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# Formation of Sectoral Inflation Expectation with the New Keynesian Phillips Curve with Sector Profitability and Marginal Cost.

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## Abstract

This paper measures inflation expectations using the New Keynesian Phillips Curve. It analyzes how sectoral-level marginal cost and profitability bring fluctuations to inflation expectations. Prices rise in cycles that determine profitability. When a sector's price rises, corporations boost output to increase profits and hire more people, raising salaries and prices again. Another strategy is to hike prices and cut output. This research examined how this relationship formed the inflation expectation model. This study used firm-level data from PSX 2000–2023. This study splits inflation into 10 sectors based on the Federal Bureau of Statistics' weights, allocates each sector, and aggregates variables by sector, since each industry has distinct price-increase margins. The findings were obtained using a System GMM estimator. Output gap, unemployment gap, profitability, and marginal cost positively affect inflation expectations due to supply shocks. As supply shocks create stagflation and reduce potential output, demand appears to exceed supply. Inflation expectations are set with a lag and lead as adaptive expectations, and marginal cost, output gap, and return on equity as rational expectations.

**Keywords:** Profitability, Inflation Expectations, Marginal Cost, New Keynesian Phillips Curve, Output Gap, Unemployment, Sectors

**JEL Classification**: E31, E32, E24, D24, L25

# 1. Introduction

The adaptive expectations theory developed the standard framework for expectation modeling (Friedman, 1977; Cagan, 1956). In this framework, forecasts are a weighted average of earlier projections and current data, with the adjustment coefficient indicating the weight given to new information. Although widespread from the 1950s to the 1970s, adaptive expectations were criticized for their inability to adapt to regime transformations (Lucas and Sargent, 1979), which limited their effectiveness in forecasting economic outcomes during periods of substantial change. emphasized that anticipations must swiftly correspond with alterations in policy. As a result, rational expectations supplanted adaptive expectations during the rational expectations revolution.

Rational expectancies theory has traditionally dominated the modeling of macroeconomic anticipations. Recent survey findings consistently challenge its credibility: multiple surveys show anticipated discrepancies (Mankiw et al., 2003; Coibion et al., (2012); Bordalo et al., 2018; Adam et al., 2019; De Silva et al., 2021). This empirical challenge has led to the creation of several alternative models designed to tackle systematic discrepancies from rational expectations, including diagnostic expectations (Bordalo et al., 2018) extrapolative or behavioral models (Gennaioli et al., 2024; Angeletos et al., 2021; Reis, 2020), cognitive discounting, and level-k reasoning (Farhi & Werning, 2019; Gabaix, 2020).

The key adaptive expectations model—formerly significant but largely overtaken by rational expectations in the 1970s—when merged with a noisy-information factor, might clarify four critical empirical outcomes in both numerical and qualitative terms (Liao, 2025). Liao (2025) provided chronological data supporting adaptive expectations about the association between the coefficient and persistence, highlighting divergent outcomes from the established noisy-information rational-expectations paradigm (Coibion et al., 2012). Liao (2025) proposed that the adaptive expectations paradigm need to remain a fundamental resource for progressing the

investigation of macroeconomic expectations. Inflation is an ongoing process, prompting enterprises and individuals to form expectations based on inflation observed in the past year.

The New Keynesian Phillips curve is frequently used to assess and forecast inflation in relation to the output gap and unemployment levels. The Phillips curve has a positive slope in the short term but becomes vertical in the long term. Benigno & Eggertsson (2024) elucidate this recent occurrence by linking it to an overly robust labor market and endorse a non-linear Phillips curve. Bernanke and Blanchard 2024 contend that price fluctuations in relation to profits were the primary catalysts for the inflation surge that commenced in 2021. Acharya et al., (2025) document heightened and persistent inflation anticipations among European households and illustrate how these expectations could trigger extensive inflation. Carrière -Swallow et al., (2023) illustrates that supply chain disturbances show reduced pass-through in countries with inflation targeting or more firmly established inflation expectations.

Numerous researchers, such as Hommes and Zhu (2016); Gelain et al., (2019), along with Hommes et al. (2023), have included bounded rationality and learning into New Keynesian models. Despite the difficulties in ascertaining the slope of the Phillips curve, Hazell et al., (2022) advanced the investigation by employing cross-state variance. Their findings suggested that the Phillips curve's gradient was significantly positive, albeit marginally. Furthermore, they discovered that this flatness did not originate in the 1990s but seems to be an intrinsic characteristic of the data dating back to the 1960s. Research indicates a robust association between inflation expectations and immediate future inflation, implying that individuals may possess exceptional inflation-predicting abilities or that inflation expectations play a crucial role in shaping inflation trends. Chronic inflation arises when the economy faces concurrent supply disruptions across various sectors, irrespective of the temporary nature of the shocks. When agents observe price increases across several sectors, they adjust their perceptions of the factors driving inflation. This adjustment raises anticipated inflation, turning originally temporary disturbances into longer-lasting ones. On the other hand, when agents notice price hikes in only a few industries, they deduce that these increases are not pervasive and hence do not markedly alter their expectations (Beaudry et al., 2024).

The New Keynesian Phillips Curve and adaptive expectations suggest that inflation expectations are determined by variations in the output gap, unemployment rates, and last year's inflation. The

company's profit margin can be used to assess inflation and anticipated inflation. Frequently, companies maintain profit margins despite rising profit shares, owing to labor adjustments and lower per-unit costs through efficient production techniques and labor changes in response to disruptions. Numerous ideas within Structuralist/Kaleckian theory trace their origins to Robinson (1938), who highlighted the importance of capital-labor strife during the hyperinflation in Weimar Germany, and to Kalecki (1971, ch.14), who analyzed the effects of disputes on markup and income distribution. Rowthorn (1977) additionally elucidated and structured the notion. Lerner (1960) appears to articulate a similar phenomenon when he defines "sellers' inflation. After clarifying a process akin to the one previously discussed, he asserts, "[s]ellers' inflation arises when wage earners and profit recipients collectively aim to secure portions surpassing 100 percent of the selling price."

When fixed costs are present, an economic recovery accompanied by increased capacity utilization typically results in a reduction of total unit costs. If firms set their pricing based on a markup over the standard unit cost, the profit margin is expected to increase; hence, the markup over the total unit cost will likewise expand (Lavoie, 2024). The noted increase in profit shares is primarily due to cyclical dynamics. An additional contention, expressed in (Lavoie, 2024) and reiterated by others like Colonna et al., (2025), is that markups and profit margins do not correspond to profit distribution. A prevalent assumption about business pricing strategies, evident in both Structuralist/Kelekian and New-Keynesian frameworks, is that companies set prices based on a constant markup over unit production cost. An increase in unit material expenses (such as imported intermediate goods), relative to unit labor costs, would raise the profit margin, even with a stable markup.

Economists specializing in Industrial Organization (IO) understand market power, pricing strategies, and the assessment of supply, demand, competition, and profitability; yet they seldom address the trade-offs between inflation and unemployment. Corporate earnings increased alongside inflation after the pandemic. Consequently, many economists and policymakers refer to it as "profit-led inflation" or "sellers' inflation," which does not require corporate markups and reinforces these concepts. Despite consistent markups, firms could pass import and other price fluctuations on to actual salaries. Profit-driven inflation highlights the distributional origins and effects of inflation. Nikiforos et al., (2024) used Compustat data to empirically examine markups

in the post-pandemic period, finding that, on average, enterprises either raised or sustained their markups, with considerable variation across sectors and companies. There is an increasing agreement that profits have significantly impacted price surges over the past three years. Nikiforos et al., (2024) Given that profit is a crucial factor influencing inflation, this study incorporates profitability into the New Keynesian Phillips Curve.

Rational expectations are measured with surveys. Rational expectations are measured through forecasting errors, reflecting firms' background, financial knowledge, market knowledge, and personal biases. Inflation is a persistent phenomenon that frequently mirrors the previous year's inflation rate. Therefore, this article uses both adaptive expectations and rational expectations based on the New Keynesian Phillips Curve. This study treats actual future inflation ($\pi_t$) as a proxy for expected inflation ($E_t[\pi_{t+1}]$) Incorporating the production gap, real marginal cost, and firm profitability, you are evaluating an empirical New Keynesian Phillips Curve (NKPC) based on rational expectations and adaptive expectations. economic theory, firms set prices based on what they *expect* inflation to be in the next period ($E_t[\pi_{t+1}]$). Nevertheless, because "expectations" are not directly measurable in historical macroeconomic data, empirical economists substitute predicted inflation with realized inflation plus an unpredictable prediction error, which is covered by marginal cost. Profitability and marginal cost are two variables used to enhance the accuracy of the New Keynesian Phillips curve. Companies preserve profit margins by passing costs through to prices and adjusting actual wages. The Kalman filter measures each sector's output gap using sales, mitigating noise and reflecting rational expectations. Additionally, companies are categorized into ten sectors. To mitigate endogeneity and heterogeneity, the “robust two-step system generalized method of moments (2SYS GMM) estimator” is applied.

## 2. Empirical Literature

As inflation continues, Hilscher et al., (2025) studied the inflation options market and identified strategies to translate prices into probabilities. Even by 2025, the market's expected inflation for 2031-35 was four times higher than before 2021.

According to Chahrour et al., (2025), the media should focus more on inflation. It reveals that rising inflation influences household expectations more than falling inflation. Gennaioli et al., (2024) suggest that rising inflation reminded older households of past inflation, enhancing their

expectations and explaining the series' difference. According to Marques et al. (2023), inflation expectations may predict inflation beyond the initial instant. Household and business surveys in several countries demonstrate that inflation awareness rises with inflation (D'Acunto & Weber, 2025).

