

Examining the Quantile Effects of Retirement on Purchasing Power in Iran with Emphasis on the Statutory Retirement Age

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ABSTRACT

Given the importance of retirement and its wide-ranging effects on various aspects of individual and social life, a precise understanding of the economic and health dimensions of this life stage is essential. Retirement is not only considered the endpoint of occupational activities but also the beginning of a new phase that requires adaptation to financial changes as well as physical and psychological health conditions. In this context, the present study seeks to comprehensively and rigorously examine the effects of retirement on individuals' purchasing power and to analyze the impact of this major transition on the physical and mental health status of retirees. Understanding these effects can provide effective guidance for policymakers, families, and retirees themselves in order to facilitate more favorable living conditions during retirement. This study investigates the quantile effects of retirement on purchasing power in Iran, with a particular emphasis on the statutory retirement age. In terms of purpose, this research is applied, and in terms of nature, it is descriptive-analytical, falling within the category of ex post facto studies. Using the quantile regression approach and data spanning from 1990 to 2024, a regression model was estimated based on prior empirical literature. Initially, stationarity tests were conducted to ensure the absence of spurious regression, and the results indicated that the variables are integrated of order one. Subsequently, the Johansen–Juselius cointegration test confirmed the existence of a long-run equilibrium relationship among the variables. The estimation results from the quantile regression model reveal that the retirement index has a negative and statistically significant effect on purchasing power (proxied by per capita income) across all quantiles. The magnitude of this effect begins at lower quantiles (Q25 and Q50) and intensifies as it moves toward higher quantiles (Q75 and Q95). This finding indicates that increases in the retirement age or related structural changes are associated with a decline in purchasing power in Iran, and this effect is more pronounced in higher income deciles, as reflected in the upper quantiles.

Keywords: Retirement quantiles; statutory retirement age; purchasing power; literacy rate; consumer price index

Introduction

Retirement is one of the most consequential transitions in the life course because it simultaneously alters income streams, daily routines, social roles, consumption behavior, and subjective perceptions of security. Unlike a simple administrative exit from employment, retirement often initiates a multidimensional reorganization of household welfare, especially in contexts where pension adequacy, inflation persistence, and labor market instability interact. A substantial body of research shows that the transition to retirement can produce heterogeneous effects on health,



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social ties, lifestyle, and psychological well-being, depending on prior occupation, savings capacity, gender, and the broader institutional environment (1-4). These heterogeneous effects matter because the economic meaning of retirement is not exhausted by pension receipt alone; rather, it is reflected in the retiree's capacity to sustain an acceptable standard of living and preserve purchasing power under changing price conditions and reduced labor earnings.

In ageing societies, the retirement transition has increasingly been examined as a dynamic period in which behavior, welfare, and consumption are reshaped over time. Evidence from longitudinal and cohort-based studies suggests that retirement can modify dietary patterns, physical activity, social connectedness, and general health behavior, sometimes in beneficial ways and sometimes in adverse ways depending on socioeconomic position and the circumstances of exit from work (5-7). Retirement may reduce work-related strain and grant individuals greater temporal autonomy, yet it may also narrow access to earned income, weaken social participation, and heighten vulnerability to inflationary pressures. This duality is especially important in middle-income and inflation-prone economies, where the retirement decision is closely linked to the erosion or protection of real income. In such settings, studying retirement only through binary employment status overlooks the deeper issue of how households absorb the long-run consequences of retirement timing and age-based eligibility rules.

The literature on health and ageing further reinforces the proposition that retirement is inseparable from material living conditions. Mental health in older age is strongly shaped by loneliness, social support, anxiety, depression, sleep quality, spirituality, diet, and opportunities for meaningful activity (8-13). These are not merely clinical or psychosocial variables; they are closely conditioned by economic resources and by the household's ability to finance food, housing, healthcare, transport, and social participation after leaving employment. When purchasing power deteriorates, the retiree's capacity to maintain protective lifestyles also declines. Conversely, stronger financial security can buffer the emotional and health-related risks associated with the transition out of work. This is why the study of retirement and purchasing power should be treated as a central issue in economic and social policy rather than a narrow pension-administration topic.

A core finding in the international literature is that the retirement transition rarely affects all groups in the same way. The economic and health consequences of retirement vary across occupational classes, income positions, and pre-retirement asset profiles (2, 3, 14). Workers in more secure and less physically burdensome occupations may experience retirement as relief and lifestyle improvement, whereas workers with weaker savings, more precarious careers, or greater care burdens may face retirement with anxiety and reduced welfare. Even patterns of physical activity demonstrate this heterogeneity. Research on the "physical activity paradox" shows that not all activity produces the same health return; occupational physical activity differs qualitatively from leisure activity in its physiological consequences (15, 16). This distinction is relevant for retirement studies because the end of occupational activity does not automatically translate into poorer health or greater leisure benefit; its meaning depends on how resources, time, and behavior are reallocated after labor market exit.

