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UNIVERSITI TEKNOLOGI MALAYSIA

MASTER OF SCIENCE (DATA SCIENCE)

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BUSINESS INTELLIGENCE AND ANALYTICS (MCSD1013)

ANALYZE THE PERFORMANCE OF MALAYSIA CURRENCY

ALTERNATIVE ASSESSMENT

Name	SOLEHAH NAJIIHAH BINTI ABD JAMAL
I/C No.	001004010308
Year / Course	1/MCSD
Section	1
Lecturer Name	DR. NOR ERNE NAZIRA BAZIN

SUBMIT BY:

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Introduction

The backbone of Malaysia's financial system is the Malaysian Ringgit (MYR), represented by RM. The Ringgit, which was introduced in 1967 and is administered by Bank Negara Malaysia, has generally been seen as stable. However, all currencies are susceptible to external and internal influences that might create changes in value.

These forces can be broadly classified as economic in nature. On the global scale, oil prices, global economic health, and currency rate volatility can all have an impact. Oil price fluctuations, a substantial Malaysian export, can have a direct impact on the country's foreign reserves and cause the value of the Ringgit effect. On the other hand, a worldwide economic slowdown during the 2008 financial crisis happened, reduced demand for Malaysian exports happened and effect reducing the currency. Furthermore, some previous articles stated that the movements in major currencies such as the US dollar can cause waves that affect the Ringgit exchange rate. Thus, the goal of this project is to identify the economic variables that could have a significant impact on the Malaysian ringgit.

After identifying the impact elements, we can simply anticipate the future of the Ringgit using business intelligence techniques. To accomplish this, it is necessary to have a thorough understanding of how these global forces may evolve. Analyzing market trend and estimating potential global economic that may affect economic performance are all necessary to forecast currency. Unexpected events and market moves are one of the variables that may impact currencies, but both may not be included in this analysis since it is hard to predict and utilize the data to construct forecasts later.

This research attempts to explore how changes in economic indicators affect the value of the Malaysian Ringgit, offering significant new insights on the relationship between economic indicator and currency volatility. The research aims to determine how much the stability and strength of the MYR by examining past data and applying statistical modeling. The findings will be useful for currency traders and economic policymakers.

Problem Statement

Firstly, "Exploring the Performance, Trends, and Patterns of the Malaysian Ringgit (RM) Exchange Rate Over Time". This study aims to analyze historical data on the Malaysian Ringgit (RM) exchange rate to identify performance trends and patterns, providing insights into the currency's historical performance. Through conducting a comprehensive analysis of RM exchange rate fluctuations, this research seeks to uncover underlying patterns and trends that can help stakeholders understand the historical performance dynamics of the RM.

Second, "Investigating the Relationship Between the Malaysian Ringgit (RM) and Other Economic Factors". This study examines the correlation between the Malaysian Ringgit (RM) exchange rate and various economic factors, such as GDP growth, inflation rates, and trade balances. By conducting a thorough analysis of the relationship between the RM and these economic indicators, the study aims to provide insights into how external economic factors influence the RM exchange rate, offering valuable information for stakeholders in the financial and economic sectors.

Thirdly, "Predicting the Future Performance of the Malaysian Ringgit (RM) Exchange Rate for the Next 2 Years". This study aims to forecast the future performance of the Malaysian Ringgit (RM) exchange rate over a 2-year period using predictive modeling techniques. By analyzing historical data and identifying key factors influencing the RM exchange rate, the research seeks to develop a predictive model that can provide insights into the potential trends and fluctuations in the RM exchange rate over the next two years. The findings will offer valuable information for stakeholders involved in currency trading and financial decision-making.

Objectives

1. To identify the performance, trend and pattern of currency Ringgit Malaysia (RM).
2. To study the relationship between RM currency and other economic factors.
3. To predict or forecast the performance of ringgit currency in the next two years.

Stakeholders

Economists and Financial Analysts: It requires a dual approach to understand the Malaysia Ringgit (RM). First, historical context reveals how the currency has reacted to past economic shocks, global events, and policy changes. This knowledge is invaluable for building accurate forecasting models and understanding the underlying dynamics that drive the RM's behavior. Second, investigating the relationship between RM and key economic factors like GDP growth, inflation, and trade balance allows these professionals to refine their model further. Analysts can develop more subtle forecasts to consider the complex interplay of domestic and international economic forces by incorporating economic indicators that influence the RM. This extensive understanding enables them to provide more accurate predictions and insights into Ringgit Malaysia's (RM) future performance, ultimately supporting sound decision-making in the financial realm.

Investor: They approach RM with a dual perspective seeking stability and potential in returns. They analyze the historical trends, patterns of appreciation, depreciation, or relative stability against other major currencies. It will help them gauge the currency's resilience in the face of economic fluctuations and its suitability for long-term investment. They also aim to make important decisions based on the likely impact of economic events on RM. Investors will examine how RM has historically reacted to changes in interest rates, inflation, global economic trends, and geopolitical events. By understanding this, they can anticipate how the RM might affect future economic developments, allowing them to adjust their portfolios accordingly.

