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THE DYNAMICS OF PROSPERITY: HOW INCOME PER CAPITA SHAPES EMPLOYMENT SENTIMENT AND LABOR MARKET CONFIDENCE: EVIDENCE FROM TIME TRENDS AND PERSISTENCE ANALYSIS

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ABSTRACT

This paper addresses a fundamental question at the intersection of macroeconomic performance and subjective well-being: does rising income per capita generate sustained improvements in employment sentiment, or do perceptions of labor conditions evolve independently of material prosperity? The central hypothesis is that the link between income and sentiment is neither linear nor immediate, reflecting both the persistence of subjective attitudes and the adaptive nature of expectations. By combining fractional integration techniques (ARFIMA and FCVAR models) with time- and frequency-domain Granger causality tests, the study disentangles long-memory dynamics from short-term feedback effects. Evidence from the Euro Zone indicates that employment sentiment exhibits stronger persistence than income per capita and that the relationship between them is bidirectional: while economic growth enhances sentiment in the short run, workers' perceptions exert a more durable influence on future income dynamics. These findings contribute to a deeper understanding of how objective and subjective dimensions of prosperity interact, emphasizing the role of sustained confidence and inclusive growth in shaping long-term labor market outcomes.

KEYWORDS: Income Per Capita; Employment Sentiment; Fractional Integration; Causality; Long Memory; Euro Zone.

JEL Classification: C22; C32; E24; E32; J28; O47.

1. INTRODUCTION

Income per capita, measured using Economic growth, which is a primary indicator for living standards. The connection between income growth and employment sentiment is the way of workers job security, pay, and fairness remains less examined, despite its significance for productivity, labor stability, and effective policy outcomes. The interrelation among the objective income measures and subjective evaluations of well-being has long been discussed. Prior research in psychology and economics suggest that income enhance life satisfaction with modest way and often largely through mediating factors (Diener and Oishi 2000; Schyns 2002). Individuals do not evaluate their economic situation solely in absolute terms but frequently rely on comparisons with peers or with their own past experiences (Easterlin 1995; Veenhoven 1991). This approach suggests that income per capita ensures part of economic well-being, as employment sentiment defines both income levels, inequality and the social meaning of earnings. A growing body of research mismatches the income positions and subjective evaluations. Zapf (1984) argued that consistent welfare positions, were objective and subjective conditions coincide and inconsistent one, has "satisfaction paradox" and the "dissatisfaction dilemma,". This diverges between income and perceived well-being. Isengard and König (2021) discussed that empirical analysis of Europe shows some older households which report contentment income below the median. Meanwhile, the other strong finances become unsatisfied. This indicates that rising income per capita will not enhance the employment sentiment because of comparative and cultural factors. Psychological theories of well-being offer further insights. This suggests that happiness equilibrium have both positive and negative shocks.

(Brickman 1971; Headey 2008). Income raises has temporary satisfaction. Meanwhile, adaptive mechanisms decrease these gains. This dynamic is reported as hedonic treadmill, which has a higher rising income on sentiment. Personal traits play a significant role in extraversion and openness link for higher living standards (Steel, Schmidt, and Shultz 2008). These elements reveal that same income change impact individuals thereby, this complements segregate connection among income per capita and employment sentiment.

Beyond individual psychology, social comparison theory highlights that perceptions of income depend strongly on relative positions. Festinger (1954) demonstrated that people relate themselves with others, not in isolation. Empirical research confirms that inequality reduces subjective well-being even when average income rises (Dittmann and Goebel 2010). Cultural and institutional factors further mediate the relationship between income and sentiment. Attitudes towards wealth differs across countries, which influence income growth. These attitudes indicate that relationship between the income-sentiment is complex, non-linear and context-dependent Zitelmann (2021), (Easterlin 1974, 1995). Income gains are frequently offset by adaptation, social comparison, inequality, and job insecurity, emphasized the relationship between income per capita and employment sentiment non-linear and not-studied, it proves the importance of productivity, absenteeism, and turnover (Judge et al. 2001).

This research indicates a research gap by investigating the relationship between income per capita and employment sentiment in Europe through dynamic and multivariate framework. Specifically, the study tests three core approaches. First, increases in income per capita which does not have uniform improvement in employment sentiment, which reflects adaptation and social effects. Second, it varies employment sentiment within short, medium and long-term horizons proposed by Breitung and Candelon (2006). Third, long-run relationships differ across many countries because of institutional and cultural variations. Finally, the inclusion of the fractional cointegration vector autoregressive (FCVAR) framework provides a powerful tool to examine long-run equilibrium connection in fractional integration, offering richer insights than conventional cointegration methods.