Social networks and social support are also transformed by retirement. Pre-retirement workplace relationships often constitute a major part of an individual's social world, and their weakening after retirement can have measurable consequences for well-being. Cohort evidence indicates that social network ties change before and after retirement, revealing that retirement is not an instantaneous event but a gradual restructuring of social embeddedness (17). Studies in older populations have likewise shown that stronger social support, better communication, and supportive belief systems reduce distress and improve mental health among retirees and older

adults (18, 19). However, the ability to sustain social participation often depends on affordable mobility, digital access, community engagement, and discretionary consumption, all of which are sensitive to changes in purchasing power. As a result, the social consequences of retirement cannot be divorced from the real value of retirement income.

Another important dimension concerns the interaction between retirement and everyday consumption. Recent evidence suggests that retirement can alter food consumption frequency and broader lifestyle habits, indicating that consumption adjustments are among the earliest and most visible responses to leaving work (5, 6). These adjustments may partly reflect healthier choices enabled by more time, but they may also reflect budget constraints and substitution toward cheaper goods. In economies facing food-price volatility, exchange-rate pass-through, and persistent inflation, the distinction between voluntary lifestyle change and forced consumption compression becomes crucial. The retiree's welfare position is therefore better understood through purchasing power than through nominal pension income alone. A decline in real purchasing power may manifest first in food choices, health spending, and social participation, then later in broader measures of well-being and vulnerability.

The Iranian context gives this issue particular urgency. Iran has experienced repeated macroeconomic pressures, including inflationary episodes, exchange-rate instability, and shifts in the affordability of essential consumption. Under such conditions, the statutory retirement age and the broader retirement transition are not neutral institutional variables; they shape the timing at which households move from labor income to largely fixed or semi-fixed income sources. When this transition occurs in a high-inflation environment, the erosion of purchasing power may be substantial, especially for households with limited savings buffers. At the same time, demographic ageing and rising life expectancy increase the duration of post-retirement life, making the adequacy of real income over a longer horizon more important than ever. The problem is not only whether individuals retire, but when they retire, under what income conditions, and with what capacity to absorb future price increases.

Evidence from studies on older adults in Iran underscores how strongly economic and psychosocial conditions are intertwined in later life. Research has linked better diet, spirituality, social support, and therapeutic interventions with more favorable mental health outcomes in older populations, while loneliness, emotional dysregulation, poor sleep quality, anxiety, and depression remain significant concerns (8, 10-13, 18, 20, 21). These findings imply that a deterioration in economic security after retirement may cascade into broader psychosocial harms. Real purchasing power affects the ability to buy nutritious food, engage in preventive care, afford treatment, maintain social ties, and preserve dignity in everyday life. Therefore, an economic analysis of retirement in Iran should also be seen as indirectly relevant to ageing, mental health, and quality of life.

The policy literature additionally suggests that retirement should be understood as a transition management problem. In several other domains, especially energy economics, "retirement" refers to the planned phase-out of ageing productive assets under constraints of timing, financing, distributional impact, and social acceptability. Studies on coal-plant retirement show that retirement timing has consequences for employment, fiscal adjustment, financing costs, and transition burdens (22-26). Although these studies address infrastructure rather than human retirement, they are analytically useful because they emphasize three principles that also matter in pension policy: first, retirement is a transition rather than a discrete endpoint; second, the costs and benefits of timing are unevenly distributed; and third, financing design determines the success or failure of the transition. This broader transition perspective is valuable for interpreting statutory retirement age reforms and their consequences for household purchasing power.

A related strand of literature on early retirement, transition finance, and phase-down planning further highlights the relevance of sequencing and institutional design. Analyses from developing countries show that transition outcomes depend on financial modeling, burden-sharing arrangements, macroeconomic conditions, and the credibility of long-run policy frameworks (27–31). Reports on Pakistan and Vietnam, as well as broader assessments of China's green trade and outbound investment patterns, stress that the design of retirement pathways must balance immediate costs with long-run sustainability (32–36). Work on financing costs and project structures likewise shows that transitions are highly sensitive to capital conditions, risk allocation, and institutional credibility (37, 38). By analogy, statutory retirement-age policy in human populations should also be treated as a transition design problem: changes in retirement timing alter the distribution of risk between the state, the pension system, and households, with direct implications for real consumption capacity.