Policymakers: In Malaysia, Bank Negara Malaysia (the central bank), are the key participant in the foreign exchange market. are vital participants in the foreign exchange market. BNM utilize real-time exchange rate data to guide the decisions on monetary policy and manage the value of the Malaysian Ringgit (RM). For instance, if RM depreciates rapidly, policymakers may step in and stabilize its value through market interventions. Furthermore, exchange rate data lets them assess how the economic policies might impact the RM, enabling them to adjust the strategies

and mitigate the negative effects. Analyzing trends helps them anticipate future economic challenges and develop proactive strategies to maintain stable growth.

Currency traders: Closely monitor exchange rates, especially the performance of the Malaysian Ringgit (RM), to develop effective trading strategies. They analyze the fluctuations and trends in the ringgit value to predict its future performance, allowing them to make decisions about buying or selling the currency. Moreover, exchange rate data is crucial for risk management, as it helps traders anticipate potential losses due to currency volatility and implement hedging strategies to protect their investments.

Data Preparation and Cleaning

Dataset 1: GDP Expenditure

Data Type: Nominal

Source: https://open.dosm.gov.my/data-catalogue

Datasets:

1. Annual Real GDP by Expenditure Type
   a. Rows: 112
   b. Columns: 4
2. Annual Real GDP by Expenditure Subtype
   a. Rows: 112
   b. Columns: 4
3. Lookup Table: GDP
   a. Rows: 175
   b. Columns: 4

Dataset	Variables	Description
Annual Real GDP by Expenditure Type and Annual Real GDP by Expenditure Subtype	series	1. Absolute values ('abs') 2. Annual growth ('growth_yoy')
	date	The date in YYYY-MM-DD format. MM-DD set at 01-01 for annual frequency
	type	Code for the expenditure type
	value	1. The value of GDP in RM millions (for rows with series type 'abs') 2. Percentage of GDP growth (for rows with series type 'growth_yoy')
Lookup Table: GDP	method	Production, Expenditure or Income
	code	Reference for the variables

	variable_en	Definition of the variable in English
	variable_bm	Definition of the variable in Malay

Data Cleaning:

1. Combine Annual Real GDP by Expenditure Type data with Annual Real GDP by Expenditure Subtype.
2. Remove unwanted rows: Rows with type of annual growth
3. Remove unnecessary columns: 'series'
4. Create a new column 'Year' and extract the year from the 'Date' column.
5. Renaming columns with clear and understandable variable names.
6. Split Lookup Table: GDP into two separate tables 'Lookup' and 'Sub Lookup' based on their codes column.
7. Establish the relationship between the tables in Power BI to include the descriptions of the code that indicates the type of expenditure and its subtypes based on its year.
8. Set the appropriate data type for each column.

series	date	code	value
abs	1/1/2015	e0	1176941
abs	1/1/2015	e1	635099
abs	1/1/2015	e1.1.01	138568
abs	1/1/2015	e1.1.02	12627
abs	1/1/2015	e1.1.03	20007
abs	1/1/2015	e1.1.04	99383

method	code	desc_en	desc_bm
production	p0	GDP at pur	KDNK pada ha
production	p1	Agriculture	Pertanian
production	p1.1	Crops	Tanaman
production	p1.1.1	Rubber	Getah
production	p1.1.2	Oil palm	Kelapa sawit
production	p1.1.3	Paddy	Padi

series	date	code	value
abs	1/1/2015	e0	1176941
abs	1/1/2015	e1	635099
abs	1/1/2015	e2	154021
abs	1/1/2015	e3	304423
abs	1/1/2015	e4	-5195
abs	1/1/2015	e5	817370

Before Cleaning

Date		Year		Type of Expenditure		Sub Expenditure		Amount (RM Million)		Percentage (%)	
● Valid	100%	● Valid	100%	● Valid	100%	● Valid	100%	● Valid	100%	● Valid	100%
● Error	0%	● Error	0%	● Error	0%	● Error	0%	● Error	0%	● Error	0%
● Empty	0%	● Empty	0%	● Empty	0%	● Empty	0%	● Empty	0%	● Empty	0%
1/1/2015		2015		Private final consumption expenditure		Food and non-alcoholic beverages		138568		11.8	
1/1/2016		2016		Private final consumption expenditure		Food and non-alcoholic beverages		147711		12	
1/1/2015		2015		Private final consumption expenditure		Alcoholic beverages and tobacco		12627		1.1	
1/1/2016		2016		Private final consumption expenditure		Alcoholic beverages and tobacco		11745		1	
1/1/2015		2015		Private final consumption expenditure		Clothing and footwear		20007		1.7	
1/1/2016		2016		Private final consumption expenditure		Clothing and footwear		22075		1.8	
1/1/2015		2015		Private final consumption expenditure		Housing, water, electricity, gas and other fuels		99383		8.4	
1/1/2016		2016		Private final consumption expenditure		Housing, water, electricity, gas and other fuels		105778		8.6	
1/1/2015		2015		Private final consumption expenditure		Furnishings, household equipment and routine household maintenance		34319		2.9	
1/1/2016		2016		Private final consumption expenditure		Furnishings, household equipment and routine household maintenance		36075		2.9	

