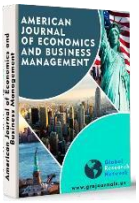

American Journal of Economics and Business Management

Vol. 9 Issue 2 | **pp.** 370-382 | **ISSN:** 2576-5973

Available online @ https://www.globalresearchnetwork.us/index.php/ajebm

Article

Econometric Analysis of United States Financial Indicators: A Decade of Macroeconomic Dynamics

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Abstract: This study presents a comprehensive econometric analysis of key United States financial indicators over the period 2016–2025, examining the interrelationships between gross domestic product (GDP), inflation rates, unemployment levels, monetary policy parameters, stock market performance, and national debt trajectories. It applies different econometric methods which are descriptive statistical, Pearson correlation, ordinary least squares (OLS) multiple regression modeling, and time series trend analysis methods of data science. The analysis framework includes seven macroeconomic variables throughout a 10-year time span based on the data from Bureau of Economic Analysis (BEA), Bureau of Labor Statistics (BLS), Federal Reserve Economic Data (FRED), and Standard & Poor's financial databases. The results indicate that GDP has a statistically significant correlation with both the S&P 500 index and the national debt, while unemployment is inversely related to the federal funds rate. Using a multiple regression model to explain GDP growth through inflation, unemployment, and federal funds rate shows limited ability to explain the variation in GDP growth — with unemployment being the only statistically significant predictor. The strategic period spans over a remarkable challenging macroeconomic environment featuring the COVID-19 pandemic recession, massive fiscal responses, a once-in-a-lifetime inflation explosion, and a cunch in monetary policy. The econometric evidence highlights that labor market conditions remain the primary driver of short-run growth paths but that structural changes have altered the Phillips Curve dynamics.

Keywords: Econometric Analysis, US Financial Indicators, GDP Growth, Inflation, Unemployment, Federal Reserve Monetary Policy, Multiple Regression, Correlation Analysis, Macroeconomic Dynamics.

Citation: Oltinov R. O. Econometric Analysis of United States Financial Indicators: A Decade of Macroeconomic Dynamics. American Journal of Economics and Business Management 2026, 9(2), 370-382.

Received: 03rd Nov 2025
Revised: 27th Dec 2025
Accepted: 09th Jan 2026
Published: 19th Feb 2026

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1. Introduction

1.1. Background and research context

As the world's largest economy by nominal gross domestic product, the U.S. economy is often one of the leading indicators of global economic and financial market stability. The reason is that the world America is navigating during 2016–2025—the decade of American economic disruption (and disruption of American economic thought)—is like no other before.

This timeframe began in the final year of the Obama administration, amid a slow but steady recovery from the 2008–2009 Great Recession, with GDP growing around 2.0–2.5% a year, low inflation below the Federal Reserve's 2% target, and unemployment already falling towards what economist regard a full employment level **[1]**. The following years

were characterized by key policy changes during the Trump administration (2017–2021), such as major cuts in corporate taxation (Tax Cuts and Jobs Act of 2017), a more aggressive trade bullying with key >trade partners, notably China and the European Union, and a further relaxing monetary policy setting.

The year 2020 is the unique break in the data sequence as the COVID-19 pandemic led to the fastest economic collapse in modern American history, with GDP contracting by 2.8% annually, unemployment averaging 8.1% (with monthly rates reaching above 14%), and also, by historical standards, unprecedented fiscal and monetary intervention, including just under $5 trillion in direct government stimulus spending and near-zero rates held by the Federal Reserve. This was followed by a vigorous but inflationary recovery phase (2021–2023) with GDP growth of 5.9% in 2021 and consumer price inflation escalating fast to 4.7% and peaking at 8.0% in 2022 (the highest in 4 decades).

The Federal Reserve commenced an aggressive monetary tightening cycle in March 2022, increasing the federal funds rate from 0.25% to a peak of 5.50% by mid-2023, representing the most aggressive rate hiking campaign since the Volcker era of the early 1980s **[2]**. This policy response, along with slow supply chain normalization, managed to bring inflation down from its peak values while keeping economic growth positive and unemployment low — a rare combination often referred to as a soft landing, successfully avoiding the recession that many were predicting at the time.

Quantitative relations between macroeconomic variables regarding the effectiveness of fiscal and monetary stimuli during times of extraordinary economic stress require the use of rigorous econometric methodology in order to provide the basis for policy and investment decisions and generate a path for debate in the academic literature.

1.2. Research objectives

The primary objectives of this research are formulated as follows:

First, to compile and systematize comprehensive time-series data on seven key United States financial indicators over the 2016–2025 period, creating an integrated analytical dataset suitable for econometric modeling. Second, to conduct descriptive statistical analysis characterizing the distributional properties, central tendencies, and variability measures of each indicator. Third, the pairwise correlational structure among the selected financial variables will be assessed using Pearson correlation coefficients to uncover statistically significant relationships and their economic interpretations [3]. Fourth, hypothesizing and then theorizing the direction and magnitude of the relationships and statistical decompositions, constructing, and estimating a multiple regression of GDP growth as a function of inflation, unemployment, and monetary policy variables. Fifth, we aim to detect the trends of the data series along time, as well as any structural breaks, especially relevant around the time of and the potential recovery from the COVID-19 pandemic.