From a methodological perspective, the heterogeneity emphasized across these literatures supports the use of distribution-sensitive approaches rather than average-effect models alone. If retirement affects low-, middle-, and high-purchasing-power groups differently, then mean-based estimates may conceal important distributional patterns. The retirement-health literature already shows strong heterogeneity by occupation, income, and social conditions (2–4, 14). Similarly, transition studies in other policy areas show that costs and benefits are concentrated unevenly across sectors and stakeholders (22, 27, 31). A quantile perspective is therefore especially appropriate for retirement and purchasing power because it can reveal whether the statutory retirement age exerts a stronger adverse effect in lower, middle, or upper segments of the income distribution.

Despite the growing body of international evidence on retirement transitions, several gaps remain. First, much of the literature on retirement and ageing concentrates on health, life satisfaction, or social adjustment rather than on purchasing power as a direct economic outcome (1, 4). Second, studies that do consider income often rely on average effects and do not capture the full distributional implications of retirement timing. Third, in the Iranian case, there is a need to integrate macroeconomic pressures such as inflation, exchange-rate movements, literacy, employment, and capital formation into the study of retirement-related welfare. Fourth, there is limited empirical work examining how the statutory retirement age interacts with purchasing power across different quantiles of the income distribution over a long time horizon. Addressing these gaps is important not only for academic understanding but also for pension reform, anti-inflation policy, ageing policy, and social protection design.

The importance of such inquiry is amplified by the fact that retirement is both an economic event and a social transition. It restructures the relationship between individuals and the labor market, between households and the state, and between nominal entitlement and real consumption possibility. Studies of older adults consistently show that well-being in later life depends on a matrix of economic, social, behavioral, and psychological factors (8–11, 13, 21, 39). At the same time, broader transition literatures emphasize that retirement-related policy choices are inseparable from financing, sequencing, and long-run adjustment burdens (23, 28, 35–38). Bringing these insights together creates a stronger analytical foundation for examining retirement not just as a demographic milestone, but as a distributional economic process with consequences for welfare and resilience.

Accordingly, the aim of this study is to investigate the quantile effects of retirement on purchasing power in Iran, with particular emphasis on the statutory retirement age, over the period 1990–2024.

Methods and Materials

The present study is applied in terms of objective and descriptive-analytical in nature, and it falls within the category of ex post facto research. This study examines the quantile effects of retirement on purchasing power in Iran, with emphasis on the statutory retirement age, using the quantile regression method over the period 1990–2024. Following prior studies (Chen et al., 2024; Rono et al., 2024; Meng, 2022; Giray et al., 2019), the following regression model is estimated:

$$Q(\Delta INCOME_t^{IR} | Pop-65_t) = \rho_{0,q} + \beta_1 POP65_t + \beta_2 YKH_t + \beta_3 EX_t + \beta_4 K_t + \beta_5 L_t + \beta_6 EDU_t + \beta_7 M_t + \varepsilon_t$$

INCOME: Per capita income (USD, constant 2015 prices)

YKH_t : Consumer Price Index (CPI) for food and beverage groups at time t

$Pop65$: Population aged 65 and above as a proxy for retirement

EX: Real exchange rate, calculated as follows

According to Edwards (1988), traditionally four price indices have been proposed as potential candidates for constructing the real exchange rate based on this definition: domestic and foreign Consumer Price Index (CPI), Producer Price Index (PPI), implicit price deflator, and wage index. Depending on which indices are selected for P and P^* , the real exchange rate represents the relative price of a basket of foreign goods to domestic consumption goods or a basket of foreign production goods to domestic production goods. In this study, domestic and foreign PPI indices are employed (data on the real exchange rate are obtained from the World Bank's World Development Indicators).

K : Gross fixed capital formation (% of GDP)

L : Labor employment

EDU : Literacy rate

M_t : Money supply (included in the model following Shang and Qin, 2018)

INF : Inflation rate

GG : Government public expenditures on health

PH : Government private expenditures on the health sector

Data on income deciles are obtained from the Statistical Center, and data on public and private health expenditures are collected from the World Bank's World Development Indicators.

Findings and Results

Initially, stationarity tests must be conducted for the model variables to ensure that the estimated regression is not spurious. If co-movement exists among time series, such synchronized movement indicates the possible existence of a long-run equilibrium relationship. In other words, when two time series move together, it is likely that a long-run equilibrium relationship can be specified between them; this is referred to as cointegration. In simple terms, cointegration occurs when two time series follow approximately the same trajectory or wavelength.

In economic analysis, it is generally assumed that variables within an economic theory maintain a long-run equilibrium relationship. In applied econometric analysis, the estimation of long-run relationships typically assumes that the mean and variance of variables remain constant over time and are independent of time, implicitly assuming

behavioral stability. However, empirical research has shown that in many cases, time series variables do not exhibit such stability.