After Cleaning

Dataset 2: GDP Income

Data Type: Nominal

Source: https://mysidc.statistics.gov.my/index.php?lang=en#

Rows: 105

Columns: 7

Variables	Description
Base Year	The base year: 2005, 2010, 2015
Year	The year the data taken
Component	Components of Malaysia GDP income: - Income Components - GDP at purchasers' prices
Sub Components	The sub components of Malaysia GDP income - Compensation of employees

	- Gross operating surplus - Taxes less subsidies on production and imports
Kind of economic activity	Type of economy activities based on the sub components. - Agriculture - Mining and quarrying - Manufacturing - Construction - Services
Value (RM Million)	The value of GDP in RM millions
Status Data	e: estimate p: preliminary

Data Cleaning:

1. Remove unwanted columns: Status Data

2. Remove unwanted rows: Rows where the base year is 2005 and 2010. Only rows with 2015 as the base year are taken.

3. Renaming columns and values with clear and understandable variable names.

4. Set the appropriate data type for each column.

Base Year	Year	Component	Sub Components	Kind of economic activity	Value RM Million	Status Dat
2005	2005	Income Components	Compensation of employees	Agriculture	8219	f
2005	2005	Income Components	Compensation of employees	Mining and quarrying	2610	f
2005	2005	Income Components	Compensation of employees	Manufacturing	48912	f
2005	2005	Income Components	Compensation of employees	Construction	11268	f
2005	2005	Income Components	Compensation of employees	Services	89586	f
2005	2005	Income Components	Gross operating surplus	Agriculture	35394	f
2005	2005	Income Components	Gross operating surplus	Mining and quarrying	67803	f
2005	2005	Income Components	Gross operating surplus	Manufacturing	89678	f
2005	2005	Income Components	Gross operating surplus	Construction	4715	f

Before Cleaning.

Base Year		Year		Components		Kind of economic activity		Amount (RM Million)	
● Valid	100%	● Valid	100%	● Valid	100%	● Valid	100%	● Valid	100%
● Error	0%	● Error	0%	● Error	0%	● Error	0%	● Error	0%
● Empty	0%	● Empty	0%	● Empty	0%	● Empty	0%	● Empty	0%
2015		2015		Compensation of employees		Agriculture		18620	
2015		2015		Compensation of employees		Mining and quarrying		8289	
2015		2015		Compensation of employees		Manufacturing		92479	
2015		2015		Compensation of employees		Construction		40179	
2015		2015		Compensation of employees		Services		252674	
2015		2015		Gross operating surplus		Agriculture		74258	
2015		2015		Gross operating surplus		Mining and quarrying		93243	
2015		2015		Gross operating surplus		Manufacturing		156968	

After Cleaning.

Dataset 3: Annual Real GDP & GNI: 1970 to Present

Data Type: Nominal and Interval

Source: https://open.dosm.gov.my/data-catalogue/gdp_gni_annual_real

Rows: 108

Columns: 5

Variables	Description
series	Absolute values or growth
date	The date in YYYY-MM-DD format. MM-DD set at 01-01 for annual frequency
gdp	The total value of goods and services produced within that year, after deducting the cost of goods and services used in production, but before deducting the consumption of fixed capital.
gni	The total value of the production of the nationals of the country, whether they are in residence in Malaysia or not. Mechnically, it is defined as GDP plus net factor incomes from abroad.
gdp_capita	The ratio of GDP to the total population of Malaysia in that year

gni_capita	The ratio of GNI to the total population of Malaysia in that year

Data Cleaning:

1. Remove unwanted columns: 'series'
2. Remove unwanted rows: Rows with type of annual growth
3. Renaming columns and values with clear and understandable variable names.
4. Create a new column 'Year' and extract the year from the 'Date' column.
5. Set the appropriate data type for each column.

series	date	gdp	gni	gdp_capita	gni_capita
abs	1/1/1970	73709.68	76983.21	6773.39	7074.204
abs	1/1/1971	81106.2	83746.67	7265.66	7503.945
abs	1/1/1972	88720.81	91918.37	7751.699	8032.858
abs	1/1/1973	99102.1	101584.2	8455.832	8667.553
abs	1/1/1974	107346.1	109385.7	8941.871	9117.128
abs	1/1/1975	108206	111851.8	8798.552	9090.682
abs	1/1/1976	120718.4	123838.2	9589.923	9837.771
abs	1/1/1977	130077.7	133193.4	10082.193	10327.015
abs	1/1/1978	138733	141107.2	10509.519	10688.523

Before Cleaning.

Date	1²3 Year	1.2 GDP (RM Million)	1.2 GNI (RM Million)	1.2 GDP per Capita (RM)	1.2 GNI per Capita (RM)
● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%
1/1/1970	1970	73709.682	76983.205	6773.39	7074.204
1/1/1971	1971	81106.199	83746.673	7265.66	7503.945
1/1/1972	1972	88720.81	91918.37	7751.699	8032.858
1/1/1973	1973	99102.104	101584.245	8455.832	8667.553
1/1/1974	1974	107346.073	109385.703	8941.871	9117.128
1/1/1975	1975	108205.988	111851.757	8798.552	9090.682
1/1/1976	1976	120718.377	123838.235	9589.923	9837.771
1/1/1977	1977	130077.743	133193.374	10082.193	10327.015

After Cleaning.