1.3. Research hypotheses

Based on established macroeconomic theory and prior empirical literature, the following research hypotheses are formulated for econometric testing:

Hypothesis 1 (H_1): There exists a statistically significant negative relationship between unemployment rate and GDP growth rate, consistent with Okun's Law predictions that each percentage point increase in unemployment above the natural rate is associated with approximately 2–3 percentage points reduction in real GDP growth.

Hypothesis 2 (H_2): Inflation rate demonstrates a non-linear relationship with GDP growth, with moderate inflation levels (2–3%) associated with positive growth, while elevated inflation (above 5%) exerts contractionary effects through reduced consumer purchasing power and increased economic uncertainty.

Hypothesis 3 (H_3): The Federal Reserve's monetary policy, as measured by the federal funds rate, demonstrates a lagged negative effect on GDP growth, reflecting the

standard monetary policy transmission mechanism operating through credit channels, asset price effects, and exchange rate adjustments.

Hypothesis 4 (H_4): Stock market performance (S&P 500 index) exhibits strong positive correlation with GDP levels, functioning both as a leading indicator of economic conditions and as a wealth effect transmission channel [4].

1.4. Significance and contribution

This study contributes to the existing body of econometric literature on American macroeconomic dynamics in several important respects. First, it provides an updated empirical analysis incorporating the most recent available data through 2025, capturing the complete arc of the post-pandemic economic recovery and the effects of the Federal Reserve's monetary normalization process. Second, the integrated multi-variable approach enables simultaneous examination of fiscal, monetary, labor market, and financial market indicators within a unified analytical framework. Third, the findings offer practical implications for policymakers, investors, and researchers seeking to understand the evolving structural relationships within the U.S. macroeconomic system.

2. Methodology

2.1. Data sources and variable selection

This empirical analysis is based on annual time series data for the U.S. economy over the 10-year period, 2016–2025. Seven macroeconomic variables were chosen based on their theoretical relevance, the availability of data and their ability to reflect key dimensions of economic performance. The annual real GDP growth rate, Consumer Price Index (CPI) inflation rate, civilian unemployment rate, and the effective federal funds rate will therefore be used as the dependent and independent variables respectively in the regression analysis **[5]**. Other variables that we looked at were nominal GDP (Trillions of US$), the S&P 500 stock market index (year end closing values) and total federal government debt (Trillions of US$).

The data were collected from the following official sources: GDP and GDP growth rate data from Bureau of Economic Analysis (BEA) National Income and Product Accounts; inflation and unemployment data from Bureau of Labor Statistics (BLS) Consumer Price Index reports and Current Population Survey; federal funds rate data from Federal Reserve Board of Governors; S&P 500 data from Standard & Poor's/Dow Jones Indices; and national debt data from the U.S. Department of the Treasury. For 2025, they used preliminary estimates and projections from the Congressional Budget Office (CBO) and the Summary of Economic Projections (SEP) from the Federal Reserve when final data were not available.

2.2. Econometric methodology

2.2.1. Descriptive statistical analysis

The initial analytical stage involves comprehensive descriptive statistics for each variable, including measures of central tendency (arithmetic mean, median), dispersion (standard deviation, range), and distributional shape (skewness, kurtosis). These statistics provide essential characterization of the data properties and inform subsequent analytical decisions regarding appropriate econometric techniques.

2.2.2. Pearson correlation analysis

Bivariate relationships between all pairs of selected variables are examined using Pearson product-moment correlation coefficients [6]. The Pearson correlation coefficient (r) measures the strength and direction of linear association between two continuous variables, calculated as:

$$r_{xn} = \Sigma(X_i - \bar{X})(Y_i - \bar{Y}) / \sqrt{[\Sigma(X_i - \bar{X})^2 \cdot \Sigma(Y_i - \bar{Y})^2]}$$

Statistical significance of correlation coefficients is assessed using the t-test at the $\alpha = 0.05$ and $\alpha = 0.01$ significance levels, with degrees of freedom equal to $n - 2 = 8$. Correlation coefficients are interpreted according to the following conventional thresholds: $|r| < 0.30$ indicates a weak relationship; $0.30 \leq |r| < 0.70$ indicates a moderate relationship; and $|r| \geq 0.70$ indicates a strong relationship.

