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WAGE GROWTH AND INFLATION DYNAMICS IN ROMANIA: EVIDENCE FROM MONTHLY DATA, 2005–2025

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Abstract

This study examines the short-run relationship between nominal wage growth and inflation in Romania using monthly data for 2005–2025. Official data from the Romanian National Institute of Statistics are used for consumer prices, average net earnings, industrial production, and registered unemployment. After testing the stationarity of the series, a dynamic OLS model is estimated with HAC/Newey–West standard errors. The results show that the contemporaneous relationship between wage growth and inflation is relatively weak, while a clearer positive association emerges with a delay. In particular, changes in wage growth become statistically significant after approximately five to six months, and the wage-growth lags are jointly significant. The main finding remains robust to alternative lag structures and HAC specifications. These results suggest that wage developments contain relevant information for subsequent inflation dynamics, although the estimated relationships should not be interpreted as structural causal effects. For Romania, monitoring the timing and persistence of wage-growth changes, together with productivity and broader economic conditions, may therefore provide useful information for assessing domestic inflationary pressures.

Keywords: Inflation; wage growth; wage–price dynamics; Romania; labor market; monthly data

INTRODUCTION

Following the strong price increases observed after the COVID-19 pandemic, inflation and wage dynamics have returned to the center of macroeconomic debate. Higher inflation can lead workers to demand higher nominal wages in order to recover purchasing power, while faster wage growth can raise firms' labor costs and, under certain conditions, be transmitted into consumer prices. The interaction between wages and prices is particularly important because it may operate in both directions. Recent research increasingly treats the wage–price relationship as dynamic, potentially delayed, and dependent on the broader economic environment rather than as a simple contemporaneous mechanism.

Goretti (2008), studying wage and price setting in new European Union member states, finds evidence of wage pass-through to inflation and emphasizes the interaction between wages, productivity, labor-market conditions, and institutional factors. Moreover, Conti and Nobili (2019) show that the transmission of wage changes to underlying inflation is incomplete and varies with the nature of the structural shock affecting the economy. Their analysis also stresses the two-way nature of the wage–price nexus, since current wages may respond to past inflation while wage shocks may subsequently influence prices.

The Romanian case is especially relevant because wage developments have taken place in an economy characterized by rapid convergence, important changes in minimum wages, substantial labor-market transformations, and several distinct inflationary regimes. Heemskerk et al. (2018), examining the substantial increase in the Romanian minimum wage during 2013–2016, conclude that its impact on inflation was very limited. Dritsaki (2016), using annual data for Romania and Bulgaria together with ARDL and Toda–Yamamoto procedures, also does not identify a direct causal relationship from real wages to inflation in the Romanian case. These differences suggest that the relationship depends importantly on the wage indicator considered, the frequency of the data, the sample period, and the empirical methodology.

The following contributions reinforce the need to consider not only whether wages and prices are related, but also how this relationship develops over time. Recent evidence suggests that the wage–price relationship should be considered from a dynamic perspective. Voinea (2018) emphasizes the relevance of accumulated wage developments for inflation, suggesting that the relationship may not be fully captured by contemporaneous changes. Moreover, Murarășu et al. (2026) examine wage–price pressures in Central and Eastern European economies, including Romania, and show that their intensity may vary across macroeconomic conditions. Their findings also highlight the importance of distinguishing predictive relationships and co-movement from structural causality.

Against this background, the present study examines the short-run relationship between nominal wage growth and inflation in Romania using monthly official data for 2005–2025. The main objective is to determine whether changes in wage growth are systematically associated with subsequent changes in inflation and to identify the time horizon over which this association becomes most visible. By focusing on the monthly lag structure of the wage–inflation relationship, the study complements previous Romanian evidence based on different data frequencies, wage measures, sample periods, and empirical approaches. The analysis therefore provides updated evidence on the timing of wage–inflation dynamics in Romania while avoiding a structural causal interpretation of the estimated relationships.