Dataset 4: Monthly Interest Rates

Data Type: Nominal and Ratio

Source: https://data.gov.my/data-catalogue/interestrates

1. Annual Interest Rates
    a. Rows: 5161
    b. Columns: 4
2. Lookup Table: Money & Banking

Data	Variables	Description
Monthly Interest Rate	date	The date in YYYY-MM-DD format.
	bank	Type of bank; commercial or investment
	rate	Type of interest rate. To be mapped with the Lookup Money & Banking table.
	value	Average rate of interest during the period, expressed as a percentage (%)

Data Cleaning:

1. Remove unrelated columns: 'rate' and 'bank'

2. Renaming columns and values with clear and understandable variable names.

3. Create a new column 'Year' and extract the year from the 'Date' column.

4. Set the appropriate data type for each column.

date	bank	rate	value
1/1/1997	commercial	fdr_1mo	7.16
2/1/1997	commercial	fdr_1mo	7.14
3/1/1997	commercial	fdr_1mo	7.2
4/1/1997	commercial	fdr_1mo	7.2
5/1/1997	commercial	fdr_1mo	7.3
6/1/1997	commercial	fdr_1mo	7.54
7/1/1997	commercial	fdr_1mo	8.05
8/1/1997	commercial	fdr_1mo	7.46
9/1/1997	commercial	fdr_1mo	7.59

Before Cleaning.

Date		1²₃ Year		1.2 Interest Rate (%)	
● Valid	100%	● Valid	100%	● Valid	100%
● Error	0%	● Error	0%	● Error	0%
● Empty	0%	● Empty	0%	● Empty	0%
1/1/1997		1997		7.16	
2/1/1997		1997		7.14	
3/1/1997		1997		7.2	
4/1/1997		1997		7.2	
5/1/1997		1997		7.3	
6/1/1997		1997		7.54	
7/1/1997		1997		8.05	
8/1/1997		1997		7.46	

After Cleaning.

13

Dataset 5: Exchange Rates (Daily)

Data Type: Ratio

Source: https://www.bnm.gov.my/exchange-rates

Rows: 15217

Columns: 10

Variables	Description
Date	The date in YYYY-MM-DD format.
Currency	USD, GBP, EUR, JYP100, CHF, AUD, CAD, SGD, HKD100, THB100, PHP100, TWD100, KRW100, IDR100, SAR100, SDR, CNY, BND, VND100, KHR100, NZD, MMK100, INR100, AED100, PKR100, NPR100, EGP

Data Cleaning

1. Remove unnecessary columns and only keep USD, SGD, EUR and JYP100 columns.
2. Rename columns with appropriate variable names.
3. Create a new column 'Year' and extract the year from the 'Date' column.
4. Set the appropriate data type for each column.

	1.2 USD	1.2 GBP	1.2 EUR	1.2 JPY100	1.2 CHF	1²3 AUD	1²3 CAD	1.2 SGD	1.2 HKD100
● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%
5/2/2003	3.8	6.1162	4.2662	3.2023	2.8241	0	0	2.1478	48.7234
5/5/2003	3.8	6.0938	4.2626	3.1945	2.8241	0	0	2.151	48.7234
5/6/2003	3.8	6.105	4.2863	3.2053	2.8297	0	0	2.1668	48.7234
5/7/2003	3.8	6.1312	4.3365	3.2301	2.8653	0	0	2.1863	48.7234
5/8/2003	3.8	6.068	4.3141	3.2591	2.8711	0	0	2.1872	48.7234
5/9/2003	3.8	6.0976	4.3783	3.2416	2.9002	0	0	2.1815	48.7234
5/12/2003	3.8	6.0976	4.3917	3.2486	2.9078	0	0	2.1901	48.7234
5/13/2003	3.8	6.1087	4.363	3.2358	2.8835	0	0	2.1896	48.7258
5/16/2003	3.8	6.1614	4.3309	3.2633	2.8736	0	0	2.2109	48.7234
5/19/2003	3.8	6.192	4.4405	3.2873	2.9326	0	0	2.2099	48.7234
5/20/2003	3.8	6.1996	4.4248	3.2461	2.9274	0	0	2.2012	48.7258

Before Cleaning.

Date	1²3 Year	1.2 USD	1.2 EUR	1.2 JPY100	1.2 SGD
● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%
5/2/2003	2003	3.8	4.2662	3.2023	2.1478
5/5/2003	2003	3.8	4.2626	3.1945	2.151
5/6/2003	2003	3.8	4.2863	3.2053	2.1668
5/7/2003	2003	3.8	4.3365	3.2301	2.1863
5/8/2003	2003	3.8	4.3141	3.2591	2.1872
5/9/2003	2003	3.8	4.3783	3.2416	2.1815
5/12/2003	2003	3.8	4.3917	3.2486	2.1901
5/13/2003	2003	3.8	4.363	3.2358	2.1896

Dataset 6: Inflation Rates

Data Type: Ratio and Interval

Source: https://www.bnm.gov.my/exchange-rates

Rows: 228

Columns: 4 (Date, Inflation Rate Malaysia (%), Year, Quarter)

Date	1.2 Inflation Rate Malaysia (%)	1²₃ Year	ᴬᴮC Quarter
● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%
1/1/2005	2.4	2005	Q1
2/1/2005	2.4	2005	Q1
3/1/2005	2.5	2005	Q1
4/1/2005	2.5	2005	Q2
5/1/2005	3	2005	Q2
6/1/2005	3.1	2005	Q2
7/1/2005	2.9	2005	Q3
8/1/2005	3.7	2005	Q3

After Cleaning.