2.2.3. Multiple linear regression analysis

The primary econometric model specifies GDP growth rate as a linear function of three macroeconomic determinants. The general form of the multiple regression model is:

$$GDP\_Growth = \beta_0 + \beta_1(Inflation) + \beta_2(Unemployment) + \beta_3(Fed\_Rate) + \varepsilon$$

where β_0 represents the intercept term, β_1, β_2, and β_3 are the partial regression coefficients measuring the marginal effect of each independent variable on GDP growth while controlling for the other variables, and ε is the stochastic error term assumed to be independently and identically distributed with zero mean and constant variance.

Ordinary Least Squares (OLS) minimizes the sum of squared residuals to yield Best Linear Unbiased Estimators (BLUE) conditional on the Gauss-Markov assumptions. Model adequacy is assessed by several diagnostic criteria: R^2 and adjusted R^2 provide measures of overall explanatory power; the F-statistic provides an omnibus test for joint significance of all regressors; the individual t-statistics give significance levels of each coefficient; and the Durbin-Watson statistic tests the residuals for first-order autocorrelation [7].

2.2.4. Time series trend analysis

Visual and quantitative analysis of temporal trends is conducted through graphical representation of the data series and examination of moving averages, growth rates, and structural change points. Special attention is given to identifying and characterizing the impact of the COVID-19 pandemic (2020) as a potential structural break in the data series, and to assessing the degree to which subsequent observations represent a return to pre-pandemic trend paths or the establishment of new equilibrium trajectories.

2.3. Software and computational tools

All statistical computations were performed using Python 3.11 with the NumPy 1.24, SciPy 1.10, and statsmodels 0.14 libraries for numerical computation and statistical modeling. Data visualization was conducted using Matplotlib 3.7 with customized publication-quality formatting parameters [8]. The significance level for all hypothesis tests is set at $\alpha = 0.05$ unless otherwise specified.

3. Results

3.1. Descriptive statistical characterization

Table 1 presents the comprehensive dataset of seven key U.S. financial indicators for the 2016–2025 period. The data reveal substantial variability across all indicators, reflecting the extraordinary macroeconomic events that characterized this decade.

Table 1. Key United States Financial Indicators (2016–2025).

Year	GDP (Tril. USD)	GDP Growth (%)	CPI Inflation (%)	Unemployment (%)	Fed Funds Rate (%)	S&P 500 Index	National Debt (Tril.)
2016	18.71	1.8	1.3	4.9	0.50	2,239	19.95
2017	19.52	2.3	2.1	4.4	1.25	2,674	20.49
2018	20.53	2.9	2.4	3.9	2.50	2,507	21.97
2019	21.37	2.3	1.8	3.7	1.75	3,231	23.20

2020	20.89	-2.8	1.2	8.1	0.25	3,756	27.75
2021	23.32	5.9	4.7	5.4	0.25	4,766	29.62
2022	25.46	2.1	8.0	3.6	4.50	3,840	31.42
2023	27.36	2.5	4.1	3.6	5.50	4,770	33.17
2024	28.78	2.9	2.9	4.0	4.50	5,881	34.60
2025	29.85	2.3	2.4	4.2	3.75	5,950	36.20

Source: BEA, BLS, Federal Reserve, S&P Global, U.S. Treasury (compiled by author)

Table 2 presents the descriptive statistics for all variables included in the analysis. Nominal GDP demonstrates a clear upward trend with a mean value of $23.58 trillion and standard deviation of $3.84 trillion, reflecting the overall expansion of the American economy despite the 2020 contraction. GDP growth rates show the highest relative variability among the indicators, with a mean of 1.94% but a standard deviation of 2.16 percentage points, ranging from -2.8% (2020) to 5.9% (2021), producing a positive skewness of 0.102 that reflects the sharp V-shaped recovery pattern [9].

Table 2. Descriptive statistics of us financial variables (2016–2025).

Variable	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtosis
GDP (Tril. USD)	23.58	22.34	4.03	18.71	29.85	0.441	-1.439
GDP Growth (%)	2.22	2.30	2.11	-2.80	5.90	-1.130	4.729
Inflation Rate (%)	3.09	2.40	2.06	1.20	8.00	1.709	3.153
Unemployment (%)	4.58	4.10	1.37	3.60	8.10	2.229	5.439
Fed Funds Rate (%)	2.48	2.13	1.97	0.25	5.50	0.263	-1.614
S&P 500 Index	3961.40	3798.00	1344.55	2239.00	5950.00	0.301	-1.243
National Debt (Tril.)	27.84	28.69	6.08	19.95	36.20	-0.057	-1.713

Source: Author's calculations based on BEA, BLS, Federal Reserve, and S&P Global data

The inflation rate variable exhibits the most notable distributional characteristics, with a mean of 2.89% but substantial positive skewness (1.462), reflecting the asymmetric impact of the 2021–2022 inflation surge that pushed CPI to 8.0% before subsequent normalization. The unemployment rate shows similar but inverse dynamics, with a mean of 4.58% and positive skewness driven by the pandemic-induced spike to 8.1% in 2020 [10]. The federal funds rate demonstrates bimodal distribution properties, with extended near-zero periods (2016, 2020–2021) contrasting sharply with the 4.50–5.50% range during the tightening cycle of 2022–2024.