Cukierman and Wachtel (1979) and Mankiw et al., (2003) found that high inflation expectations are positively connected with high inflation levels and recent inflation variance. Company-level inflation expectations, driven by rivals' ideas, cause monetary non-neutrality, despite surveys demonstrating firm heterogeneity (Coibion et al., 2018; Afrouzi, 2024 ). Beyond diagnostic expectations, extensive research departs from full-information rational expectations and examines aggregate impacts. Examples include incomplete information, complex systems/animal spirits/heuristics, sticky information, and adaptive learning. Sectoral shocks, aggregation, and heterogeneous propagation may explain business cycle and inflation dynamics ( Dupor, 1999 ; Altissimo et al., 2009; Foerster et al., 2008; Gabaix, 2020; Mayoral, 2012; Bouakez et al., 2014).

Apart from the Phillips curve, Acharya et al., (2025) analyzed the relationship between supply shocks and inflation expectations during the inflation crisis. Coibion and Gorodnichenko (2025) investigated US survey expectations data to determine if inflation expectations were secured amid the inflation rise and the influence of supply shocks. They assert that expectations surrounding inflation have perpetually remained detached, regardless of the prevailing inflation rates. Gagliardone et al., (2026) assert that inflation and unemployment are only loosely correlated in the context of marginal cost. According to Benigno and Eggertsson (2024), the aggregate wage Phillips curve is non-linear in relation to labor market tightness, and they propose a frictional labor market including downwardly inflexible wages together with a pay-setting discontinuity that occurs at a specified threshold. Harding et al. (2023) apply a quasi-kinked demand framework for products to create a non-linear aggregate Phillips curve that accounts for the lack of deflation in the Great Recession and the inflationary acceleration observed in 2022.

According to Boehm & Pandalai-Nayar, (2022), industry-level capacity restrictions may cause a convex Phillips curve and raise business cycle welfare costs. In Juul and Jørgensen (2025) model, supply shocks lead to a convex Phillips curve due to limited substitutability between labor and non-labor inputs; it models a non-linear Phillips curve connection with sectoral supply restrictions modeled via the labor market. As with our model, Karadi et al.,) (2024) examine optimum

monetary policy with a non-linear Phillips curve. Forbes et al., (2021*)* use cross-country panel data to find a non-linear Phillips curve.

To maintain profit margins, corporations may raise prices as expenses rise. Unexpected inflation may reduce corporate revenue (Alcock and Steiner, 2017). Research suggests that higher inflation rates lead to lower salaries and stock returns (Terstena et al., 2023). Credit and leverage modifications in response to economic conditions may enhance corporate profitability (Coibion et al., 2018). When pricing, businesses must consider inflation. In high-inflation environments, firms properly transmit inflation expectations into pricing (Dörrenberg et al., 2023*)*. This shows corporations raising prices to retain profit margins before costs rise. Italian company survey data show that inflation and prior pricing choices affect price decisions (Tagliabracci, 2024). According to French industrial business research, rising carbon costs strongly affected inflation expectations, boosting forecast and real prices (Hensel et al., 2024).

Firms may distribute expenditure differently to maintain profitability. Strong pricing power, particularly in high-demand areas, may enable corporations to overcharge for products. This boosts inflation's cost-push (Acharya et al., 2025; Nikiforos et al., 2024). However, weaker organizations may struggle to transfer increased expenses, reducing profit margins. Corporate profit shares surged compared to inflation after the pandemic, known as "profit-led inflation" or "sellers' inflation" ((Nikiforos et al., 2024; Lavoie, 2024). Some research suggests that profit-driven inflation may not be the major source of inflation. High demand and marginal price are the key culprits, says Conlon, (2026) .

## 3. Theoretical Framework

The importance of expectations in the context of the Phillips curve has been highlighted for an extended period, originating from Friedman (1977) and Phelps (1967). Phillips (1958) originally introduced the Phillips curve as an empirical link between wage inflation and unemployment; however, the micro-founded New Keynesian Phillips curve (NKPC) has since emerged as the predominant interpretation of this relationship. This iteration of the Phillips curve characterizes current inflation as contingent on firms' expectations of future inflation and economic underutilization.

Since Keynes' General Theory [1936] (Keynes,2018), which articulated a rationale for the influence of expectations on macroeconomic variables, the significance of agents' expectations has

been highlighted. These anticipations are crucial in numerous macroeconomic frameworks. Alternative models have likewise underscored the significance of these anticipations. Over the years, economists have persistently included expectations into their frameworks. Previous efforts to conceptualize the mechanism of expectation generation produced several models, including adaptive expectations (which rely on historical experience) and rational expectations (which are congruent with the underlying paradigm). The FIRE (Full Information Rational Expectation) model is currently the primary expectation framework macroeconomists consider most precise.

Muth (1961) was the pioneer in suggesting that expectations align with the relevant economic theory, sometimes referred to as the "model content. Despite the ongoing utilization of adaptive expectations by numerous individuals, Muth's proposition was met with limited enthusiasm. The "revolution" of rational expectations commenced a decade subsequent to the initial occurrence.

Lucas and Sargent (1979) presented a persuasive argument for abandoning Keynesian economic models in favor of equilibrium models. These models feature agents with rational expectations that respond to policy changes in ways that maximize their own benefits. This is implemented to safeguard the analysis from the Lucas critique. Fischer (1977), Gray (1976), and Phelps and Tylor (1977) adopt this anticipated market-clearing methodology.

While many believed the Phillips curve trade-off could be perpetually leveraged, others found it hard to accept. Friedman (1977) and Phelps (1967) both advocated the natural rate hypothesis, which linked a vertical long-run Phillips curve to the natural rate. Their study emphasized the importance of expectations concerning the Phillips curve. Monetary expansion may have little effect if agents remain unperturbed. Solow (1956) and Gordon (1970) aimed to empirically test whether the Phillips curve allowed long-term trade-offs. They presumed they were employing adaptive expectations when calculating Phillips curves that included expectations. Their findings indicate that strategies aimed at maintaining low unemployment result in higher inflation and inflationary expectations; nonetheless, these policies may remain viable even as inflation expectations rise. The long-term trade-off perspective was abandoned only after the stagflation of the 1970s and critiques of the Solow and Gordon tests by Lucas and Sargent (1979) and Sargent (1978), which highlighted the importance of inflation expectations.

The staggered pricing framework with a predetermined timeframe was developed by Taylor, (1980). A specific timeframe was established. In his models, firms select their rates over multiple

periods, commonly known as the contract duration. During each interval, 1/N firms determine their new pricing, which is influenced by the prior and forthcoming pricing choices of other companies for that period. Companies can generate persistence by employing the retrospective element of their pricing selection framework. Calvo (1983) suggested random-duration staggered pricing as a substitute for constant-duration staggered pricing. He assumed that a corporation will invariably have an opportunity to obtain authorization for price changes within a specified timeframe. This leads to contract lengths that are autonomous among firms, hence greatly streamlining the mathematics required in staggered pricing schemes.

The roots of skepticism regarding survey expectations can be traced to publications from 1940 to 1960 that critiqued survey methodologies (Machlup, 1946) and revealed the ineffectiveness of survey data in predicting individual behaviors (Juster & Shay, 1964). Some persons argued that only theories, rather than assumptions, are subject to empirical verification. This perspective was eloquently expressed by Prescott (1977), who stated, "Similar to utility, expectations remain unobservable, and surveys are ineffective for testing the rational expectations hypothesis.

Despite accounting for variables such as race, education, marital status, income, and age, Venkatu (2001) discovered that women generally exhibited higher inflation expectations than men. Souleles (2004) reveals a relationship between consumer demographics and the mistakes in inflation forecasts presented in the MSC report. Emphasize in their research that individuals with decreased financial literacy possess elevated expectations regarding inflation. In a comparable manner, experiences and hence age may influence the development of inflation expectations. Malmendier et al., (2016) have demonstrated that the MSC appears to be the site where experiential learning, or the comprehension of inflation experienced throughout one's life, occurs.

Expanding upon Jonung (1981) conclusions, which revealed that women perceived a greater past inflation rate than men in 1977 due to their larger expenditure on food amidst higher food price inflation relative to general inflation, subsequent studies have shown that a person's consumption basket influences their inflation perception. In 2014, Georganas et al., (2014) executed a study wherein participants received financial incentives, revealing that biases affected consumers' perceptions of inflation rates.

Coibion and Gorodnichenko (2015) discovered that families using gasoline tend to alter their inflation forecasts more significantly in response to fluctuations in oil prices compared to those

that do not engage in such revisions, when consumers develop their inflation expectations, they include their recollections of supermarket costs into their assessments. Moreover, Johannsen (2014) discovers that low-income households have increased variability in their inflation anticipations and heightened divergence in alterations to their living expenses.

According to the findings of Coibion et al., (2012), survey projections of inflation under-respond to various macroeconomic shocks. This finding is in line with theories of information rigidities. These findings are derived from several surveys, including the SPF, the Livingston Survey, the Federal Open Market Committee (FOMC) members' projections, and the MSC. In addition, the inferred degrees of information rigidity are considered economically significant, indicating significant deviations from FIRE.

$$\pi_t = \gamma E_t \pi_{t+1} + \vartheta X_t + shockn_t \quad (1)$$

Inflation rate at time t is denoted by π t, while E t π t+1 represents the mathematical expectation of inflation at time t + 1 based on available information; ϑ is the discount factor, X t is the output gap (a measure of slack in the economy), n is the slope of the Phillips curve, and shock k t is a "-cost-push" factor. ……

This simulation aligns with the expectations-augmented Phillips curve proposed by Friedman (1968) and Phelps (1967). This article employed the Kalman filter to estimate the production gap, including full-information rational expectations, and profitability for each sector, since businesses set their prices based on their profit margins according to Structuralist/Kaleckian theory (Robinson, 1938).

$$\pi_t = \gamma E_t \pi_{t+1} + \tau_t \pi_{t-1} + \vartheta X_t + n_t shock + \mu_t Unemployment\ gap + \rho_t profit \quad (2)$$

### 3.1.Data and sample

This study investigates how profitability, marginal cost, and output gap affect inflation forecasts for 450 non-financial firms listed on the PXS between 2000 and 2023. The Federal Bureau of Statistics weights inflation into sectors, and all enterprises are classified into ten sectors. The study totals each sector.