Dataset 7: Malaysia Trade Balance

Data Type: Ratio and Interval

Source:

https://www.macrotrends.net/globalmetrics/countries/MYS/malaysia/trade-balance-deficit

Rows: 65

Columns: 3 (Date, Balance (Billions of USD), % of GDP)

Data Cleaning:

1. Renaming columns and values with clear and understandable variable names.
2. Create a new column 'Year' and extract the year from the 'Date' column.

3. Set the appropriate data type for each column.

	Balance	% of GDP		
date	Billions of	% of GDP		
12/31/1960	0.2646	13.8084		
12/31/1961	0.130994	6.8877		
12/31/1962	0.058147	2.9052		
12/31/1963	0.043447	1.7309		
12/31/1964	0.046387	1.7345		
12/31/1965	0.1323	4.4751		
12/31/1966	0.124134	3.9489		
12/31/1967	0.077747	2.438		
12/31/1968	0.117274	3.5213		
12/31/1969	0.373707	10.1979		

Before Cleaning.

Date		1.2 Total Amount (USD Billions)		1.2 % of GDP		123 Year	
● Valid	100%	● Valid	100%	● Valid	100%	● Valid	100%
● Error	0%	● Error	0%	● Error	0%	● Error	0%
● Empty	0%	● Empty	0%	● Empty	0%	● Empty	0%
12/31/1960		0.264600388		13.8084		1960	
12/31/1961		0.130993525		6.8877		1961	
12/31/1962		0.058146752		2.9052		1962	
12/31/1963		0.04344673		1.7309		1963	
12/31/1964		0.046386735		1.7345		1964	
12/31/1965		0.132300194		4.4751		1965	
12/31/1966		0.124133515		3.9489		1966	
12/31/1967		0.077746781		2.438		1967	
12/31/1968		0.117273505		3.5213		1968	
12/31/1969		0.373707215		10.1979		1969	

After Cleaning.

Dataset 8: Malaysia GDP and GDP Growth

Data Type: Ratio and Interval

Link:
https://www.macrotrends.net/global-metrics/countries/MYS/malaysia/gdp-gross-domestic-product

Rows: 65

Columns: 4 (Date, GDP (Billions of US $), GDP per Capita (US $), Balance (Billions of USD), Growth Annual % Change)

	GDP		Per Capita	Growth
date	GDP (Billions of US $)		Per Capita (US $)	Annual % Change
12/31/1960	1.916229477		244.611	0
12/31/1961	1.901856123		235.5297	7.598
12/31/1962	2.001489602		240.4418	6.421
12/31/1963	2.510110348		292.5758	7.3388
12/31/1964	2.674423922		302.6762	5.359
12/31/1965	2.956337669		325.1933	7.6849
12/31/1966	3.143517944		336.5564	7.8167
12/31/1967	3.188924677		332.8007	3.8571
12/31/1968	3.330371551		339.0965	7.978
12/31/1969	3.664552041		364.2086	4.8885

Before Cleaning

	Date	1²₃ Year	1.2 GDP (Billions of US $)	1.2 Per Capita (US $)	1.2 GDP Annual Growth (%)
	● Valid 100%	● Valid 100%	● Valid 100%	● Valid 100%	● Valid 100%
	● Error 0%	● Error 0%	● Error 0%	● Error 0%	● Error 0%
	● Empty 0%	● Empty 0%	● Empty 0%	● Empty 0%	● Empty 0%
1	12/31/1960	1960	1.916229477	244.611	0
2	12/31/1961	1961	1.901856123	235.5297	7.598
3	12/31/1962	1962	2.001489602	240.4418	6.421
4	12/31/1963	1963	2.510110348	292.5758	7.3388
5	12/31/1964	1964	2.674423922	302.6762	5.359
6	12/31/1965	1965	2.956337669	325.1933	7.6849
7	12/31/1966	1966	3.143517944	336.5564	7.8167
8	12/31/1967	1967	3.188924677	332.8007	3.8571
9	12/31/1968	1968	3.330371551	339.0965	7.978
10	12/31/1969	1969	3.664552041	364.2086	4.8885

After Cleaning

Dataset 9: Malaysia Annual Nominal GDP

Data Type: Ratio and Interval

Link: https://open.dosm.gov.my/data-catalogue/gdp_gni_annual_nominal

Rows: 154

Columns: 6 (series, gdp, gni, gdp per capita, gni per capita)

series	date	gdp	gni	gdp_capita	gni_capita
abs	1/1/1947	3531	3511	719	715
abs	1/1/1948	3619	3580	726	718
abs	1/1/1949	3550	3400	699	669
abs	1/1/1950	5345	4765	1023	912
abs	1/1/1951	7520	6840	1409	1282
abs	1/1/1952	6350	6155	1153	1118
abs	1/1/1953	5780	5690	1013	997
abs	1/1/1954				
abs	1/1/1955	4992	4756	824	785.045