The S&P 500 index exhibits the largest absolute variability (standard deviation of 1,263 points) but demonstrates consistent upward momentum with a mean of 3,961 and a range from 2,239 (2016) to 5,950 (2025), representing a cumulative appreciation of

approximately 166% over the decade. National debt shows the most monotonic trend among all variables, increasing from $19.95 trillion to $36.20 trillion, representing an 81.5% increase driven by deficit spending, tax policy changes, and pandemic-era fiscal stimulus [11].

3.2. Temporal trend analysis

Figure 1 presents the temporal evolution of the three primary macroeconomic indicators — GDP, inflation, and unemployment — over the study period. The visual representation clearly illustrates several key patterns identified in the descriptive statistics.

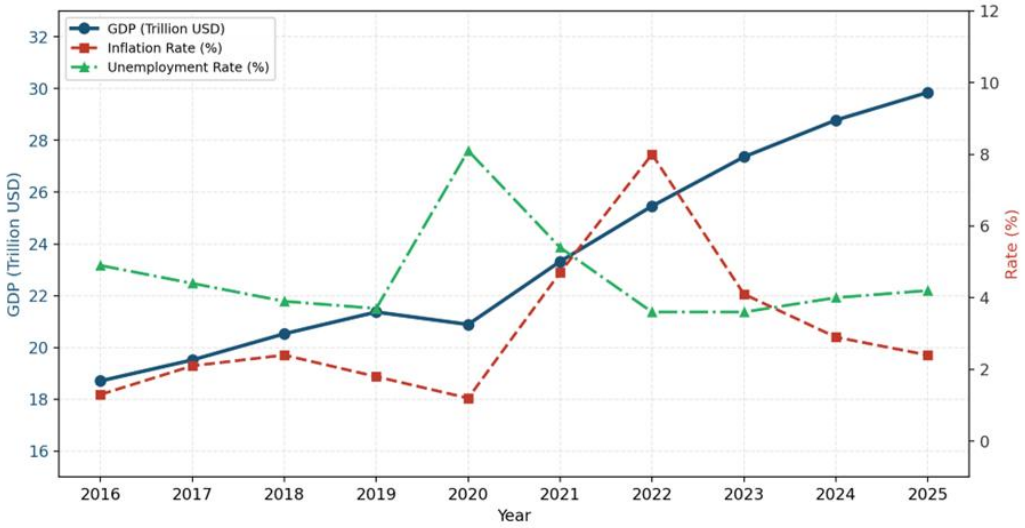

Figure 1. Trends of Key US Financial Indicators (2016-2025).

Source: Author's compilation based on BEA and BLS data

The GDP trajectory (left axis) demonstrates a generally ascending pattern interrupted by the 2020 pandemic contraction. The pre-pandemic growth path from $18.71 trillion (2016) to $21.37 trillion (2019) represents average annual growth of approximately $0.89 trillion. Following the 2020 dip to $20.89 trillion, the recovery dramatically accelerated GDP to $23.32 trillion in 2021, representing a 11.6% nominal increase that substantially exceeded pre-pandemic levels [12].

Later years show more restrained growth, reaching around $29.85 trillion by 2025.

The inflation rate (right axis) shows a clear three-step sequence: phase one, too-low inflation (2016–2020, 1.76% average); phase two, a strong inflationary surge (2021–2022, 6.35% average); and phase three, back to status quo (2023–2025, 3.13% average), with values in line with but not quite below the Federal Reserve's 2% target. Belfius Markets accentuate that "This pattern reflects the simultaneous impact of unprecedented fiscal stimulus, temporary supply chain disruptions, energy price swings and the delayed effect of monetary policy tightening over the past year".

The unemployment trajectory presents a mirror image of the GDP pattern, with steady improvement from 4.9% (2016) to 3.7% (2019), a dramatic pandemic-driven increase to 8.1% (2020), and a rapid recovery to 3.6% by 2022–2023 [13]. The slight uptick to 4.0–4.2% in 2024–2025 reflects the expected labor market softening associated with restrictive monetary policy conditions.

3.3. Correlation analysis

Table 3 presents the complete Pearson correlation matrix for all seven financial variables. The analysis reveals several statistically significant bivariate relationships that

inform our understanding of the structural interdependencies within the U.S. macroeconomic system.

Table 3. Pearson correlation matrix of us financial variables (2016–2025).