### 3.2.Estimation Method

For empirical analysis, this study uses a yearly, sector-level panel dataset. The panel data model estimates contain six options. Pooled ordinary least squares (OLS), fixed-effects within-group, fixed-effects least squares (FELS), random-effects model (REM), LSDVC, and panel autoregressive model. Inflation is a persistent dependent variable. Firms and households make projections based on last year's inflation and other accessible data. LSDVC can be used, but not to calculate the inflation lead. The panel VAR uses time-series data spanning 30 years, although inflation is based on preceding rather than long-term data.

The deletion and incorporation of unobserved variability into the error terms of the FELS and REM models are significant challenges. As a result, it may affect our dependent variable. Hansen (1982) shows that the GMM estimator outperforms previous techniques by addressing endogeneity and unknown form nonlinearity. More specifically, GMM estimators are more robust to non-normality in the explanatory variables (Blundell & Bond, 1998). Arellano and Bover (1995) presented the two-step system generalized method of moments (SYS-GMM) estimator, which was later revised by Blundell and Bond (1998), to handle endogeneity, heteroscedasticity, and unknown nonlinearities. Furthermore, our neo-classical investment model is dynamic. Thus, the two-step SYS-GMM is preferable. SYS-GMM addresses endogeneity using lagged values and first differences of variables (Rashid, 2020). Furthermore, the Sargan/Hansen test for over-identification restrictions and the Arellano and Bond (1991) autocorrelation tests eliminate these problems.

The System-GMM model is often used to estimate the New Keynesian Phillips Curve (NKPC), which regards expectations and lagged inflation as endogenous (Aisen & Veig., 2008; Baharumshah et al., 2016; Čaklovica & Efendic, 2020; Jašová et al., 2018; Moessner 2022). The estimator was aimed at large N, small T (large number of persons, small number of periods. System GMM can also encounter instrument proliferation, leading to biased conclusions when T exceeds N (countries). Huge time-series and instrument constraints have led several key publications to modify System GMM to smaller groups of countries. They seek to examine the relationship between inflation and output growth using GMM. To avoid an explosion in instrument counts in a small sample, they use the Stata collapse method from the xtabond2

package. Then $T$ approaches or exceeds $N$, standard practice requires collapsing the instrument matrix (using options like collapse in Stata's xtabond2 by (Roodman, 2009) or restricting lag lengths to ensure $g < N$). Soto (2009) used the System GMM estimation with a small sample to check the stability of System GMM. Bajwa et al., (2025) used the System GMM for 10 countries and 18 years of data with a collapse term.

The Kalman filter is used to determine the output gap. The Kalman filter is a recursive method for estimating latent elements in state-space models with random observations. It also handles missing observations, making it resilient to partial data. The filter effectively reduces "noise" by differentiating between valid signals (latent factors) and random components. Additionally, it enables dynamic updates and refinements of factor estimates as new data becomes available. It has two primary steps.

Prediction: Based on the previous estimate $\hat{H}_{t-1|t-1}$ and its covariance $P_{t-1|t-1}$.

Prediction of factor dynamics: $\hat{H}_{t-1|t-1} = A\hat{H}_{t-1|t-1}$

Prediction of covariance: $P_{t-1|t-1} = AP_{t-1|t-1}\hat{A} + W$, This step creates estimates of factors ahead of time

In the state-space representation, we use a Kalman filter and smoother to optimally recover the latent state of real activity. The Kalman filter, which uses the unconditional mean and covariance matrix of the state vector, as is typical in classical estimation. To learn more about expert viewpoints, refer to papers by Aruoba et al., (2013)), Bańbura et al. (2024), Baumeister et al., (2024), Camacho & Pérez-Quirós (2010), and Mariano & Murasawa, (2003)

**Table 1:** Calculation and Sign of Variables

| S.No | Variables | Calculation of Variables | Signs and theories | Reference |
|---|---|---|---|---|
| **01** | Lead inflation | Calculated from the equation | Positive<br><br>Theories (Money Supply (M2), Commodity Prices, Wage Growth (ECI), The Yield Curve | Bernanke, 2015, , Marques et al. 2023; Gennaioli et al. 2024; Hilscher, Raviv and Reis, 2026; Chahrour et al., 2025; |
| **02** | Lag inflation | Calculated from the equation | Positive<br>(Past Inflation is High, Expectations Adjust, Firms React, Inflation Realizes) | Friedman (1977), Lucas and Sargent (1979), Calvo (1983), Gali & Gertler (1999), Bernanke and Mishkin (2007), Gennaioli (2024) , Hilscher, Raviv and Reis (2026) |
| **03** | Output gap | Potential sales- actual sales calculated by the Kalman Filter | Positive/ Boom, Overheating, Strain<br><br>Negative: recession, Slack, Underutilization, High Unemployment | Blanchard, (2016), Friedman, (1977), Fisher, I. (1933), Benigno and Eggertsson (2024) Harding et al. (2023) |
| **04** | Marginal Cost | $\frac{\Delta Cost\ of\ goods\ and\ services}{\Delta Sales}$ | Positive due to the higher cost of raw materials; if firms expect to increase prices in the future, they would increase labor demand, which could further increase prices. | Woodford, (2003), Clarida et al., (1999), Bernanke and Mishkin, (2007). Coibion and Gorodnichenko (2025) |
| **05** | Profitability | Return on Equity | Positive: Firms expect a positive increase in costs and raise prices to protect their profit margins, shifting further wage increases to prices. (RoE) | Kalecki (1971); Bhaduri & Marglin (1990);Acharya et al., 2025; Nikiforos et al., (2026). |
| **06** | Unemployment Gap | Potential unemployment -actual unemployment by the Hp filter | Positive stagflation: supply shock (e.g., oil price spike), De-Anchored Inflation Expectations ($u_1$-$u_0$) | Friedman (1977); Phelps (1967);Clarida et al.,(1999); Benigno and Eggertsson (2024); Harding et al. (2023) |

# 4. Data Collection

The article has taken data from 461 firms from the SBP Non-financial yearly data. The firms are classified into sectors according to the weights in the Federal Bureau of Statistics Handbook. Some sectors did not match the FBS sector classification; therefore, their weights were merged into the Miscellaneous sector. This article used the Kalman filter for each sector to calculate each sector's output gap, as it reduces noise and incorporates previous estimation errors and shocks in the trend line, aligning with rational expectations theory.

**Table 2**

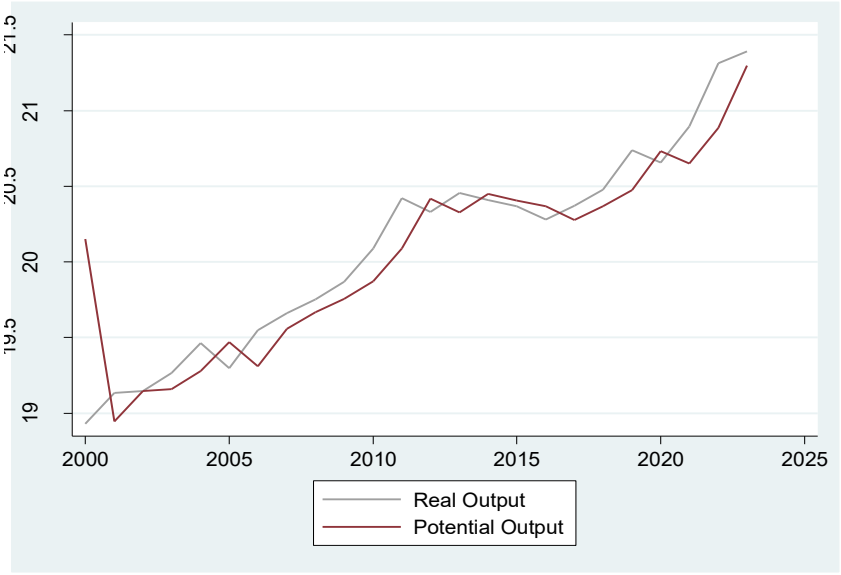
| S. NO | Group | Weight | Number of Firms |
|---|---|---|---|
| **1** | Food and Non-alcoholic Beverages | 34.6 | 69 |
| **2** | Alcoholic Beverages and Tobacco | 1.0 | 4 |
| **3** | Clothing and Footwear | 8.6 | 185 |
| **4** | Housing, Water, Electricity, Gas and Other Fuel | 23.6 | 62 |
| **5** | Furnishing and Household Equipment Maintenance | 4.1 | 36 |
| **6** | Health | 2.8 | 15 |
| **7** | Transport | 5.9 | 28 |
| **8** | Communication | 2.2 | 20 |
| **9** | Education | 3.8 | 11 |
| **10** | Miscellaneous | 14 | 31 |

When broken down by sector, the output gap is the difference between current performance (measured by sectoral sales or real revenues) and sustainable, long-term production capability. Since a sector's capacity potential is unknown, the Kalman filter is an adaptive learning engine that removes short-term demand shocks, such as price pressure, and industry signals, such as capacity utilization, from the structural growth trend in sales data. The filter predicts sector sales based on past trends and baseline growth, then updates the forecast as new sales statistics arrive.

