is consequent from the MWR's dependency on cash flow timing. MWR provides insight on how the wealth actually evolved and is more relevant for our performance evaluation.

Risk Analysis

We have performed several forms of risk analysis throughout our work: studying the standard deviation of the financial statements in the fundamental analysis, calculating the sharpe ratio in the portfolio construction, etc.

We still used these KRIs for our performance evaluation:

- **Sortino Ratio**: Measures risk-adjusted returns, focusing only on downside risk, which is more relevant to investors than total volatility.
- **Beta[44]:** Indicates a portfolio's sensitivity to market movements, helping assess systematic risk.

[43] This is not uncommon in a market where there are many large shareholders which basically control the price. If they decide to sell a block of shares, the price goes down.

[44] We have already used this in the portfolio construction for refinement

- **Treynor Ratio**: Evaluates risk-adjusted returns using only systematic risk (Beta) to measure performance.
- **Value at Risk VaR**: Estimates the potential maximum loss over a specified time frame with a given confidence level.
- **Maximum drawdown**: Identifies the largest peak-to-trough loss, revealing the worst-case decline in value over a period.

Conclusion of Evaluation

When you look at the numbers[45], we can only conclude that we have fulfilled our investment goal to some extent. Our success comes mainly from staying loyal to our approach of minimizing risk, we trust that with more time we would have got better returns as the TMR would indicate, but we are happy with what we have, after all, we've beat the market[46].

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[45] All data is available in the attached excel file
[46] Our portfolio has a better performance than the TUNINDEX, as shown in the attached excel sheet

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