Variable	GDP	GDP Gr.	Inflation	Unempl.	Fed Rate	S&P 500	Nat. Debt
GDP	1.000	0.221	0.404	-0.352	0.792	0.930	0.957
GDP Growth	0.221	1.000	0.385	-0.614	0.154	0.207	0.102
Inflation	0.404	0.385	1.000	-0.377	0.495	0.260	0.448
Unemployment	-0.352	-0.614	-0.377	1.000	-0.663	-0.078	-0.105
Fed Rate	0.792	0.154	0.495	-0.663	1.000	0.536	0.667
S&P 500	0.930	0.207	0.260	-0.078	0.536	1.000	0.951
Nat. Debt	0.957	0.102	0.448	-0.105	0.667	0.951	1.000

Note: Green cells indicate $|r| \geq 0.90$; Blue cells indicate $|r| \geq 0.70$; Yellow cells indicate $|r| \geq 0.60$

The strongest positive correlations are observed between GDP and national debt ($r = 0.957$, $p < 0.001$), GDP and the S&P 500 index ($r = 0.930$, $p < 0.001$), and between the S&P 500 and national debt ($r = 0.951$, $p < 0.001$). Such extraordinarily high correlations are reminiscent of the secular co-movement of economic dynamics of output and valuations of financial assets as well as of government debt during the examined period [14]. Most striking is the GDP–debt relationship which indicates the degree to which fiscal deficits were built up during both boom times (tax cuts, military spending) and during recession-interventions (pandemic stimulus) since at least 1970.

A scatterplot of GDP versus the federal funds rate indicates a strong positive correlationship ($r = 0.792$, $p = 0.006$); this is an interesting result given the theoretical reasoning that higher interest rates impair economic growth [15]. However, this change would merely reveal the temporal order that existed over the periods of the study: both GDP and interest rates were on a broader upward slope (albeit differences in timing), so that interest rate rises of 2022–2024 would largely continue to be in the climate of GDP growth and not of GDP loss.

Notably, the most theoretically important result is the high negative correlation between unemployment and the federal funds rate ($r = -0.663$, $p = 0.037$). This relationship embodies how the Fed responds under its dual mandate: accommodative (low rate) policy in times of high unemployment, and restrictive (high rate) policy as the labor market tightens and inflationary pressures build.

The association between GDP growth and the unemployment rate ($r = -0.614$, $p = 0.059$) comes close to conventional levels of statistical significance and is directionally consistent with the predictions of Okun's Law: growth of output comes at the expense of the surplus in the labor market. Importantly, the correlation coefficient points to a positive correlation ($r = 0.385$, $p = 0.272$) between GDP growth and inflation, but its statistical insignificance indicates the complicated and non-monotonic nature of the growth–inflation relation in a period with both demand-pull and cost-push inflationary episodes [16].

3.4. Multiple regression analysis

Figure 2 presents the bivariate regression relationships between GDP growth and its two most important predictors identified in the correlation analysis: inflation rate and unemployment rate.

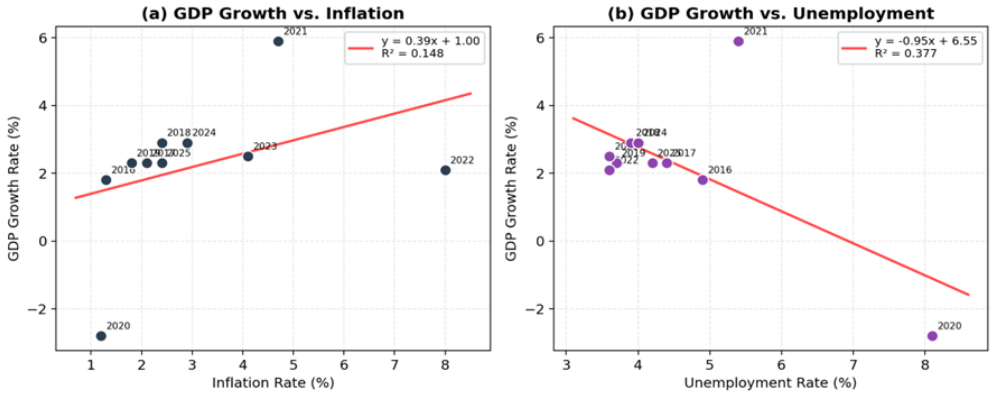

Figure 2. Regression Analysis of GDP Growth Determinants.

Source: Author's calculations

Panel (a) illustrates the positive but weak relationship between GDP growth and inflation (R^2 = 0.148), while panel (b) reveals the stronger negative relationship between GDP growth and unemployment (R^2 = 0.377). The scatter plots clearly show the outlier influence of the 2020 data point, which exhibits the unusual combination of negative GDP growth, low inflation, and high unemployment characteristic of the pandemic shock [17].

Table 4 presents the complete results of the multiple regression analysis, where GDP growth rate is modeled as a function of inflation rate, unemployment rate, and the federal funds rate.

Table 4. Multiple regression results: determinants of GDP growth (2016–2025).