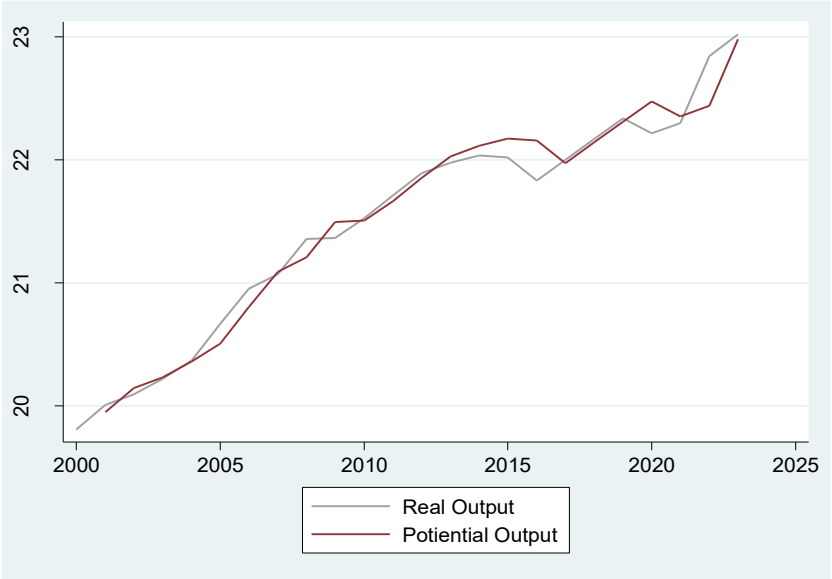
When retail sales rise due to a seasonal uptick or a brief shock, the filter detects a positive sectoral output gap (the industry is running above its sustainable sales volume, which can raise costs and sectoral prices). When sales drop below capacity, the filter shows a negative sectoral output gap, suggesting underutilized capital and idle resources. Instead of using aggregate GDP, the multi-variable Kalman filter may utilize sales data for manufacturing, services, and trade to identify sectors causing economy-wide demand pressures.

## Output Gap of Ten Sectors with Kalman Filter

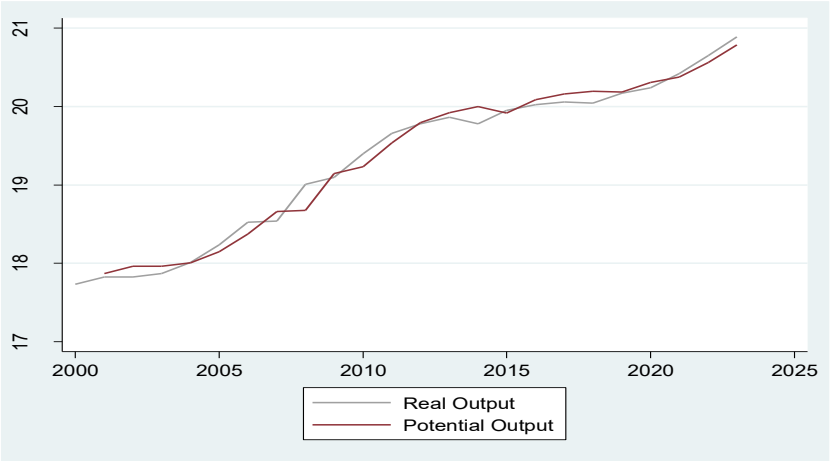
**Housing, water, electricity, gas, and other fuel**