2. DATA

The study utilized a quarterly euro data from May 1999 to August 2024. This sample captures major macroeconomic episodes, introduction period of the euro, the global financial and sovereign debt crisis, the COVID-19 pandemic, and recent inflationary cycle. The length and frequency of the data examine the persistence, long memory properties and dynamic interactions within a fractional integration framework. Employment sentiment evaluates the Eurostat's Employment Expectations Indicator, which is a balance statistic that reflects three-month employment outlook, were lower values indicate pessimistic labor market expectations. This is a forward-looking nature, the indicator is widely used as a timely measure of labor market confidence and economic activity in the Euro Area.

Income per capita is measured as an indicator for

aggregate prosperity, with quarterly data from Thomson Reuters Eikon, standardized variables to support persistence, long memory behaviour and long-run connections with employment sentiment.

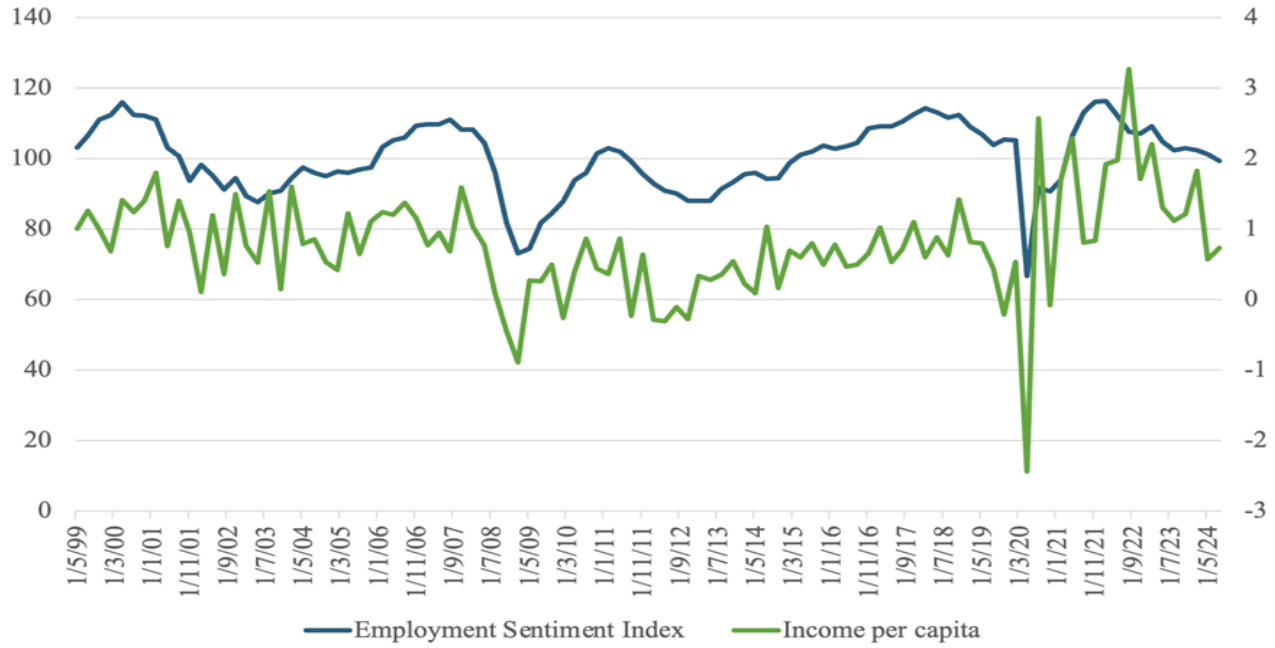

Figure 1: Employment Sentiment Index and Income per Capita in the Euro Area (1999-2024).
Note: Employment sentiment is measured by the Employment Expectations Indicator from Eurostat (left axis), while income per capita is expressed in levels and sourced from Thomson Reuters Eikon (right axis).