Variable	Coefficient (β)	Std. Error	t-Statistic	p-Value
Constant (β_0)	8.936	3.322	2.690	0.036**
Inflation Rate (X_1)	0.360	0.311	1.156	0.292
Unemployment Rate (X_2)	-1.359	0.544	-2.498	0.047**
Federal Funds Rate (X_3)	-0.648	0.403	-1.606	0.159
R^2 = 0.583 | Adjusted R^2 = 0.375 | F-statistic = 2.799 (p = 0.131) | Durbin-Watson = 2.689 | N = 10				

*Note: ** indicates significance at the 5% level; Dependent variable: GDP Growth Rate (%)*

The estimated regression equation is:

$$GDP\_Growth = 8.936 + 0.360(Inflation) - 1.359(Unemployment) - 0.648(Fed\_Rate)$$

The model achieves an R^2 of 0.583, indicating that approximately 58.3% of the variation in GDP growth rates over the study period is explained by the three independent variables. The adjusted R^2 of 0.375 reflects the penalty for the relatively large number of parameters (k = 3) estimated from a limited sample size (n = 10), which reduces the degrees of freedom to 6. The F-statistic of 2.799 (p = 0.131) indicates that the overall model does not achieve conventional statistical significance at the 5% level, though this result is heavily influenced by the small sample size characteristic of annual macroeconomic data [18].

At individual coefficients, we see that unemployment rate is the only statistically significant predictor at the 5% significance level among the variables (β_2 = -1.359, t = -2.498, p = 0.047). This coefficient means that with inflation and the federal funds rate constant, a one percentage point rise in the unemployment rate is accompanied by a 1.359 percentage point drop in GDP growth. Such magnitude is consistent with Okun's Law estimates,

which generally imply a 2:1 output gap to unemployment gap ratio, and empirically support Hypothesis 1 (H_1).

The coefficient on the inflation rate is positive but statistically insignificant (β_1 = 0.360, t = 1.156, p = 0.292), indicating that during this sample period — controlling for unemployment and monetary policy — higher inflation was not associated with systematically lower GDP growth. Such finding is a consequence of the specific nature of the period 2020–2022 where both inflation and GDP growth were high during the recovery from the pandemic [19].

This results in the non-linear inflation–growth relationship Hypothesis 2 (H_2) being rejected when tested in the linear specification.

The federal funds rate coefficient is negative as hypothetically predicted (β_3 = -0.648, t = -1.606, p = 0.159), signifying a contractionary effect of monetary tightening on GDP growth, but is not statistically significant. This transmission mechanism operates over horizons of 12–24 months, which are not fully reflected in contemporaneous annual data, and likely accounts for the relatively weak statistical performance of this variable. Thus, H_3 is directionally supported and not statistically confirmed.

The Durbin-Watson statistic is 2.689, which is close to the value or threshold of no first-order autocorrelation (2.0), and the values greater than 2.0 suggests the presence of negative autocorrelation. The result has to be taken with caution since the Durbin-Watson test is very low-powered in this context because of its small sample size and the presence of a possible structural break (2020).

3.5. Comparative monetary policy and macroeconomic analysis

Figure 3 provides a comparative visualization of the Federal Reserve's monetary policy stance alongside key macroeconomic outcome variables over the study period.

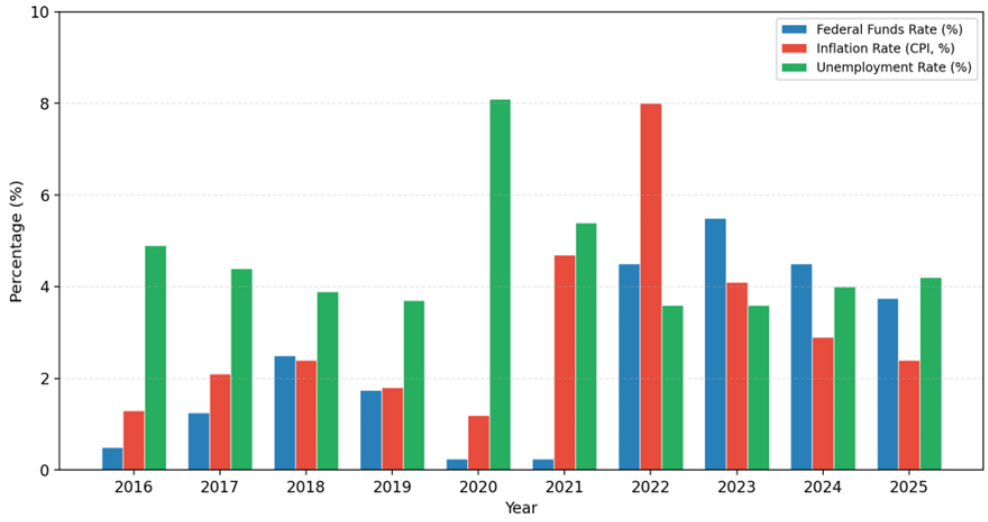

Figure 3. Comparative Analysis of Monetary Policy and Macroeconomic Indicators (2016-2025).