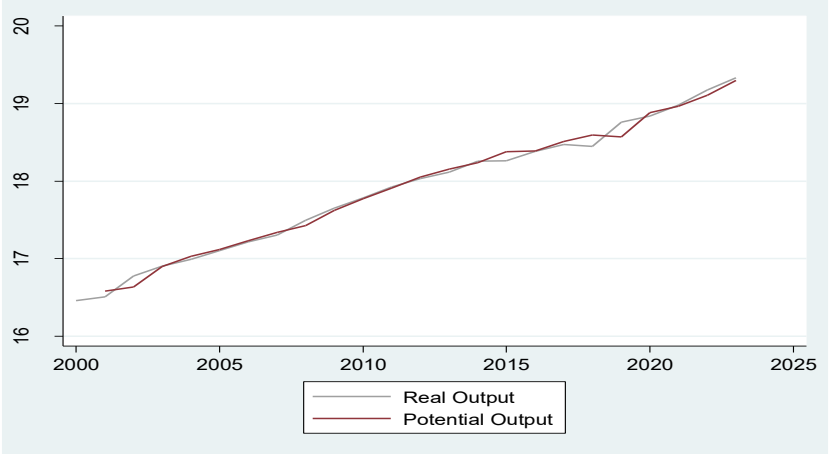

**Clothing and footwear**



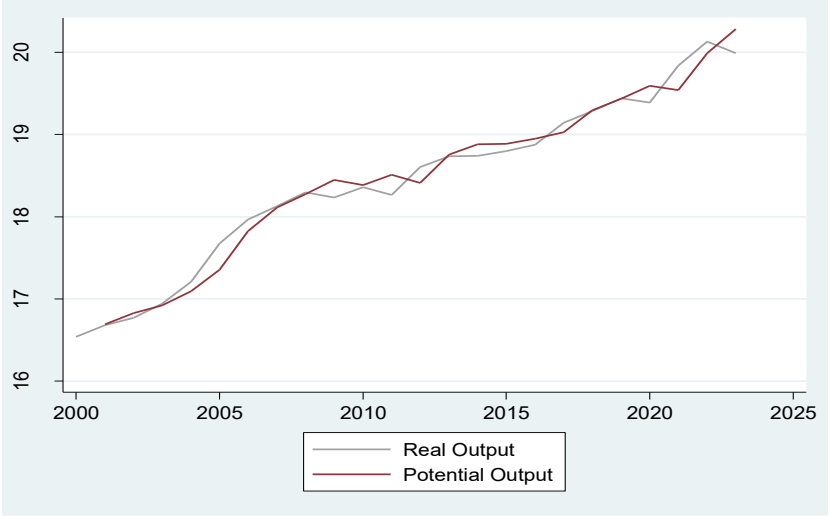
**Food and Non-alcoholic Beverages**



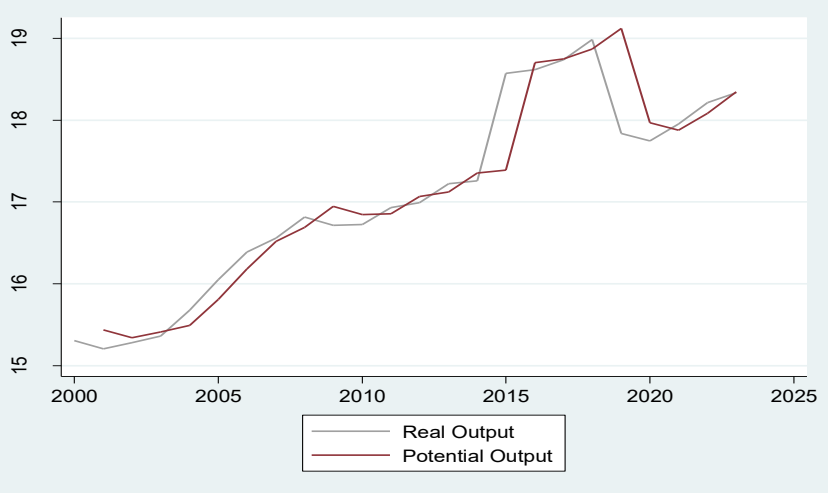

**Health**



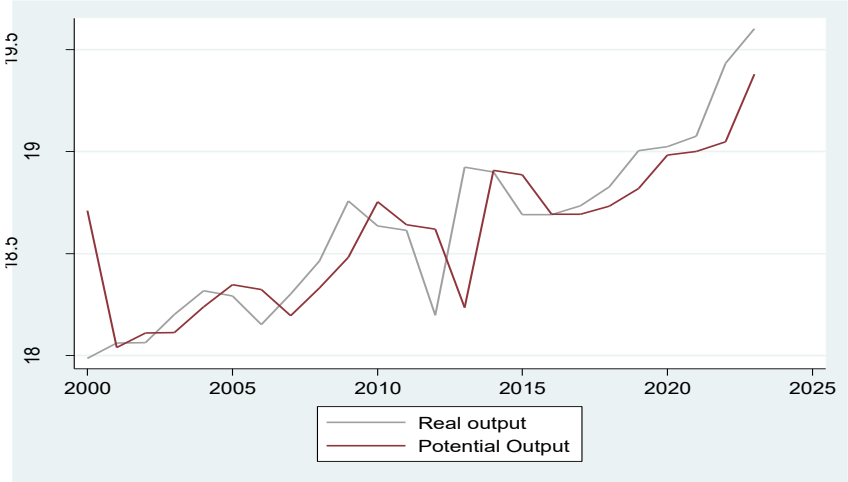

**Furnishing & Household Equipment Maintenance**



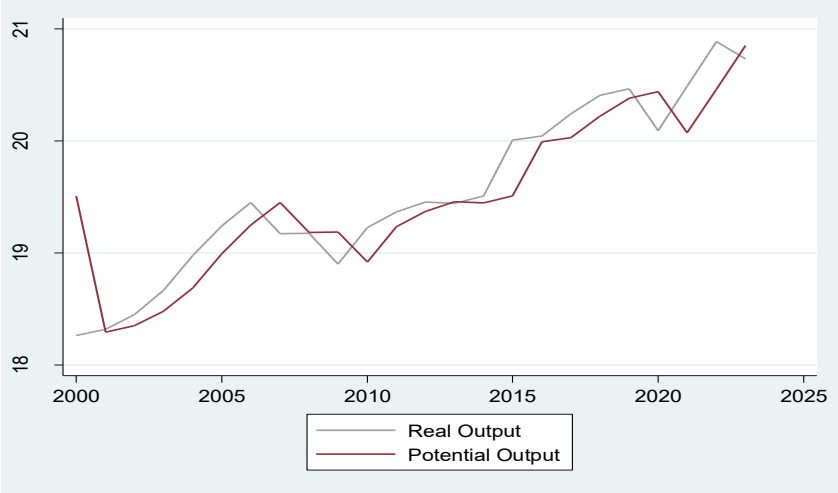
**Technology & Communication**



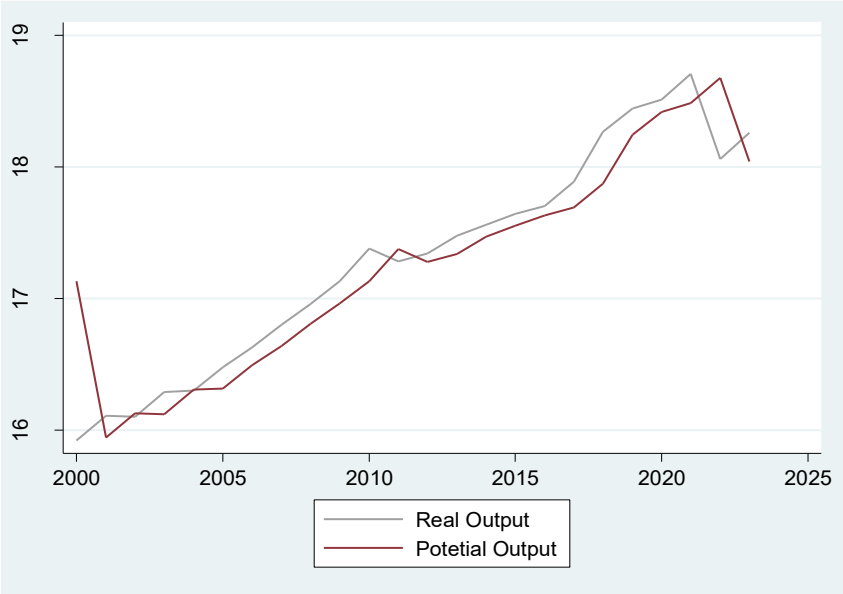

**Transport**



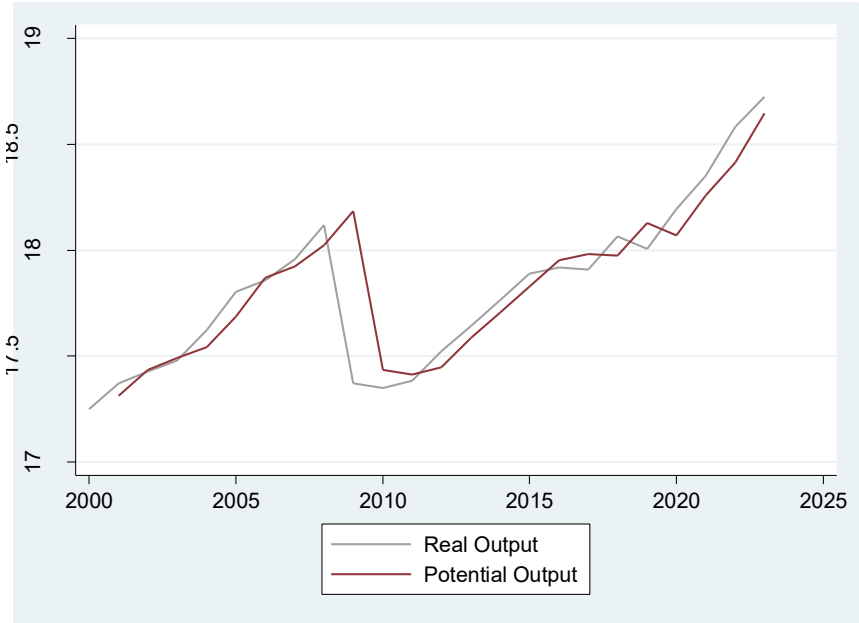

**Miscellaneous**



**Education**




**Alcoholic beverage and Tobacco**




The illustrations describe the disparities that exist between the potential production and the actual output of several industries. Since the Kalman Filter is used to estimate the output gap, the projected output trend shifts in accordance with the actual output. When compared to the HP filter, this approach produces more accurate results according to the output gap. Generally speaking, every industry is exhibiting a tendency towards progress. There are certain industries that are seeing stable and growing trends in their potential production, while other industries are

experiencing minor bumps in their trend. Furniture and household equipment maintenance, as well as food and non-alcoholic beverages, and the health sector are exhibiting a consistent upward trend in potential output. On the other hand, all other industries are exhibiting major dips and rises, except for education, which is exhibiting a declining trend.

# 5. Descriptive Statistics

## 5.1.Descriptive Statistics

**Table 3:** Descriptive Statistics of Inflation Prediction Model

| Variable | Obs | Mean | Std. Dev. | Min | Max | |
|---|---|---|---|---|---|---|
| $\pi^{e}_{j,t+1}$ | 240 | 0.938 | 1.357 | 0.025 | 10.646 | |
| $Output\ Gap_{jt}$ | 234 | 0.018 | 0.253 | -1.281 | 1.182 | |
| $u_{t0} - u_t$ | 240 | 1.868 | 0.151 | 1.649 | | 2.14 |
| $ROE_{jt}$ | 240 | 5.461 | 1.349 | 1.780 | 9.68 | |
| $MC_{jt}$ | 229 | 16.33 | 1.955 | 10.93 | 21.832 | |

**Table 4:** Partial correlations of Inflation

| Variables | Partial Corr | Significance level |
|---|---|---|
| $Output\ Gap_{jt}$ | 0.055 | 0.000 |
| $u_{t0} - u_t$ | 0.032 | 0.021 |
| $ROE_{jt}$ | 0.374 | 0.006 |
| $MC_{jt}$ | 0.400 | 0.000 |

Table 3 presents summary statistics for all four aggregate variables. Sectoral Inflation has a mean of 0.938 with an *S.D*. of 1.357. The output gap and the unemployment gap have mean values of 0.018 and 1.868, respectively, but the output gap's *S.D*. is greater than the unemployment gap's. The marginal cost and Return equity have mean values of 5.461 and 16.33, with *S.D*.s of 1.349 and 1.955, respectively. In Table 4, all variables show a positive and significant correlation with sectoral Inflation. Marginal cost shows a stronger correlation with sectoral inflation than the other variables. Second, profitability is strongly related to sectoral inflation.

# 6. Regression Results

Overall, the results show that inflation forms with lead and lag as adaptive expectations, and with marginal cost, output gap, and unemployment as rational expectations. Lead represents the inflation expectation in the table. Its values are 0.48, 0.38, and 0.34, respectively. All these coefficients are significant at the 1% level. These coefficients are adjusted toward sectoral Inflation.

**Table 5:** Impact of marginal cost and profitability on sectoral Inflation

| **Variables** | | | |
|---|---|---|---|
| | Dependent Variable: Sectoral Inflation | | |
| | Model 1 | Model 2 | Model3 |
| $\pi_{j,t-1}$ | 0.600*** | 0.929*** | 0.925*** |
| | (0.009 ) | (0.035) | (0.183) |
| | [60.20] | [26.52] | [5.03] |
| $\pi^{e}_{j,t+1}$ | 0.479*** | 0.379*** | 0.339 *** |
| | (0.004) | (0.014) | (0.067) |
| | [105.08] | [26.43] | [5.01] |
| $Output\ Gap_{jt}$ | 0.177** | 0.290*** | 1.582 *** |
| | (0.075) | (0.089) | (0.023) |
| | [2.34] | [3.24] | [3.02] |
| $u_{t0} - u_t$ | 0.190 *** | 0.474*** | 0.239* |
| | (0.039) | (0.079) | (0.023) |
| | [4.81] | [5.96] | [1.94] |
| $ROE_{jt}$ | | 0.046** | 0.036** |
| | | (0.000) | (0.000) |
| | | [2.30] | [2.45] |
| $(MC)_{jt}$ | | | 0.861** |
| | | | (0 .003) |
| | | | [ 2.56] |
| **Constant** | -0.429*** | -1.132*** | -0.705** |
| | (0.0856) | (0.181) | (0.086) |
| | [-5.02] | [-6.23] | [-2.47] |
| **Diagnostic Test** | | | |
| **J-Statistics** | 7.99 | 9.20 | 2.02 |
| **J:P-value** | 0.157 | 0.163 | 0.980 |
| **AR(2)** | 1.59 | 1.48 | 1.23 |
| **AR(2) P-value** | 0.112 | 0.138 | 0.218 |
| **No of Sectors** | 10 | 10 | 10 |

P-values and J-statistics are calculated using Hansen's (1982) test of over-identifying restrictions. Bracket values are the standard errors and t-statistics for the variables. This study uses

an AR (2) model and the Arellano and Bond (1991) test to test for residual correlations. The model employs one-period lagged and lead values for the initial difference. The ** and***significance thresholds are 5 %and 1%.

The adjustment coefficient decreases with the Inclusion of the Roe and Marginal cost variables. This value shows that Inflation is a persistent phenomenon according to the New Keynesian Phillips Curve; next year's Inflation depends on this year's. Firms always forecast higher Inflation than the previous year; this is known as the upward bias in inflation expectations. (Keynes,2018; Marques et al., 2023; Gennaioli et al., 2024; Hilsher et al., 2026; Chahrour et al., 2025). In recent literature, the theory of upward-biased Inflation holds that even a short-term supply shock can lead to long-term, persistent Inflation in the market due to wage negotiations and adjustments (Beaudry et al., 2026).

The lag describes how today's Inflation depends on the previous year's Inflation. The adjustment values are 0.6, 0.929, and 0.925, and all are significant at the 1% confidence level. This value indicates that most of today's Inflation is driven by the previous year's Inflation. This statistical and behavioral dependency is known as inflation inertia or inflation persistence (Keynes, 1933; Marques et al., 3f). In the Phillips curve, people have adaptive expectations: if last year's Inflation was high, they would expect high Inflation this year as well. (Akinlade, 2025). Supply shocks persist for many years after they occur, affecting inflation predictions and actual Inflation (Cukierman and Wachtel 1979; Mankiw et al., 2003).