LITERATURE REVIEW

Research on wages and inflation in Romania has produced rather different results, partly because the studies differ in scope, period and methodology. Using relatively simple empirical approaches, Necșulescu and Șerbănescu (2013) discuss a two-way relationship: inflation may trigger wage adjustments intended to preserve purchasing power, while higher wages may later add to price pressures. A mainly descriptive perspective is taken by Anghel et al. (2018), who examine nominal and real earnings and underline the role of inflation in separating wage increases from actual gains in purchasing power. Much broader is the analysis of Avram et al. (2020) Based on monthly Romanian data for 2000–2018, their VAR includes average net and minimum wages, inflation, productivity, employment and the trade deficit. Their results associate average wage increases with persistent inflationary effects, particularly when wage developments are not matched by productivity gains.

Romania also appears as a particular case in the broader Central and Eastern European evidence. Astrov et al. (2019) find that the conventional Phillips-curve mechanism is relatively weak across several CEE economies. For Romania, the estimated relationship between unemployment and subsequent unit labour cost growth even has the opposite sign to the conventional one. Rapid minimum-wage increases and specific features of the Romanian labour market are offered as possible explanations. This matters for the present analysis because unemployment cannot necessarily be treated as a complete measure of domestic wage pressures.

More recent research places wage developments in the context of the inflation episode that followed the pandemic. Jonckheere and Zimmer (2024) show why wages became increasingly relevant for monetary policy once external inflationary pressures began to ease and domestic cost pressures gained importance. Yet wage growth does not translate mechanically into inflation. Productivity can absorb part of the increase in labour costs, making unit labour costs particularly relevant for understanding the transmission from wages to prices. At the firm

level, operational efficiency and higher productivity can contribute to cost reduction and improved business performance (Militaru, 2009). For Romania, Cirică (2025) documents the substantial increase in the minimum wage during 2020–2025 and points to possible spillovers beyond employees paid exactly at the statutory minimum.

A different methodological direction appears in Aiftincăi (2025), who applies Random Forest, XGBoost and neural networks to Romanian data covering 1991–2024. Inflation and CPI are among the variables used to estimate average net salaries, with Random Forest providing the best predictive performance among the three approaches. Although the dependent variable differs from that used here, the study illustrates the close empirical connection between wage and price developments.

Taken together, previous findings remain mixed and depend strongly on the period, wage measure and empirical method employed. Less attention, however, has been given to the monthly timing of the association between changes in aggregate nominal wage growth and subsequent inflation dynamics in Romania. The present study addresses this narrower issue by examining when, rather than assuming whether, such an association becomes visible in the data.

METHODOLOGY

Research Design

The empirical analysis uses a quantitative longitudinal research design based on monthly data for Romania covering the period January 2005–December 2025. The period was selected because it represents the longest common monthly span available for all four indicators and captures several distinct macroeconomic environments, including the global financial crisis, the COVID-19 pandemic, and the subsequent inflationary episode. All series were obtained from the TEMPO-Online database of the Romanian National Institute of Statistics (INSSE). Four macroeconomic indicators are considered: the Consumer Price Index (CPI), average net earnings, the industrial production index, and the registered unemployment rate. The industrial production series is working-day and seasonally adjusted, while the unemployment variable refers to the registered unemployment rate at the end of each month.

To obtain comparable measures of annual dynamics, CPI inflation is calculated as the percentage change relative to the corresponding month of the previous year, as reported by INSSE. Nominal wage growth is computed from average net earnings as:

$$WG_t = 100 \times [\ln(W_t) - \ln(W_{t-12})], \quad (1)$$

where, W_t denotes average net earnings. Industrial production growth (IPG_t) is calculated in the same way, using the seasonally and working-day adjusted industrial production index. The registered unemployment rate (U_t) is expressed in percentage points.

Before estimating the model, the time-series properties of the variables are examined using the Augmented Dickey–Fuller (ADF) test. The results indicate that inflation, wage growth, and the registered unemployment rate are not stationary in levels at the 5% significance level, whereas industrial production growth is stationary. Consequently, first differences are used for inflation, wage growth, and unemployment. The resulting transformed series are stationary, reducing the risk of spurious regression.