Before Cleaning

Date	1²₃ Year	1.2 GDP (RM Million)	1.2 GNI (RM Million)	1.2 GDP per Capita	1.2 GNI per Capita
● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%	● Valid 100% ● Error 0% ● Empty 0%
1/1/1947	1947	3531	3511	719	715
1/1/1948	1948	3619	3580	726	718
1/1/1949	1949	3550	3400	699	669
1/1/1950	1950	5345	4765	1023	912
1/1/1951	1951	7520	6840	1409	1282
1/1/1952	1952	6350	6155	1153	1118
1/1/1953	1953	5780	5690	1013	997
1/1/1954	1954	4992	4756	824	785.045
1/1/1955	1955	4992	4756	824	785.045
1/1/1956	1956	5060	4842	809	774

After Cleaning

Data Integration

Data 1	Data 2	Type of relationship
Exchange Rates	MYR GDP Growth	Many to One
Inflation Rates	MYR GDP Growth	Many to One
Inflation Rates	Interest Rates	Many to Many
Interest Rates	MY GDP Nominal	Many to One
Interest Rates	Exchange Rates	Many to Many
Malaysia Trade Balance	MY Real GDP GNI	One to One
Malaysia Trade Balance	MYR GDP Growth	One to One
MYR GDP Growth	MY GDP Nominal	One to One
GDP Expenditure (Sub Code)	GDP Sub Lookup (Sub Code)	Many to One
GDP Expenditure	MY Real GDP GNI	Many to One
GDP Expenditure	MY GDP Nominal	Many to One
GDP Income	MYR Real GDP GNI	Many to One
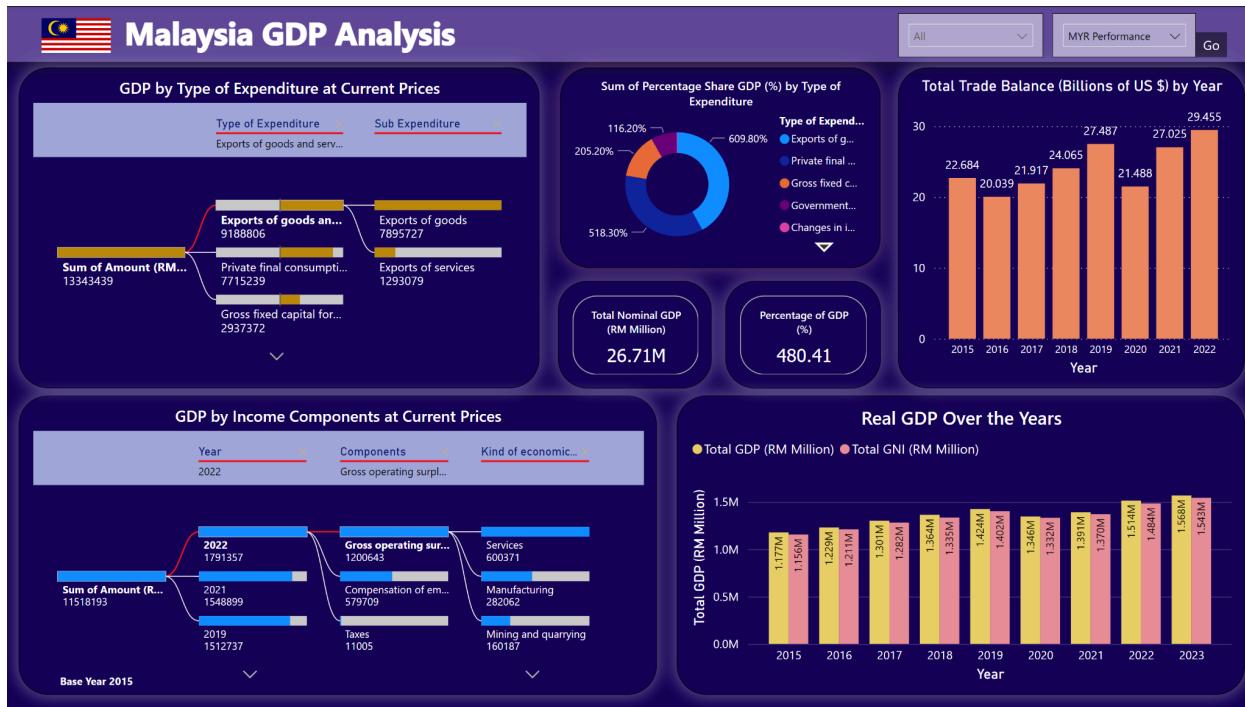
Data Storytelling and Dashboard Analytics Based on Identified Business Problem

    A. To identify the performance, trend and pattern of currency Ringgit Malaysia (RM).

    B. To study the relationship between RM currency and other economic factors.

    C. To predict or forecast the performance of ringgit currency in the next two years.

According to Investopedia, currency is a medium of exchange for goods and services. Any currency's value always fluctuates in reference to other currencies. There are many factors that influence the fluctuation including trade balance, interest rates, inflation and overall economic performance.