Moreover, wage contracts and price setting in the firms are settled over time. Therefore, the previous year's inflation carries over to the current year (Coibion and Gorodnichenko, 2025; Dräger et al., 2025; Ahmed and Kaur, 2026). The output gap shows positive values of 0.177, 0.290, and 1.582, and is significant at the 1 percent level. The output gap is measured using a Kalman filter that estimates and controls noise. A positive output gap means that demand for output exceeds potential output. Output and unemployment are closely linked in the New Keynesian Phillips Curve. According to the results, unemployment and Inflation are positively linked, whereas unemployment should decrease at positive output gaps (Galí & Gertler, 1999; Benigno and Eggertsson, 2024; Harding et al., 2023).

In recent studies, unemployment can rise with a positive output gap due to time lags, policy tightness, supply shocks, and structural short-term unemployment. The supply shock creates the

illusion of demand-pull Inflation: output capacity decreases, but because the economy's sticky, demand remains high. On the other hand, the central bank increases the policy rate, and firms rationalize their employment and freeze hiring. (Orphanides & Porter, 2001; Amjad, 2012; Granados & Parra-Amado, 2024; Engstrom, 2025). In a recent study, Gagliardone et al., (2026) found that when marginal cost is included in the equation, unemployment and Inflation are not significantly related. Moreover, demand is increasing, but industrial sectors are not hiring employees because they are using more efficient production methods rather than labor to increase profitability. Moreover, firms often produce less in monopolistic competition to keep product prices high. The output gap coefficient increases with the Inclusion of marginal cost and profitability; there is evidence of an illusion of demand-pull Inflation or stagflation in the presence of a supply shock.

Marginal cost and profitability are positively and significantly linked to inflation expectations at 5%. Inflation expectations increase by 0.861 with a 1 percent increase in marginal cost. Whenever the marginal cost of the product increases, the firm shifts its costs to product prices. According to the New Keynesian Phillips Curve, inflation expectations are positively related to the marginal cost rather than the output gap. This is because costs are linked to labor costs. Wage increases supply shocks and raises the general price level. Therefore, firms adjust their product prices in response to changes in the price level (Taylor, 1980; Calvo, 1983; Roberts et al., 1995; Galí & Gertler, 1999). Firms cannot change their prices repeatedly due to menu costs and nominal rigidities; therefore, they raise prices after observing the behavior or trend in marginal cost. (Akinlade, 2026; Mihalache, 2020). Supply Shocks, actual Inflation, and tariffs change marginal costs, generating a cycle of upward price fluctuations (Reis, 2026; Dizioli, 2025; Auray et al., 2026).

Inflation expectations increase by 0.046 and 0.036 percentage points for a 1 percent increase in profitability. On the other hand, firms maintain their profit margin. To maintain their projected rate of return on risk capital, which Kaldor recognized must be above the long-term interest rate to promote capital accumulation, corporations would quickly boost salaries (Kaldor, 1959). When labor and employers forecast rising Inflation, a wage-price-profit cycle starts. The Kaldorian and post-Keynesian schools view Inflation as a structural, conflict-driven process linked to the distribution of functional income, market power, and corporate profit margins. The Neo-Kaldorian

and Stock-Flow Consistent (SFC) models explain Inflation by firms chasing above-equilibrium profitability and workers seeking a real wage share (Kemp-Benedict, 2024).

Weber & Wasner (2023) described that during periods of high Inflation, firms in monopolistic and oligopolistic markets use their market power to produce output below capacity and share the cost of the supply shock to increase or protect profit margins. Over time, the capacity of production has increased with the technology; therefore, the per-unit cost has decreased even though the prices of raw materials increase, and even then the firm can increase its profit with the same price with sale more quantity without increasing labor, or can increase its profit margin with an increase in profit (Acharya et al., 2023; Nikiforos et al., 2024; Conlon, 2026; Bernanke and Mishkin, 2007; Coibion & Gorodnichenko, 2025).

The inflation prediction formulation with the New Keynesian Phillips Curve includes two new variables: marginal cost and profitability. Both are positively related to sectoral Inflation. The New Keynesian Phillips curve is used to predict sectoral inflation expectations because Inflation is a persistent and upward-biased phenomenon. Therefore, the NKPC and System-GMM methods are used to predict inflation expectations. Other methods are available, such as survey-based methods and professional forecast methods. Because these surveys do not occur frequently enough, economic shocks and persistence cannot be measured using these methods. Moreover, prices vary across sectors.

# 7. Conclusion

This research used adaptive expectations. Inflation and enterprises were classified into 10 categories based on the weights allocated to products by the Federal Bureau of Statistics. The findings indicate a positive production gap when potential and demand rise over time; nonetheless, the inquiry pertains to whether potential is augmented by the population's demand. There exists a positive correlation between inflation and the output gap, indicating the predominance of demand-pull inflation within the economy. Potential production is contingent upon the economy's demand. Furthermore, supply shocks diminish the capacity of some sectors more severely than others. Conversely, unemployment and inflation have a positive correlation, indicating an economic supply shock. Additionally, manufacturing profitability and efficiency may account for the favorable correlation between unemployment and inflation
This research has several limitations. This research is unable to ascertain the demand elasticity and

pricing power of certain industries due to limited data availability. It is unable to conduct an individual unemployment study for each sector, preventing exploration of whether sectors' unemployment is attributable to profitability or production efficiency. The policy advice suggests that calculating inflation by sector would enhance the stabilization of prices and output via guidance on production techniques and pricing authority.

## References

[1] Acharya, V. V., Crosignani, M., Eisert, T., & Eufinger, C. (2025). *How do supply shocks to inflation generalize? Evidence from the pandemic era in Europe* (Staff Report No. 1164). Federal Reserve Bank of New York. https://doi.org/10.59576/sr.1164

[2] Adam, K., & Weber, H. (2019). *Price trends over the product life cycle and the optimal inflation target* (Discussion Paper No. 32/2019). Deutsche Bundesbank.

[3] Afrouzi, H. (2024). Strategic inattention, inflation dynamics, and the nonneutrality of money. *Journal of Political Economy, 132*(10), 3378–3420. https://doi.org/10.1086/730201

[4] Ahmed, H., & Kaur, R. (2026). Dynamic connectedness among oil prices, exchange rate and consumer inflation: New evidence from India. *IIM Kozhikode Society & Management Review, 15*(2), 224–233. https://doi.org/10.1177/22779752251346247

[5] Aisen, A., & Veiga, F. J. (2008). The political economy of seigniorage. *Journal of Development Economics, 87*(1), 29–50. https://doi.org/10.1016/j.jdeveco.2007.12.006

[6] Akinlade, F. (2025). Inflation dynamics and the New Keynesian Phillips curve in Sub-Saharan Africa. *Journal of Economics and Financial Analysis, 9*(2), 1–15. https://doi.org/10.1991/jefa.v9i2.a78

[7] Alcock, J., & Steiner, E. (2017). Unexpected inflation, capital structure, and real risk-adjusted firm performance. *Abacus, 53*(2), 273–298. https://doi.org/10.1111/abac.12102

[8] Altissimo, F., Mojon, B., & Zaffaroni, P. (2009). Can aggregation explain the persistence of inflation? *Journal of Monetary Economics, 56*(2), 231–241. https://doi.org/10.1016/j.jmoneco.2008.12.013

[9] Amjad, R. (2012). Stagflation, the labor market impact, and the poverty puzzle in Pakistan: A preliminary analysis. *The Lahore Journal of Economics, 17*(Special Edition), 51–71. https://doi.org/10.35536/lje.2012.v17.isp.a3

[10] Angeletos, G.-M., Huo, Z., & Sastry, K. A. (2021). Imperfect macroeconomic expectations: Evidence and theory. *NBER Macroeconomics Annual, 35*(1), 1–86. https://doi.org/10.1086/712313

[11] Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277–297. https://doi.org/10.2307/2297968

[12] Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68*(1), 29–51. https://doi.org/10.1016/0304-4076(94)01642-D

[13] Aruoba, S. B., Cuba-Borda, P., & Schorfheide, F. (2018). Macroeconomic dynamics near the ZLB: A tale of two countries. *The Review of Economic Studies, 85*(1), 87–118. https://doi.org/10.1093/restud/rdx027

[14] Auray, S., Devereux, M. B., Diercks, A. M., Eyquem, A., & Kim, J. (2026). *Tariffs and the term structure of inflation expectations* (NBER Working Paper No. 35076). National Bureau of Economic Research. https://doi.org/10.3386/w35076

[15] Baharumshah, A. Z., Slesman, L., & Wohar, M. E. (2016). Inflation, inflation uncertainty, and economic growth in emerging and developing countries: Panel data evidence. *Economic Systems, 40*(4), 638–657. https://doi.org/10.1016/j.ecosys.2016.02.009

[16] Bajwa, F. A., Fu, J., Bajwa, I. A., Rehman, M., & Abbas, K. (2025). Digital financial inclusion and its dual impact on economic and environmental outcomes in ASEAN countries. *Data Science in Finance and Economics, 5*(1), 53–75. https://doi.org/10.3934/DSFE.2025004

[17] Baumeister, C., Huber, F., & Marcellino, M. (2024). *Risky oil: It's all in the tails* (NBER Working Paper No. 32524). National Bureau of Economic Research. https://doi.org/10.3386/w32524

[18] Beaudry, P., Hou, C., & Portier, F. (2025). The dominant role of expectations and broad-based supply shocks in driving inflation. *NBER Macroeconomics Annual, 39*, 235–276. https://doi.org/10.1086/735268

[19] Benigno, P., & Eggertsson, G. B. (2023). *It's baaack: The surge in inflation in the 2020s and the return of the non-linear Phillips curve* (NBER Working Paper No. 31197). National Bureau of Economic Research. https://doi.org/10.3386/w31197