Figure 1 indicates evolution of employment sentiment and income per capita in the Euro Area from 1999 to 2024. Both series display clear cyclical patterns and pronounced downturns during major economic shocks, particularly global financial crisis and the COVID-19 pandemic. Employment sentiment reveals more volatile fluctuations; this reflects that growth in income per capita evolves gradually with consistent inherent inertia of aggregate income. Periods of co-movement coexist with episodes of divergence, especially during recoveries, suggesting that improvements in material prosperity do not automatically translate into proportional changes in labor market confidence. These stylized facts motivate a formal econometric analysis of persistence and dynamic interactions between the two variables.

3. METHODOLOGY

a. Unit Roots

Unit root test confirms the Augmented Dickey-Fuller Test which was demonstrated by Dickey and Fuller (1979). Alternative test for robustness, such as Phillips–Perron test (Phillips and Perron, 1988), the stationarity test of Kwiatkowski et al. (1992), and the GLS-based method of Elliott, Rothenberg, and Stock (1996) are also mentioned, this will produce a comparable insight in trends.

b. ARFIMA (p, d, q) Model

Conventional unit roots will not perform clearly, during the process that exhibits long memory or fractional integration which was demonstrated by Lee and Schmidt (1996), Hassler and Wolters (1994), and Diebold and Rudebusch (1991). Additionally, this study has fractional degrees for differencing and adopts the ARFIMA (p, d, q) framework to model such dynamics.

$$(1-L)^d x_t = u_t, t = 1, 2, \qquad (1)$$

According to equation (1), u_t denotes I (0), L is the lag-operator (Lx_t=x_(t-1)), d is any real number, and x_t is the time series with an integrated process of order d (x_t≈I(d)).

The AR and MA values was guided using Akaike (1973) and Bayesian (Akaike, 1979) information criteria, with the long-memory parameter (d). This tests all (p, q<2) combinations and evaluations using 95% confidence intervals.

c. Granger Causality test

The VAR framework model is used to perform Granger causality test and examines the direct connection among the stationary variables (xt and yt)

in bivariate VAR structure.

$$x_t = a_1 + \sum_{i=1}^{k} a_i x_{t-i} + \sum_{i=1}^{k} \beta_i y_{t-i} + \epsilon_{1t}$$

$$y_t = a_2 + \sum_{i=1}^{k} \gamma_i x_{t-i} + \sum_{i=1}^{k} \delta_i y_{t-i} + \epsilon_{2t}$$

K value shows the lag length of the variables x_t and y_t. The null hypothesis can be tested "x is not a consequence of y", which can be described as H_0^1=γ_1=⋯=γ_k=0. The result defines that causality goes from y_t to x_t when the null value is rejected; in the same way as in the second case 〖 H 〗_0^2=a_1=⋯=a_k=0 the causality from x_t to y_t occurs on Chi-square tests, this shows the casuality in both directions and neglection of null values.

d. FCVAR model

Johansen and Nielsen (2012) reported that multivariate FCVAR model is used to test the long-run connection on the variables.

$$\Delta^d X_t = \alpha\beta' L_b \Delta^{d-b} X_t + \sum_{i=1}^{k} \Gamma_i \Delta^b L_b^i Y_t + \varepsilon_t \qquad (2)$$

Where ε_t represents the p-dimensional error term with zero mean and covariance matrix Ω, β that enables long term equilibrium. Γi captures short-run dynamics, α determines equilibrium deviations and adjustment speed.

4. EMPIRICAL RESULTS

Table 1 represents the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) reflects two variables using unit root test under consideration: employment sentiment index and income per capita in Europe.

The test was conducted under three alternative specifications: (i) without deterministic components, (ii) including an intercept, and (iii) including both an intercept and a linear time trend.

Table 1: Unit Roots Results.

	ADF			PP	
	(i)	(ii)	(iii)	(ii)	(iii)
Original Data					
Employment Sentiment Index	−0.3858	−2.9112*	−2.9763	−3.4004*	−3.4348
Income per capita	−2.2308*	−3.6824*	−3.6905*	−8.2551*	−8.2438*

ADF and PP tests contribute mixed stationary results, with the unit root rejection and Employment Sentiment Index, which implies non-stationarity at levels. Overall, these results point to heterogeneous stochastic properties across the two series, with employment sentiment exhibiting stronger persistence and potential long-memory behavior compared to income per capita.