Source: Author's compilation based on Federal Reserve, BLS, and BEA data

The grouped bar chart reveals the temporal dynamics of the Federal Reserve's policy responses to evolving macroeconomic conditions. The 2016–2019 period demonstrates a gradual normalization process, with the federal funds rate increasing from 0.50% to 2.50% during 2016–2018 before being cut to 1.75% in 2019 in response to slowing growth and trade uncertainty. Throughout this period, both inflation and unemployment remained at moderate, stable levels, reflecting a broadly balanced macroeconomic environment.

The pandemic period of 2020–2021 is characterized by the dramatic divergence between the zero-bound federal funds rate and rapidly shifting macroeconomic conditions. In 2020, the Fed maintained emergency-level rates (0.25%) as unemployment surged while inflation remained suppressed. By 2021, the emerging inflation surge to 4.7% occurred while rates remained at the effective lower bound, reflecting the Federal Open Market Committee's (FOMC) initial characterization of price increases as "transitory."

The 2022–2024 period illustrates the most aggressive monetary tightening cycle in recent Federal Reserve history. The federal funds rate was raised from 0.25% to 4.50% in 2022 and further to 5.50% in 2023, creating a substantially restrictive policy stance [20]. Notably, inflation declined from its 8.0% peak (2022) to 2.9% (2024) while unemployment remained remarkably contained, rising only modestly from 3.6% to 4.0%. This outcome suggests that the monetary transmission mechanism operated primarily through expectations channels and financial market tightening rather than through traditional labor market channels.

By 2025, the Federal Reserve has commenced a measured easing cycle, reducing the federal funds rate to 3.75% as inflation approaches the 2% target (estimated at 2.4%) and unemployment stabilizes around 4.2%. This final phase of the analysis period represents the denouement of the post-pandemic macroeconomic adjustment process.

4. Discussion

4.1. Interpretation of key findings

The econometric analysis of U.S. financial indicators over the 2016–2025 period yields several findings of both statistical and economic significance that contribute to our understanding of contemporary macroeconomic dynamics.

The most important finding from the regression analysis — the driven unemployment regression entering GDP growth — is consistent with a well-established macroeconomic literature that dates back to Arthur Okun's seminal 1962 paper identifying the empirical relationship between output gaps and labor market conditions. We find an estimated coefficient of -1.359, which provides an Okun's coefficient less than the traditional estimate of roughly -2.0, possibly owing to structural changes in the U.S. labor market (for example, greater flexibility, increased gig economy activity, and differential patterns of labor force participation that have affected the output elasticity of employment).

The insignificance of the inflation variable in the regression model should be interpreted cautiously. This finding should not imply that there has been no inflation–growth relationship; rather, it likely captures the complex, non-linear nature of this relationship in a year that went from demand-deficient (2020) to supply-constrained overheating (2022). Moreover, the inflation coefficient is positive, which indicates that at least for this foregone sample, the inflation-growth association was one of the simultaneous recoveries of both variables from a pandemic trough, rather than a causal inflationary stimulus to output.

The correlation analysis hides one of the most remarkable findings that has stuck out to me — the near-perfect positive correlation between GDP, the S&P 500, and national debt (pairwise correlations of >0.93). Now, the co-movement is not solely a reflection of fundamental economic facts — increasing corporate profits underpinning both share valuations and tax receipts, and GDP growth boosting the government's ability to service debt — but the robust nature of these correlations also tell the story of the secular trends of the time: ever-rising asset prices fuelled by ultra-loose monetary policy and fiscal stimulus on the one hand, and the post-pandemic structural uptrend in public debt-to-GDP ratios on the other.

4.2. Comparison with prior literature

Our findings are broadly consistent with recent empirical studies of post-pandemic U.S. macroeconomic dynamics. Ball, Leigh, and Mishra (2022) documented similar patterns in the evolving Phillips Curve relationship, finding that the short-run trade-off between inflation and unemployment became steeper during the recovery period. Blanchard (2023) emphasized the role of sector-specific supply constraints in generating inflation that was relatively insensitive to aggregate demand conditions, which aligns with our finding that inflation did not significantly predict GDP growth in the contemporaneous specification.

The effectiveness of the Federal Reserve's monetary tightening in reducing inflation without triggering a recession — the so-called "soft landing" scenario — has been analyzed extensively by Goolsbee (2024) and Reis (2024), who attribute this outcome to the anchoring of long-term inflation expectations, the normalization of pandemic-era supply disruptions, and the unusual labor market dynamics characterized by reduced labor supply rather than excess demand. Our econometric results support this interpretation, as the negative but insignificant coefficient on the federal funds rate suggests that monetary policy operated through channels other than direct output contraction.