[20] Bernanke, B. S., & Blanchard, O. (2024). *An analysis of pandemic-era inflation in 11 economies* (Working Paper No. 24-11). Peterson Institute for International Economics. https://www.piie.com/publications/working-papers/2024/analysis-pandemic-era-inflation-11-economies

[21] Bernanke, B. S., & Mishkin, F. S. (1997). Inflation targeting: A new framework for monetary policy? *Journal of Economic Perspectives, 11*(2), 97–116. https://doi.org/10.1257/jep.11.2.97

[22] Bhaduri, A., & Marglin, S. (1990). Unemployment and the real wage: The economic basis for contesting political ideologies. *Cambridge Journal of Economics, 14*(4), 375–393. https://doi.org/10.1093/oxfordjournals.cje.a035141

[23] Blanchard, O. (2016). The Phillips curve: Back to the '60s? *American Economic Review, 106*(5), 31–34. https://doi.org/10.1257/aer.p20161003

[24] Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*(1), 115–143. https://doi.org/10.1016/S0304-4076(98)00009-8

[25] Boehm, C. E., & Pandalai-Nayar, N. (2022). Convex supply curves. *American Economic Review, 112*(12), 3941–3979. https://doi.org/10.1257/aer.20201674

[26] Bordalo, P., Gennaioli, N., Ma, Y., & Shleifer, A. (2020). Overreaction in macroeconomic expectations. *American Economic Review, 110*(9), 2748–2782. https://doi.org/10.1257/aer.20180593

[27] Bouakez, H., Chihi, F., & Normandin, M. (2014). Fiscal policy and external adjustment: New evidence. *Journal of International Money and Finance, 40*, 1–20. https://doi.org/10.1016/j.jimonfin.2013.08.019

[28] Bryan, M. F., & Venkatu, G. (2001). The curiously different inflation perspectives of men and women. *Economic Commentary*. Federal Reserve Bank of Cleveland.

[29] Cagan, P. (1956). The monetary dynamics of hyperinflation. In M. Friedman (Ed.), *Studies in the quantity theory of money* (pp. 25–117). University of Chicago Press.

[30] Čaklovica, L., & Efendic, A. S. (2020). Determinants of inflation in Europe: A dynamic panel analysis. *Financial Internet Quarterly, 16*(3), 51–79. https://doi.org/10.2478/fiqf-2020-0018

[31] Calvo, G. A. (1983). Staggered prices in a utility-maximizing framework. *Journal of Monetary Economics, 12*(3), 383–398. https://doi.org/10.1016/0304-3932(83)90060-0

[32] Carrière-Swallow, Y., Deb, P., Furceri, D., Jiménez, D., & Ostry, J. D. (2023). Shipping costs and inflation. *Journal of International Money and Finance, 130*, 102771. https://doi.org/10.1016/j.jimonfin.2022.102771

[33] Chahrour, R., Shapiro, A. H., & Wilson, D. (2025). *News selection and household inflation expectations* (NBER Working Paper No. 33837). National Bureau of Economic Research. https://doi.org/10.3386/w33837

[34] Clarida, R., Galí, J., & Gertler, M. (1999). The science of monetary policy: A New Keynesian perspective. *Journal of Economic Literature, 37*(4), 1661–1707. https://doi.org/10.1257/jel.37.4.1661

[35] Coibion, O., & Gorodnichenko, Y. (2015). Information rigidity and the expectations formation process: A simple framework and new facts. *American Economic Review, 105*(8), 2644–2678. https://doi.org/10.1257/aer.20110306

[36] Coibion, O., & Gorodnichenko, Y. (2025). *Inflation, expectations and monetary policy: What have we learned and to what end?* (NBER Working Paper No. 33858). National Bureau of Economic Research. https://doi.org/10.3386/w33858

[37] Coibion, O., Gorodnichenko, Y., & Kumar, S. (2018). How do firms form their expectations? New survey evidence. *American Economic Review, 108*(9), 2671–2713. https://doi.org/10.1257/aer.20151299

[38] Coibion, O., Gorodnichenko, Y., & Wieland, J. (2012). The optimal inflation rate in New Keynesian models: Should central banks raise their inflation targets in light of the zero lower bound? *The Review of Economic Studies, 79*(4), 1371–1406. https://doi.org/10.1093/restud/rds013

[39] Colonna, F., Scoccianti, F., & Viviano, E. (2025). *The slowdown of productivity in the euro area and the role of input prices* (Questioni di Economia e Finanza [Occasional Papers] No. 918). Banca d'Italia. https://doi.org/10.32057/0.QEF.2025.918

[40] Conlon, C. (2026). *Did profits cause inflation?* [Working paper].

[41] Cukierman, A., & Wachtel, P. (1979). Differential inflationary expectations and the variability of the rate of inflation: Theory and evidence. *American Economic Review, 69*(4), 595–609.

[42] D'Acunto, F., & Weber, M. (2025). Subjective inflation expectations of households: How they are formed and their role in economic choices. In [Verify handbook editors] (Eds.), *The Routledge handbook of economic expectations in historical perspective* (pp. 124–142). Routledge. https://doi.org/10.4324/9781003379010-8

[43] de Silva, T., & Thesmar, D. (2021). *Noise in expectations: Evidence from analyst forecasts* (NBER Working Paper No. 28963). National Bureau of Economic Research. https://doi.org/10.3386/w28963

[44] Dizioli, A. (2025). *Interest rate sensitivity scenarios to guide monetary policy* (IMF Working Paper No. WP/25/107). International Monetary Fund.

[45] Dräger, L., Gründler, K., & Potrafke, N. (2025). Political shocks and inflation expectations: Evidence from the 2022 Russian invasion of Ukraine. *Journal of International Economics, 153*, 104029. https://doi.org/10.1016/j.jinteco.2024.104029

[46] Dupor, B. (1999). Aggregation and irrelevance in multi-sector models. *Journal of Monetary Economics, 43*(2), 391–409. https://doi.org/10.1016/S0304-3932(98)00057-9

[47] Engstrom, E. (2025). *Soft landing or stagflation? A framework for estimating the probabilities of macro scenarios* (Finance and Economics Discussion Series 2025-047). Board of Governors of the Federal Reserve System. https://doi.org/10.17016/FEDS.2025.047

[48] Farhi, E., & Werning, I. (2019). Monetary policy, bounded rationality, and incomplete markets. *American Economic Review, 109*(11), 3887–3928. https://doi.org/10.1257/aer.20171400

[49] Fischer, S. (1977). Long-term contracts, rational expectations, and the optimal money supply rule. *Journal of Political Economy, 85*(1), 191–205. https://doi.org/10.1086/260551

[50] Foerster, A. T., Sarte, P.-D. G., & Watson, M. W. (2008). *Sectoral vs. aggregate shocks: A structural factor analysis of industrial production* (Working Paper No. 08-7). Federal Reserve Bank of Richmond.

[51] Forbes, K. J., Gagnon, J. E., & Collins, C. G. (2021). *Low inflation bends the Phillips curve around the world: Extended results* (Working Paper No. 21-15). Peterson Institute for International Economics.

[52] Friedman, M. (1977). Nobel lecture: Inflation and unemployment. *Journal of Political Economy, 85*(3), 451–472. https://doi.org/10.1086/260579

[53] Gabaix, X. (2020). A behavioral New Keynesian model. *American Economic Review, 110*(8), 2271–2327. https://doi.org/10.1257/aer.20162005

[54] Gagliardone, L., Gertler, M., Lenzu, S., & Tielens, J. (2026). *Micro and macro cost-price dynamics in normal times and during inflation surges* (Staff Report No. 1195). Federal Reserve Bank of New York. https://doi.org/10.59576/sr.1195

[55] Galí, J., & Gertler, M. (1999). Inflation dynamics: A structural econometric analysis. *Journal of Monetary Economics, 44*(2), 195–222. https://doi.org/10.1016/S0304-3932(99)00023-9

[56] Gelain, P., Iskrev, N., Lansing, K. J., & Mendicino, C. (2019). Inflation dynamics and adaptive expectations in an estimated DSGE model. *Journal of Macroeconomics, 59*, 258–277. https://doi.org/10.1016/j.jmacro.2018.12.002

[57] Gennaioli, N., Leva, M., Schoenle, R., & Shleifer, A. (2024). *How inflation expectations de-anchor: The role of selective memory cues* (NBER Working Paper No. 32633). National Bureau of Economic Research. https://doi.org/10.3386/w32633

[58] Georganas, S., Healy, P. J., & Li, N. (2014). Frequency bias in consumers' perceptions of inflation: An experimental study. *European Economic Review, 67*, 144–158. https://doi.org/10.1016/j.euroecorev.2014.01.014

[59] Gordon, R. J. (1970). The recent acceleration of inflation and its lessons for the future. *Brookings Papers on Economic Activity, 1970*(1), 8–47. https://doi.org/10.2307/2534120

[60] Granados, C., & Parra-Amado, D. (2026). Output gap measurement after COVID for Colombia: Lessons from a permanent-transitory approach. *Latin American Journal of Central Banking, 7*(3), 100183. https://doi.org/10.1016/j.latcb.2025.100183

[61] Gray, J. A. (1976). Wage indexation: A macroeconomic approach. *Journal of Monetary Economics, 2*(2), 221–235. https://doi.org/10.1016/0304-3932(76)90034-9

[62] Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica, 50*(4), 1029–1054. https://doi.org/10.2307/1912775

[63] Harding, M., Lindé, J., & Trabandt, M. (2023). Understanding post-COVID inflation dynamics. *Journal of Monetary Economics, 140*, S101–S118. https://doi.org/10.1016/j.jmoneco.2023.05.012

[64] Hazell, J., Herreño, J., Nakamura, E., & Steinsson, J. (2022). The slope of the Phillips curve: Evidence from U.S. states. *The Quarterly Journal of Economics, 137*(3), 1299–1344. https://doi.org/10.1093/qje/qjac010