In the view of economic standpoint, these findings indicate that employment sentiment aligns very slowly than income per capita, highlights inertia from expectations, institutions, and adaptation. Because of this material gains will not translate improved labor market perceptions. New unit root methods are unable to capture fully; the degree of persistence characterize macroeconomic and behavioral time series. In practice, many economic variables exhibit fractional degrees of integration, lying somewhere between stationarity and non-stationarity. Ignoring this intermediate behavior becomes the misleading inferences and durability of the data. To address this limitation, a ARFIMA (p,d,q) model captures the integration model to assume the non-integer values and flexible memory characteristics of income per capita and employment sentiment.

Parameter estimation tests the exact maximum likelihood method reported by Sowell (1992),

exploring model configurations with autoregressive and moving-average orders restricted to values less than two. The result represents the fractional differencing parameter (d), in conjuction with the AR and MA parameters are reported in Table 2.

The ARIMA methodology contribute higher flexibility rate than standard unit root methods through fractional integration, long memory and slow mean reversion in time series.

Table 2: Long Memory Results.

Data analyzed	Sample size (month)	Model Selected	d	Std. Error	Interval	I(d)
Original Data						
Employment Sentiment Index	102	ARFIMA (0, d, 0)	0.88	0.094	[0.72, 1.03]	I(d), I(1)
Income per capita	102	ARFIMA (1, d, 0)	0.45	0.055	[0.36, 0.54]	I(d)

Table 2, provides the estimated differencing parameter d for the Employment Sentiment Index is approximately 0.88, with a 95% confidence interval ranging from 0.72 to 1.03. This value lies close to unity, indicating strong persistence and suggests shocks to employment sentiment tend to have long-lasting effects and may not fully dissipate over time. In contrast, the estimated d for Income per capita is 0.45, within the interval [0.36, 0.54], implying a lower degree of dependence and a tendency toward mean reversion in the long run. These result views that income adjusts more than employment sentiment, which is designed by the adaptive and psychological elements. This emphasize that credible policy will enhance the confidence of the labor market. To capture all the changes in one variable, a multivariate model using a Granger causality is employed. The past values will help to predict the current dynamics. This method allows us to identify potential leading–lagging relationships and assess the dynamic interdependence between economic performance and workers' perceptions. The results reported in Table 3 summarize these interactions within a vector autoregressive (VAR) structure estimated with three lags, selected according to standard information criteria.

Table 3: Results of Granger Causality Test.

Direction of Causality	Lags[1]	Prob.	Decision	Outcome
Income per capita → Employment sentiment	3	0.080*	Reject Null	Income per capita is causing behavior in employment sentiment in Euro Zone.
Employment sentiment → Income per capita	3	0.058*	Reject Null	Employment sentiment is causing behavior in income per capita in Euro Zone.
* This shows that there is a significant causality relationship at the 10% significance level. ** This shows that there is a significant causality relationship at the 5% significance level. *** This shows that there is a significant causality relationship at the 1% significance level.				

Table 3 indicates the examination of bidirectional Granger causality of variables has 10% significance level, with bidirectional causality between income per capita and employment sentiment within the Euro Zone. This finding implies that not only does economic growth exert an influence on workers' perceptions, but sentiment itself also plays a predictive role for subsequent changes in income levels. Overall, higher income improves optimism about jobs and positive employment sentiment, it also stimulates economic activity through higher productivity, consumption and dynamics. On the economic perspective, this bidirectional pattern suggests a reinforcing relation among economic conditions and sentiment. Whereas, confidence-built growth and decline sentiment through deeper contractions. Breitung and Candelon (2006) emphaised that there has been a changing

[1] We have used Akaike Information Criterion to detect the number of lags.

relationship among income per capita and employemnt sentiment, which shows that casuality varies across businesses. This may function over longer time spans.

Table 4: Breitung and Candelon Frequency Domain Causality Test Results.

Hypothesis	Long Term ($\omega = 0.05$)	Medium Term ($\omega = 1.5$)	Short Term ($\omega = 2.5$)
Original Time Series			
Income per capita →Employment sentiment	3.51 (0.173)	1.39 (0.498)	4.62* (0.099)
Employment sentiment→ Income per capita	5.70* (0.058)	5.41* (0.067)	6.10** (0.047)
(*) denotes that the causal relationship is statistically significant at the 10% level. (**) denotes that the causal relationship is statistically significant at the 5% level. (***) denotes that the causal relationship is statistically significant at the 1% level. The values in parentheses indicate the p-values of the F-statistics calculated for the corresponding frequency (ω) values.			