Gross Domestic Products (GDP) is an indicator of a country's economic health, the total value of all goods and services produced by the country over a specific period. The world economy is a complex network of interrelated elements that have a significant impact on one another. GDP and the value of a nation's currency stand out as two essential components that have a major impact on the economic landscape of a country. There are many facets to the relationship between GDP and currency value, including complex dynamics driven by both internal and foreign causes.

GDP can be measured using either the expenditures approach, which takes into account the total goods and services purchased by the economy, or the income approach, which takes into account the income earned from production. Trade balance means the gap between exports and imports. When products that are produced domestically sold abroad, it is called export. Import is when the residents of a country purchase goods produced in other countries. When the exports of a country exceed the imports, it is called a trade surplus. If it is the other way around, it is called a trade deficit. If the exports of a country exceeds imports, this means more foreign currency is coming into the country as they need to convert their currency into local currencies to purchase the exported goods and services.
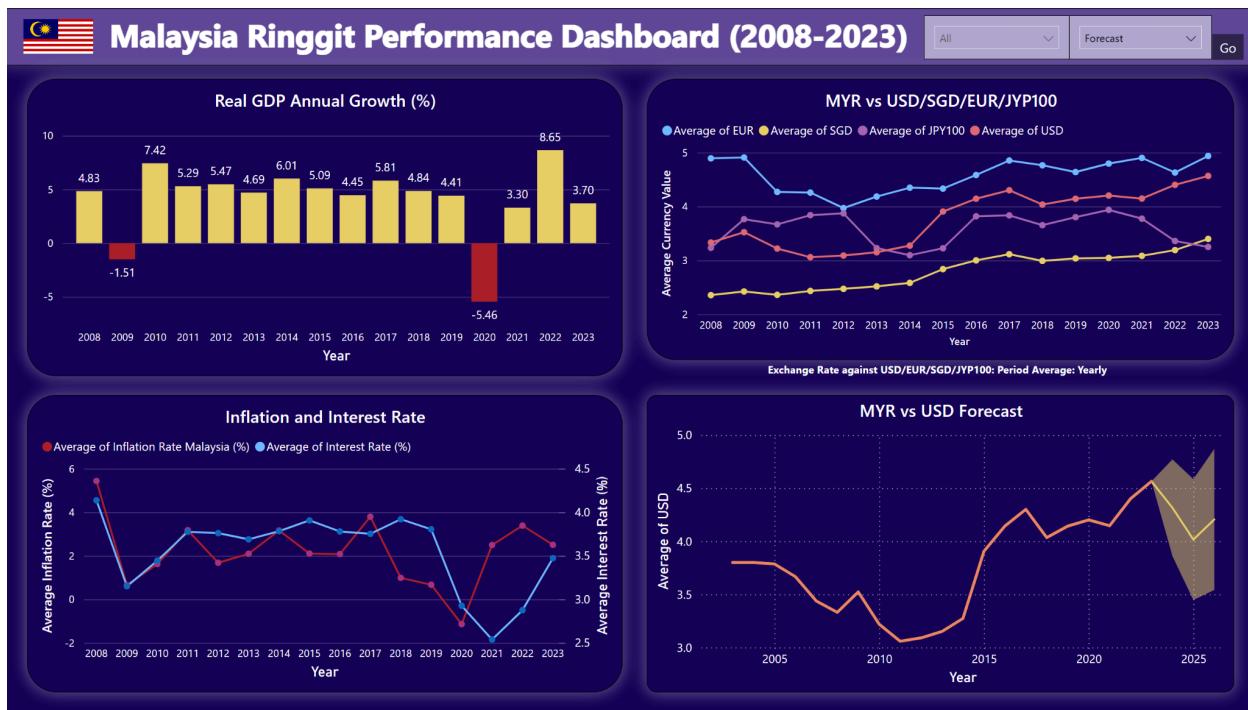
Dashboard Page 1

Malaysia GDP Analysis dashboard shows the historical performance of Malaysia GDP over the years from 2015 to 2022. It breaks down further into expenditures and income components, the percentages of each component, total trade balance and Malaysia GDP over the years in RM million. From the dashboard and data provided by the Department of Statistic Malaysia (DOSM), GDP Malaysia expenditure is based on 5 components; private and government final consumption, gross fixed capital formation, changes in inventories and valuables, exports and imports. Exports of goods and services is the main contributor in GDP expenditure followed by private final consumption. Generally, GDP income approach can be divided into durable goods, nondurable goods, services, structures, and inventories. The 'Income Components at Current Prices' graph breaks down the Malaysia economic income activities under 3 main components; Compensation of employees, Gross operating surplus and Taxes.

The total trade balance, estimated in billions of US dollars by year, further emphasizes Malaysia's economic narrative. The trade balance is showing an upward trend, peaking at $29.455 billion in 2022, despite some fluctuations. This pattern features Malaysia's rising export capacity and further increasing trade terms, vital for supporting economic growth. Trade terms is the ratio of the prices a country gains for its exports over the amount of payments for imports.