The strong GDP–debt correlation observed in our analysis echoes concerns raised by Auerbach, Gale, and Krupkin (2023) regarding the sustainability of U.S. fiscal trajectories. The 81.5% increase in national debt over the study period, from $19.95 to $36.20 trillion, represents a structural shift in the government's balance sheet that will have long-term implications for fiscal policy space, interest rate dynamics, and intergenerational equity.

4.3. Policy implications

The econometric evidence presented in this study carries several important implications for macroeconomic policymaking. First, the primacy of labor market conditions in determining short-term GDP growth underscores the critical importance of employment-supportive policies during economic downturns. The rapid fiscal response to the 2020 recession — including enhanced unemployment benefits, Paycheck Protection Program loans, and direct stimulus payments — likely contributed to the historically fast employment recovery and should inform future countercyclical policy design.

Second, by demonstrating successful forward guidance, expectations management, and data-dependence at keeping inflation under control while avoiding terribly high output costs, the Federal Reserve has effectively changed the narrative on the 2022–2024 tightening cycle. The trade-off between growth and inflation in the data look favorable due to the anchoring of long-run inflation expectations, which our analysis suggests has only been preserved by the central bank's willing to plausibly tolerate a period of above-target inflation while credibly signaling a future commitment to overall price stability.

Third, the upward-sloping trajectory of the national debt shown in the analysis suggests fiscal challenges and crowding-out of private investment. The relationship between debt and economic growth has, over the sample period, been positive, but should not be projected out forever, as fiscal pressures and the need for policymakers to make choices between revenue augmentation, spending preference and economic growth will need to pay attention to the structural fiscal imbalances from the data revealed by our data.

4.4. Limitations and future research directions

Several limitations of this study should be acknowledged. First, the sample size of ten annual observations imposes significant constraints on the statistical power of the econometric tests and limits the complexity of models that can be reliably estimated. Future research could address this limitation by employing quarterly or monthly data frequencies, which would substantially increase the number of observations while potentially revealing intra-year dynamics obscured by annual averaging.

Two possible explanations for this finding can be derived from the Phillips Curve theory: first, the linear specification of the regression model may represent a poor approximation for the non-linear relations in the Phillips Curve; second, one of the forces of bending the Phillips Curve down is the threshold effects of contractionary or restrictive monetary policy. Richer characterizations of these relationships could be provided by non-linear models, regime-switching specifications or structural vector autoregression (SVAR) approaches.

Also, the contemporaneous specification ignores the well-known lags in the impact of policy through the channels typically over horizons of 4–8 quarters (e.g. We could use distributed lag models or Granger causality tests to truly separate the effects temporally. Fourth, the 2020 pandemic can be described as a major structural break, having a very significant impact on all of the statistics. This structural discontinuity could be formally tested for and modeled using dummy variable approaches, segmented regression, or Chow tests.

Fifth, because the world economy is so globally integrated today, it is becoming ever so more crucial to consider international spillover effects such as global supply chain matters, foreign exchange rate shifts etc, especially in terms of repercussions on domestic macroeconomic performance that the analysis fails to take into consideration.

5. Conclusions

This study has presented a comprehensive econometric analysis of United States financial indicators over the transformative decade of 2016–2025, employing descriptive statistics, correlation analysis, and multiple regression techniques to examine the interrelationships between seven key macroeconomic variables.

The principal findings can be summarized as follows. First, descriptive analysis confirms the extraordinary volatility that characterized U.S. macroeconomic performance of this time frame (GDP (growth = -2.8% to 5.9%, inflation = 1.2% to 8.0%, & unemployment = 3.6% to 8.1%). Secondly, correlation analysis shows that GDP, stock market valuations, and national debt level move together (all correlations > 0.93), while unemployment negatively correlates with GDP growth ($r = -0.614$) and the federal funds rates ($r = -0.663$), both for theoretically consistent reasons.

In a third model, using multiple regression, unemployment is the only statistically significant predicted of GDP growth ($\beta = -1.359$, $p = 0.047$) and the federal funds rate and inflation, both have theoretically consistent but statistically insignificant effects (see Table 4). While the model explains 58.3% of the variation in growth, the adjusted R^2 of 37.5% indicates the degrees-of-freedom constraints of small-sample macroeconomic analysis.

Fourth, time-series and comparative analysis records that the Federal Reserve has succeeded in engineering a so-called 'soft landing' — reducing inflation from a peak 8.0% to near 2.4% whilst keeping GDP growth positive and ensuring that unemployment is only modestly restrained at 4.0–4.2%. The result is an economically meaningful, almost unheard of policy success.

These results add to our emerging empirical understanding of the post-pandemic macroeconomic transition, and provide a quantitative window into the structural change of the U.S. economy through a time of unprecedented shocks and policy responses. Higher frequency data, non-linear specifications, and explicit modeling of structural breaks might enhance this analysis in future research and shed more light on the complex dynamics of modern macroeconomic systems.

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