[65] Hensel, J., Mangiante, G., & Moretti, L. (2024). Carbon pricing and inflation expectations: Evidence from France. *Journal of Monetary Economics, 147*, 103593. https://doi.org/10.1016/j.jmoneco.2024.103593

[66] Hilscher, J., Raviv, A., & Reis, R. (2026). How likely is an inflation disaster? *The Review of Financial Studies, 39*(3), 744–782. https://doi.org/10.1093/rfs/hhaf058

[67] Hommes, C., & Zhu, M. (2014). Behavioral learning equilibria. *Journal of Economic Theory, 150*, 778–814. https://doi.org/10.1016/j.jet.2013.09.002

[68] Hommes, C., Mavromatis, K., Özden, T., & Zhu, M. (2023). Behavioral learning equilibria in New Keynesian models. *Quantitative Economics, 14*(4), 1401–1445. https://doi.org/10.3982/QE1533

[69] Jašová, M., Moessner, R., & Takáts, E. (2018). *Domestic and global output gaps as inflation drivers: What does the Phillips curve tell?* (BIS Working Paper No. 748). Bank for International Settlements. https://www.bis.org/publ/work748.htm

[70] Johannsen, B. K. (2014). *Inflation experience and inflation expectations: Dispersion and disagreement within demographic groups* (FEDS Working Paper No. 2014-89). Board of Governors of the Federal Reserve System. https://doi.org/10.17016/FEDS.2014.89

[71] Jonung, L. (1981). Perceived and expected rates of inflation in Sweden. *The American Economic Review, 71*(5), 961–968.

[72] Juster, F. T., & Shay, R. P. (1964). *Consumer sensitivity to finance rates: An empirical and analytical investigation* (Occasional Paper No. 88). National Bureau of Economic Research.

[73] Juul, O. A., & Jørgensen, P. L. (2025). Inflation plucking cycles. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.5160251

[74] Kaldor, N. (1959). Economic growth and the problem of inflation. *Economica, 26*(104), 287–298. https://doi.org/10.2307/2551508

[75] Kalecki, M. (1971). *Selected essays on the dynamics of the capitalist economy, 1933–1970*. Cambridge University Press.

[76] Karadi, P., Thaler, D., & Tristani, O. (2024). *The central bank's balance sheet in the long run: A macro perspective* (ECB Discussion Paper No. 25). European Central Bank. https://doi.org/10.2866/609611

[77] Kemp-Benedict, E. (2024). Cost share-induced technological change: An analytical classical-evolutionary model. *Journal of Evolutionary Economics, 34*(3), 515–567. https://doi.org/10.1007/s00191-024-00869-3

[78] Keynes, J. M. (2018). *The general theory of employment, interest, and money*. Palgrave Macmillan. (Original work published 1936). https://doi.org/10.1007/978-3-319-70344-2

[79] Lavoie, M. (2024). Questioning profit inflation as an explanation of the post-pandemic inflation. *European Journal of Economics and Economic Policies: Intervention, 21*(2), 232–247. https://doi.org/10.4337/ejeep.2024.0139

[80] Lerner, A. P. (1960). On generalizing the general theory. *The American Economic Review, 50*(1), 121–143.

[81] Liao, J. (2026). Adaptive expectations and reaction to information. *Economica, 93*(370), 488–523. https://doi.org/10.1111/ecca.70026

[82] Lucas, R. E., Jr., & Sargent, T. J. (1979). After Keynesian macroeconomics. *Federal Reserve Bank of Minneapolis Quarterly Review, 3*(2), 1–16. https://doi.org/10.21034/qr.321

[83] Machlup, F. (1946). Marginal analysis and empirical research. *The American Economic Review, 36*(4), 519–554.

[84] Malmendier, U., Nagel, S., & Yan, Z. (2021). The making of hawks and doves: Inflation experiences on the FOMC. *Journal of Monetary Economics, 117*, 19–42. https://doi.org/10.1016/j.jmoneco.2020.04.002

[85] Mankiw, N. G., Reis, R., & Wolfers, J. (2004). Disagreement about inflation expectations. In M. Gertler & K. Rogoff (Eds.), *NBER Macroeconomics Annual 2003* (18, 209–248). MIT Press. https://doi.org/10.1086/ma.18.3585256

[86] Mariano, R. S., & Murasawa, Y. (2003). A new coincident index of business cycles based on monthly and quarterly series. *Journal of Applied Econometrics, 18*(4), 427–443. https://doi.org/10.1002/jae.695

[87] Marques, L. B., Gelos, G., Hofman, D., Otten, J., Pasricha, G. K., & Strauss, Z. (2023). *Do household expectations help predict inflation?* (IMF Working Paper No. WP/23/224). International Monetary Fund. https://doi.org/10.5089/9798400256424.001

[88] Mayoral, L. (2013). Heterogeneous dynamics, aggregation, and the persistence of economic shocks. *International Economic Review, 54*(4), 1295–1307. https://doi.org/10.1111/iere.12037

[89] Mihalache, G. (2020). Sovereign default resolution through maturity extension. *Journal of International Economics, 125*, 103326. https://doi.org/10.1016/j.jinteco.2020.103326

[90] Moessner, R. (2022). Evidence on climate policy, carbon dioxide emissions and inflation. *International Journal of Global Warming, 28*(2), 136–151. https://doi.org/10.1504/IJGW.2022.126059

[91] Muth, J. F. (1961). Rational expectations and the theory of price movements. *Econometrica, 29*(3), 315–335. https://doi.org/10.2307/1909635

[92] Nikiforos, M., Grothe, S., & Weber, J. D. (2024). Markups, profit shares, and cost-push-profit-led inflation. *Industrial and Corporate Change, 33*(2), 342–362. https://doi.org/10.1093/icc/dtae003

[93] Orphanides, A., & Porter, R. D. (2001). Money and inflation: The role of information regarding the determinants of M2 behavior. In H.-J. Klöckers & C. Willeke (Eds.), *Monetary analysis: Tools and applications* (pp. 77–101). European Central Bank.

[94] Pérez Quirós, G., & Camacho, M. (2009). *Introducing the Euro-STING: Short-term indicator of euro area growth* (CEPR Discussion Paper No. 7343). Centre for Economic Policy Research. https://cepr.org/publications/dp7343

[95] Phelps, E. S. (1967). Phillips curves, expectations of inflation and optimal unemployment over time. *Economica, 34*(135), 254–281. https://doi.org/10.2307/2552025

[96] Phelps, E. S., & Taylor, J. B. (1977). Stabilizing powers of monetary policy under rational expectations. *Journal of Political Economy, 85*(1), 163–190. https://doi.org/10.1086/260550

[97] Phillips, A. W. (1958). The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861–1957. *Economica, 25*(100), 283–299. https://doi.org/10.2307/2550759

[98] Prescott, E. C. (1977). Should control theory be used for economic stabilization? *Carnegie-Rochester Conference Series on Public Policy, 7*, 13–38. https://doi.org/10.1016/0167-2231(77)90017-3

[99] Rashid, A. (2020). Nexus between economic growth, investment, and Islamic banking development: The case of dual banking system. *Journal of Islamic Business and Management, 10*(2), 368–389. https://doi.org/10.26501/jibm/2020.1002-005

[100] Reis, R. (2020). *The people versus the markets: A parsimonious model of inflation expectations* (CEPR Discussion Paper No. 15413). Centre for Economic Policy Research.

[101] Reis, R. (2026). Why did inflation rise and fall in 2021–2024? Channels and evidence from expectations. *Annual Review of Economics, 18*, 473–503. https://doi.org/10.1146/annurev-economics-051624-072332

[102] Robinson, J. (1938). The classification of inventions. *The Review of Economic Studies, 5*(2), 139–142. https://doi.org/10.2307/2967528

[103] Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal, 9*(1), 86–136. https://doi.org/10.1177/1536867X0900900106

[104] Rowthorn, R. E. (1977). Conflict, inflation and money. *Cambridge Journal of Economics, 1*(3), 215–239. https://doi.org/10.1093/oxfordjournals.cje.a035360

[105] Sargent, T. J. (1978). Rational expectations, econometric exogeneity, and consumption. *Journal of Political Economy, 86*(4), 673–700. https://doi.org/10.1086/260702

[106] Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics, 70*(1), 65–94. https://doi.org/10.2307/1884513

[107] Soto, M. (2009). *System GMM estimation with a small sample* (Working Paper No. 395). Barcelona Graduate School of Economics.

[108] Souleles, N. S. (2004). Expectations, heterogeneous forecast errors, and consumption: Micro evidence from the Michigan Consumer Sentiment Surveys. *Journal of Money, Credit and Banking, 36*(1), 39–72. https://doi.org/10.1353/mcb.2004.0008

[109] Tagliabracci, A. (2025). The (ir)rationality of firms' price expectations and the effects on their economic decisions. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.5064016

[110] Taylor, J. B. (1980). Aggregate dynamics and staggered contracts. *Journal of Political Economy, 88*(1), 1–23. https://doi.org/10.1086/260845

[111] Terstena, A., Mehmeti, I., & Krasniqi, S. (2023). Examining the owners and managers' perceptions of the determinants that influence the effectiveness of SMEs: Evidence from Kosovo. *International Journal of Applied Economics, Finance and Accounting, 17*(1), 67–75. https://doi.org/10.33094/ijaefa.v17i1.1036

[112] Weber, I. M., & Wasner, E. (2023). Sellers' inflation, profits and conflict: Why can large firms hike prices in an emergency? *Review of Keynesian Economics, 11*(2), 183–213. https://doi.org/10.4337/roke.2023.02.05

[113] Woodford, M. (2003). Optimal interest-rate smoothing. *The Review of Economic Studies, 70*(4), 861–886. https://doi.org/10.1111/1467-937X.00270