The empirical specification focuses on whether changes in wage growth are associated with subsequent changes in inflation. Given the monthly frequency of the data and the persistence of inflation, the baseline model includes twelve lags of the dependent variable and six lags of changes in wage growth:

$$\Delta\pi_t = \alpha + \sum_{i=1}^{12} \beta_i \, \Delta\pi_{t-i} + \sum_{j=1}^{6} \gamma_j \, \Delta WG_{t-j} + \delta IPG_t + \theta \Delta U_t + \varepsilon_t, \qquad (2)$$

where $\Delta\pi_t$ represents the monthly change in year-on-year CPI inflation, ΔWG_t is the change in year-on-year nominal wage growth, IPG_tdenotes year-on-year industrial production growth, and ΔU_t is the monthly change in the registered unemployment rate. Industrial production is included to account for developments in economic activity, while unemployment captures changes in labor-market conditions.

The model is estimated by ordinary least squares (OLS). Because monthly macroeconomic data may exhibit residual serial correlation, statistical inference is based on heteroskedasticity and autocorrelation consistent (HAC/Newey–West) standard errors, using a maximum lag of 12 months. The individual wage coefficients indicate the timing of the relationship, while their overall relevance is assessed through a joint Wald test of the six wage-growth lags. Therefore, the estimated coefficients are interpreted as dynamic associations rather than structural causal effects.

Post-estimation analysis includes the Ljung–Box and Breusch–Godfrey tests for residual autocorrelation and the Breusch–Pagan and White tests for heteroskedasticity. Robustness is additionally assessed by varying the HAC bandwidth and the number of inflation and wage-growth lags. This allows the stability of the main result to be evaluated without relying on a single dynamic specification.

The starting point of the sample is determined by data availability across the four indicators, with industrial production defining the common beginning of the dataset. Monthly observations were aligned by reference period before the variables were transformed. Since year-on-year growth rates require twelve previous monthly observations, the effective estimation sample becomes shorter after the transformations and the introduction of lagged variables. No interpolation was applied to extend the original series.

RESULTS AND DISCUSSIONS

Table 1 reports the descriptive statistics for the variables used in the analysis. Average year-on-year CPI inflation was 4.87%, compared with average nominal net wage growth of 10.07%. Both series varied considerably over the sample period, while industrial production showed substantially greater volatility. The registered unemployment rate averaged 4.38%, ranging from 2.70% to 8.40%.

Table 1. Descriptive Statistics

Variable	N	Mean	Std. Dev.	Minimum	Median	Maximum
CPI inflation (%, year-on-year)	239	4.870	3.795	-3.460	4.670	16.760
Net wage growth (%, year-on-year)	239	10.068	5.580	-2.578	10.560	26.788
ndustrial production growth (%, year-on-year)	239	2.605	7.792	-48.899	2.842	49.854
Registered unemployment rate (%)	239	4.381	1.318	2.700	4.200	8.400

A first indication of the wage–price relationship is provided by the correlation matrix in Table 2. The contemporaneous correlation between inflation and wage growth is positive but weak (0.162). Inflation is negatively correlated with registered unemployment (-0.257), whereas its correlation with industrial production growth is close to zero. Thus, the descriptive evidence does not point to a strong immediate relationship between wage and price developments. This is consistent with the idea that adjustments may require time to pass through firms' costs, pricing decisions, and ultimately consumer prices.