Gross National Income (GNI) is the total amount of a nation's people and business earned whether they are inside or outside the country's border. Malaysia's GDP and Gross National Income (GNI) show a slightly parallel rise, proving the nation's economic growth as well as improved living standards.

Dashboard Page 2

When the inflation rate of a country rises, the central bank of the country will use interest rates as a tool in order to manage the inflation. When a country maintains its GDP growth over the years, it translates to high demand for goods and services. This surge can cause rises in inflation due to the lack of supply as they struggle to keep up. Hence, central banks raise the interest rates, making borrowing more expensive and curbing consumer spending. Higher interest rates attract foreign investors due to higher return on investment. These foreign investors buy local currency to make investments thus increasing the demand for currency and contributing to currency appreciation. A high growth GDP rate indicates the economic health of a country. A nation that has a consistent GDP growth record is therefore said to have a stable economic environment thus offering a number of opportunities for investments.

This dashboard presents the history of Malaysia's economic journey, showcasing real GDP growth, inflation rate, interest rate, and exchange rate of the Malaysian Ringgit for the

period 2008 to 2023. Looking at the Real GDP Annual Growth, there are considerable fluctuations, and the highest growth rate was recorded in 2022 at 8.65%. GDP annual growth rate drops at the lowest in 2020 at -5.46%, impacted from COVID-19. As discussed earlier, inflation and interest rates have influence on each other, where interest rates typically follow changes in inflation with a lag. From the dashboard, it can be seen when the inflation rate drops in 2017, the interest rate drops in the following year. When the inflation rate rises in 2021, the interest rate follows the changes in 2022 as the central bank raises interest rates to control inflation.

The observation of the exchange rate of the MYR relative to other leading currencies such as USD, SGD, EUR, JPY illustrates more or less a fluctuating depreciation of the MYR over the years. The significant depreciation post-2015 indicates economic pressures as well as changes in internal economic policies. High GDP growth tends to stabilize the MYR currency as can be seen in 2010 and 2022 where the GDP was at its peak in both periods, enhancing investors confidence on investments in Malaysia leading to a stronger Ringgit currency. High inflation means the prices of goods and services rise and causing reduced purchasing power that leads to weaker MYR currency value. This can be seen in post-2008 and 2022. As the interest rates increase to maintain inflation at the same time attracting more foreign investors, the currency retains its purchasing power and stabilizes the MYR.

By monitoring the historical performance of MYR exchange rates from 2003 to 2023, it is possible to forecast its performance in the next 3 years using proper statistical methods or machine learning. In this research, the focus will be on forecasting the currency exchange rate of MYR versus USD only. Based on the dashboard, the forecasted exchange rate will drop continuously to 4.32 in 2024, 4.02 in 2025 and later increase to 4.21 in 2026.

The MYR Performance dashboard is an invaluable tool for various stakeholders such as economists and financial analysts, investors, policymakers and currency traders, aiding them into making decisions. Economists and financial analysts can monitor the performance of Malaysia's economy based on total GDP values and GDP growth percentage over the years. These insights help them identify trends and adjust investment strategies. Analysts also can monitor the inflation-interest rate relationship to assess investment risks. When investing in the MYR, exchange rate fluctuations are crucial to observe as it affects the return on investment; currency depreciation reduces profitability while appreciation increases it. This increases the confidence in

the economy to investors and may lead to increased investment on any form of assets within Malaysia including shares, bonds and real estate. Fluctuations in the interest rates are crucial for investors as the higher interest rates will attract foreign capital, strengthening MYR while lower rates might cause depreciation. In the case of policymakers, the GDP growth data is used as an indicator of the strength of the economy in crisis and leads to such actions as the provision of the fiscal stimulus or changes in the monetary policy. Inflation rates are an important aspect of currency stability. Policymakers monitor the inflation rates as it aims for stable exchange rates by preventing excessive depreciation. Currency traders work with a chart analysis of exchange rates to find out trends, helping their trading decisions where depreciation means short selling and appreciation can be a buy signal. They also take into account economic factors such as the GDP growth and inflation rates in the fundamental analysis because high GDP growth rate often leads to MYR strength while high inflation rates have the opposite effect.

Conclusion

In conclusion, the Malaysia Ringgit Performance Dashboard is a clear presentation of the Malaysia economic indicators with focus on the relationship between GDP growth, inflation rates, interest rates and the currency performance. The analysis of the economic trends show the years of stability and instabilities, for instance, high GDP in 2010 and 2022, and low in 2009 and 2020. Inflation and interest rates are interrelated thus underlining the need to strike a balance on monetary policies with the view of achieving the desired stability in the economy. Malaysia's competitiveness in international markets can therefore be deduced from the MYR's performance against major currencies regarding the above economic factors. To economists, financial analysts, investors, policymakers, and currency traders, the sophisticated dashboard may be useful in decision making processes such as in economic forecasts, changes of investment plans, in development of policies or in trading plans. Finally, the dashboard reminds a user that it is critically important to grasp how various economic indicators are to be used in decision-making in order to achieve the best possible outcome concerning financial and policy planning.

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