As shown in Table 4, causality from employment sentiment to income per capita is statistically important at the 10%, 5%, and 1% levels across most frequencies, indicating that sentiment exerts a persistent influence on economic activity. Conversely, the causal effect from income per capita to employment sentiment appears weaker and is only significant in the short term (at the 10% level). This asymmetry suggests that while increases in income can temporarily boost perceptions of employment conditions, workers' sentiment itself may play a more enduring role in shaping macroeconomic trajectories.

Finally, the examination of stable relationship exists among the variables, the Fractionally Cointegrated Vector Autoregressive (FCVAR) model was estimated. This framework extends conventional cointegration analysis allows fractional integration orders, thereby accommodating the long-memory behavior identified in previous sections.

Table 5: Results of the FCVAR Model.

	$d \neq b$	Cointegrating equation beta	
		Employment	Income
Panel I: Employment sentiment Vs Income per capita	$d = 0.180\ (0.302)$ $b = 0.180\ (0.286)$	1.000	–109.474
	$\Delta^d \left(\begin{bmatrix} Employment \\ Income \end{bmatrix} - \begin{bmatrix} 99.464 \\ 0.720 \end{bmatrix} \right) = L_d \begin{bmatrix} 0.927 \\ 0.131 \end{bmatrix} \nu_t + \sum_{i=1}^{2} \hat{\Gamma}_i \Delta^d L_d^i (X_t - \mu) + \varepsilon_t$		
Panel II: Income per capita vs Employment sentiment	$d = 0.180\ (0.000)$ $b = 0.180\ (0.000)$	–0.009	1.000
	$\Delta^d \left(\begin{bmatrix} Income \\ Employment \end{bmatrix} - \begin{bmatrix} 0.720 \\ 99.464 \end{bmatrix} \right) = L_d \begin{bmatrix} -14.320 \\ -101.454 \end{bmatrix} \nu_t + \sum_{i=1}^{2} \hat{\Gamma}_i \Delta^d L_d^i (X_t - \mu) + \varepsilon_t$		

The estimated cointegrating equations, presented in Table 5, confirms the stable long-term relationship between employment sentiment and income per capita. The results indicates that incomer per capita boosts employment sentiment over long time. This declines the subsequent reductions in aggregrate income. Also, the dynamic mechanism among economic performance and labour market impact each other over time. Consequently, the persistence and bidirectional relationship values underscores the importance of incorporating sentiment into macroeconomic monitoring and policy design.

5. CONCLUSION

This study investigates the dynamic connection between income per capita and employment sentiment in Europe, combining time- and frequency-domain approaches with fractional integration and cointegration techniques. The analysis provides novel insights into the persistence and directionality of the link between objective measures of prosperity and subjective perceptions of labor market conditions.

The results reveal substantial differences in the stochastic properties of the two series. While income per capita displays mean-reverting behavior consistent with moderate persistence, employment sentiment exhibits a high degree of long memory, indicating that perceptions adjust slowly to changing economic circumstances. This asymmetry suggests that improvements in material conditions do not immediately translate into higher employment satisfaction, reflecting psychological adaptation and institutional inertia in the labor market.

The multivariate evidence further highlights a bidirectional and reinforcing relationship between the two variables. This indicates that income growth improves employment sentiment in a shorter period, whereas sentiment defines the greater and enduring impact on economic activity, as supported by the FCVAR estimation, implying that sustained improvements in income ultimately foster more favorable employment perceptions, while declining sentiment may anticipate periods of weaker growth.

From a policy perspective, these findings underscore the importance of considering subjective indicators, such as employment sentiment, alongside conventional macroeconomic metrics. Economic growth that is not accompanied by improved perceptions of job security, fairness, and recognition may fail to generate lasting welfare gains. Policies that foster inclusive growth, institutional trust, and stable labor relations can strengthen the feedback loop between prosperity and confidence, enhancing both economic resilience and social cohesion.

Future research could extend this analysis by incorporating cross-country heterogeneity and exploring the role of institutional quality, inequality, and cultural attitudes toward work and wealth. Furthermore, applying panel or spatial models could help disentangle the regional spillover effects of income and sentiment, providing a more granular understanding of how prosperity shapes, and is shaped by, the collective psychology of the labor force.

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