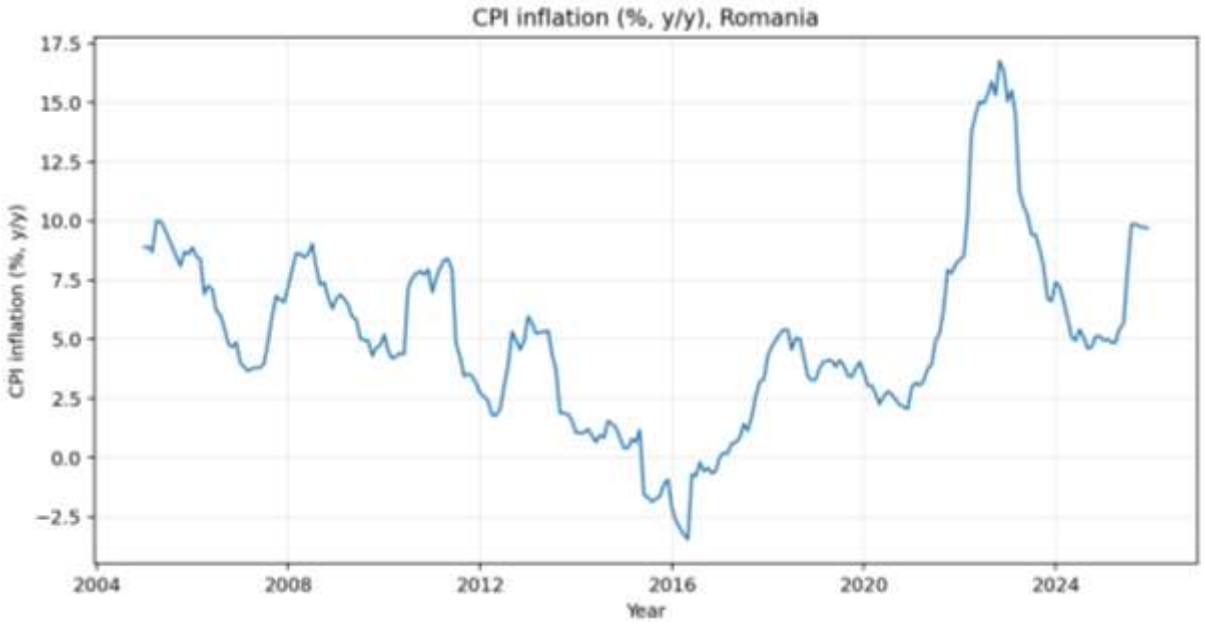
Table 2. Correlation Matrix

Variable	CPI inflation	Net wage growth	Industrial production growth	Registered unemployment rate
CPI inflation	1.000	0.162	0.031	-0.257
Net wage growth	0.162	1.000	0.094	-0.285
Industrial production growth	0.031	0.094	1.000	-0.062
Registered unemployment rate	-0.257	-0.285	-0.062	1.000

Figure 1 illustrates the evolution of year-on-year CPI inflation over the sample period. Inflation shows substantial variation, with periods of relative stability interrupted by pronounced inflationary episodes. The sharp increase observed in the later part of the sample is particularly

visible, followed by a gradual moderation. These fluctuations also indicate why inflation persistence needs to be considered in the dynamic specification.

Figure 1. Year-on-Year CPI Inflation in Romania, 2005–2025



Source: Author's calculations based on INSSE TEMPO-Online data

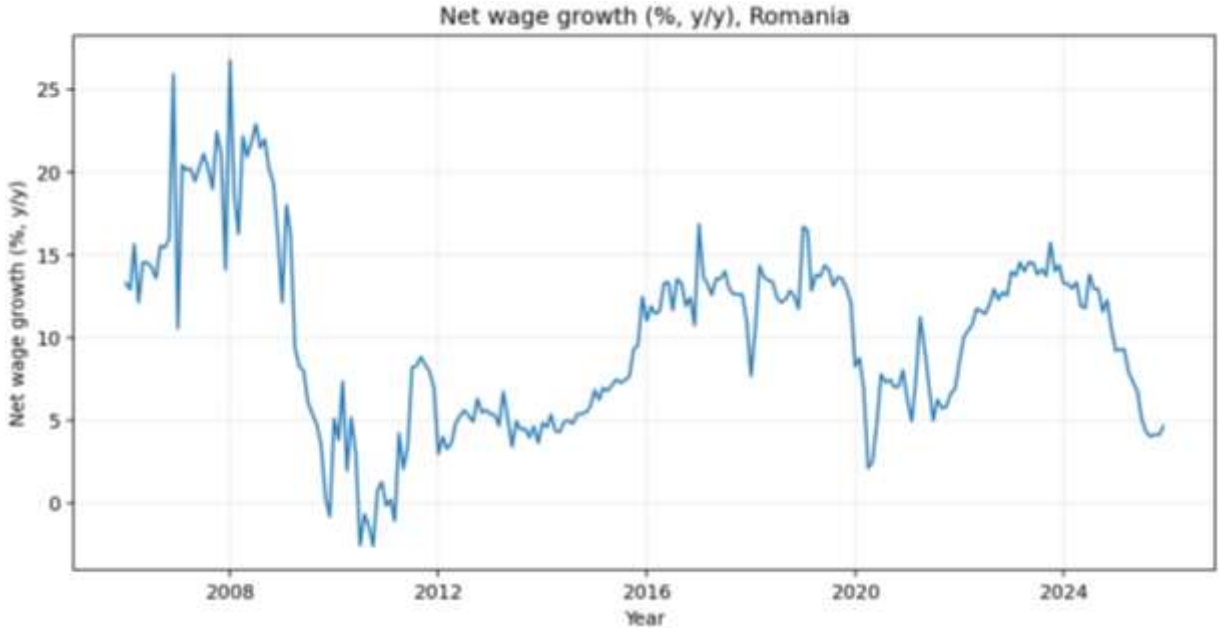
The figure also reveals that the inflationary environment changed considerably across the sample. Relatively moderate movements during much of the period contrast with the pronounced acceleration observed toward the end of the sample. The subsequent decline was gradual rather than immediate, indicating that inflation remained elevated for some time after reaching its peak. At the same time, the earlier years show several shorter episodes of rising and falling inflation, although their magnitude was considerably smaller.

This variation across the sample reinforces the importance of accounting for inflation persistence in the empirical model. It also suggests that contemporaneous movements alone may provide an incomplete picture of the relationship between wages and prices. A dynamic specification is therefore more appropriate for identifying whether changes in wage growth are followed by changes in inflation over subsequent months.

Wage growth followed a different trajectory, as shown in Figure 2. Although year-on-year net wage growth remained positive during most of the period, its fluctuations did not consistently coincide with movements in inflation. In particular, the two series do not suggest a stable contemporaneous relationship throughout the sample. This visual pattern is consistent with

examining whether changes in wage growth are associated with inflation only after a certain time lag.

Figure 2. Year-on-Year Net Wage Growth in Romania, 2006–2025



Source: Author's calculations based on INSSE TEMPO-Online data

The time-series properties of the variables are examined in Table 3. The ADF results do not reject the unit-root null for CPI inflation, nominal wage growth, or the registered unemployment rate at the 5% level. Industrial production growth is stationary in levels. Once first differences are taken, the remaining variables become stationary, supporting their use in the dynamic specification.

Table 3. Augmented Dickey–Fuller Unit Root Tests

Variable	N	ADF Statistic	P-value	Conclusion
CPI inflation	252	-1.698	0.432	Non-stationary
Net wage growth	240	-2.713	0.072	Non-stationary at 5%
Industrial production growth	240	-3.363	0.012	**Stationary**
Registered unemployment rate	252	-1.303	0.628	Non-stationary
Δ CPI inflation	251	-4.538	<0.001	**Stationary**
Δ Net wage growth	239	-3.250	0.017	**Stationary**
Δ Registered unemployment rate	251	-5.829	<0.001	**Stationary**

The main regression results are presented in Table 4. The model explains approximately 37.8% of the variation in monthly changes in year-on-year inflation. No statistically significant relationship is found for the first four wage-growth lags. The picture changes at longer horizons: the fifth lag is positive and significant at the 5% level, while the sixth lag is larger and strongly significant. Its estimated coefficient of 0.064 suggests that a one-percentage-point increase in the change of year-on-year wage growth is associated with an approximately 0.064 percentage-point increase in the monthly change of year-on-year inflation six months later, holding the other variables constant.

Table 4. Main Dynamic Regression Results (Dependent variable: Δ CPI inflation)

Variable	Coefficient	HAC Std. Error	T-statistic	P-value
Δ Wage growth (t−1)	-0.0198	0.0154	-1.288	0.199
Δ Wage growth (t−2)	-0.0217	0.0182	-1.193	0.234
Δ Wage growth (t−3)	-0.0175	0.0226	-0.773	0.441
Δ Wage growth (t−4)	0.0072	0.0168	0.430	0.668
Δ Wage growth (t−5)	0.0298	0.0143	2.083	0.038
Δ Wage growth (t−6)	0.0642	0.0152	4.234	<0.001
Industrial production growth	0.0035	0.0045	0.772	0.441
Δ Registered unemployment rate	0.1410	0.1249	1.128	0.261

Looking at the wage coefficients separately, however, gives only part of the picture. The six wage-growth lags are jointly significant according to the Wald test ($p < 0.001$). The evidence therefore suggests a delayed rather than an immediate association between wage-growth dynamics and inflation, with the clearest positive relationship appearing after approximately five to six months. Neither industrial production growth nor the contemporaneous change in registered unemployment is individually significant in the baseline model. This timing adds an important element to the Romanian evidence. Avram et al. (2020), using a VAR model and monthly Romanian data for 2000–2018, report a substantial relationship between average wages and inflation.

Their analysis, however, addresses the broader consequences of Romania's wage-led growth strategy and treats the macroeconomic variables as mutually interdependent. The present results provide a more specific view of the timing involved: the strongest positive wage–inflation association does not occur contemporaneously, but several months after the initial change in wage-growth dynamics. At the same time, the weak contemporaneous correlation

reported in Table 2 reinforces the point that looking only at wages and inflation within the same period may conceal part of their dynamic relationship.

Diagnostic tests provide mixed evidence regarding residual autocorrelation. Although the Ljung–Box tests do not indicate significant autocorrelation at the conventional lags considered, the Breusch–Godfrey test rejects the null at 12 lags (p = 0.018). HAC/Newey–West standard errors are therefore used for inference. The Breusch–Pagan and White tests provide no evidence of significant heteroskedasticity. Moreover, the joint significance of the wage-growth lags remains robust when alternative HAC bandwidths and shorter or longer specifications of inflation dynamics are considered. The positive association around the sixth month also remains visible across these specifications.

Taken together, the results support a relatively cautious conclusion. Changes in wage growth contain relevant information for subsequent inflation dynamics in Romania, but the relationship is neither immediate nor sufficiently uniform to be interpreted as a mechanical wage-to-price transmission. Most importantly, the estimates identify predictive and dynamic associations rather than structural causal effects. Within this interpretation, the five-to-six-month horizon represents the main empirical finding of the analysis and helps explain why the wage–inflation relationship may appear weak when examined only contemporaneously.

CONCLUSIONS AND RECOMMENDATIONS

This study examined the short-run relationship between nominal wage growth and inflation in Romania using monthly data for 2005–2025. The results point to a relationship that is more visible with a delay than within the same month. While the contemporaneous correlation between wage growth and inflation is relatively weak, changes in wage growth become statistically relevant at longer lags. In the baseline model, the clearest positive association appears after approximately five to six months, and the six wage-growth lags are jointly significant.

These findings should not be interpreted as evidence that wage increases automatically cause inflation. Consumer prices respond to a wider set of domestic and external factors, while wages themselves may adjust to previous inflation. The results instead indicate that wage developments contain useful information about subsequent inflation dynamics. This distinction is particularly important in the Romanian context, where wage policies, labor-market conditions and periods of rapid price growth have changed considerably over the sample.

From a policy perspective, wage developments should be assessed together with productivity, labor-market conditions, and the broader inflationary environment rather than in isolation. The results suggest that persistent changes in wage growth may become relevant for

inflation dynamics only after several months. Consequently, policymakers should avoid interpreting a single month of rapid wage growth as an immediate inflationary signal and should instead monitor whether such increases persist over time and are supported by corresponding improvements in productivity.

For monetary-policy analysis, the five-to-six-month lag identified in the baseline model suggests that wage indicators may provide useful forward-looking information on domestic inflationary pressures. Persistent accelerations in wage growth could therefore be incorporated into short-term inflation monitoring alongside measures of economic activity and labor-market conditions. From a fiscal and income-policy perspective, measures that support sustainable productivity growth can help accommodate higher wages without generating equivalent increases in unit labor costs. At the same time, the results do not support using wage restraint as an automatic response to inflation, since the estimated relationship is dynamic and predictive rather than causal.

Several limitations should nevertheless be acknowledged. The analysis uses aggregate indicators and therefore cannot capture differences across industries, occupations or income groups. Registered unemployment also represents an administrative measure of labor-market conditions rather than an ILO-based unemployment indicator. Moreover, the model identifies statistical associations and does not isolate structural wage shocks. Future research could examine sector-level wage and price data or distinguish between private- and public-sector wage developments, while preserving the higher-frequency perspective adopted here.

Overall, the Romanian evidence suggests that the wage–inflation relationship is neither immediate nor mechanical. Its most visible positive association emerges with a lag of approximately six months, while the robustness checks confirm the joint relevance of wage-growth dynamics under alternative specifications. Monitoring the timing and persistence of wage changes, rather than wage growth alone, therefore provides a more informative perspective on their relationship with inflation.

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