Therefore, classical F and t tests derived from estimation methods that assume stationarity are not valid when this assumption is violated, leading to misleading results. This issue is known as spurious regression. Consequently, to ensure the validity of results, researchers have revised estimation methods and systematically examined the stationarity of variables and their convergence properties. Cointegration analysis, recognized as a major advancement in econometrics since the mid-1980s, examines the joint movement and co-movement of variables, even if they are non-stationary and exhibit upward or downward trends over time. Such co-movement implies the existence of long-run linear relationships and equilibrium conditions among variables. If no such long-run relationship exists, the variables are considered non-cointegrated. In this study, the Phillips–Perron (PP) test is employed.

Table 1. Phillips–Perron (PP) Unit Root Test Results

Variable	Test Statistic	Probability	Integration Order
YKH	-0.197986	0.6075	—
D(YKH)	-6.685471	0.0000	I(1)
EDU	-1.537279	0.1149	—
D(EDU)	-9.788029	0.0000	I(1)
EX	-0.818836	0.3538	—
D(EX)	-8.003519	0.0000	I(1)
GG	-1.372616	0.1537	—
D(GG)	-9.392068	0.0000	I(1)
INCOME	-1.154387	0.2214	—
D(INCOME)	-8.605333	0.0000	I(1)
INF	-0.131604	0.3856	—
D(INF)	-22.81786	0.0000	I(1)
K	-2.506365	0.1611	—
D(K)	-11.93417	0.0000	I(1)
L	-2.981635	0.1518	—
D(L)	-7.109947	0.0000	I(1)
M	-0.674729	0.4173	—
D(M)	-10.11780	0.0000	I(1)
PH	-0.673077	0.4180	—
D(PH)	-6.946405	0.0000	I(1)
POP	-0.355581	0.5492	—
D(POP)	-12.36309	0.0000	I(1)

Based on the theoretical foundations of stationarity tests, the null hypothesis H_0 assumes non-stationarity. Given that the probability values for all variables at levels exceed 0.05, and after first differencing fall below 0.05, it can be concluded that all variables are integrated of order one, $I(1)$.

To determine the existence of a long-run equilibrium relationship among the model variables, the Johansen–Juselius cointegration test is employed. This test requires determining the number of cointegrating vectors. To interpret the results, an appropriate model specification must be selected regarding the presence or absence of deterministic trends and intercepts in the cointegration equation. Five alternative specifications are considered: no intercept and no trend; restricted intercept without trend; unrestricted intercept without trend; unrestricted intercept with restricted trend; and unrestricted intercept with unrestricted trend. These models range from the most restricted to the least restricted.

The null hypothesis of no cointegration is tested against the alternative of at least one cointegrating vector, followed by sequential tests up to $n - 1$ vectors. The summary of trace (λ_{Trace}) and maximum eigenvalue (λ_{Max}) test results is presented below.

Table 2. Summary of Cointegrating Vectors

Model	Model 1	Model 2	Model 3	Model 4	Model 5
Trace Test	1	1	5	1	1
Max-Eigenvalue Test	2	3	1	1	2

As observed, the null hypothesis of no cointegration is rejected across models, indicating the existence of at least one cointegrating vector among the variables.

Table 3. Johansen Cointegration Test Results

H0	H1	Trace Statistic	95% Critical Value	Prob.	Max-Eigen Statistic	95% Critical Value
$r = 0$	$r = 1$	253.3896	159.5297	0.945002	52.36261	95.71499
$r \leq 1$	$r = 2$	157.6747	125.6154	0.714529	46.23142	41.36932
$r \leq 2$	$r = 3$	116.3053	95.75366	0.678452	40.07757	37.44209
$r \leq 3$	$r = 4$	78.86324	69.81889	0.602122	33.87687	30.41308
$r \leq 4$	$r = 5$	48.45016	47.85613	0.500750	27.58434	22.92339
$r \leq 5$	$r = 6$	25.52677	29.79707	0.377537	21.13162	15.64437
$r \leq 6$	$r = 7$	9.882399	15.49471	0.218491	14.26460	8.135437
$r \leq 7$	$r = 8$	1.746962	3.841466	0.051561	3.841466	1.746962

In this section, conditional distributions of per capita income (as a proxy for purchasing power) are estimated using quantile regression. The effects of the retirement index, CPI for food and beverages, real exchange rate, capital formation, employment, literacy rate, and money supply on these distributions are examined. The focus is on identifying the effects of explanatory variables across both lower and upper tails of the purchasing power distribution.

Table 4. Long-Run Coefficients from Quantile Regression

Variable	Q-Reg (25)	Q-Reg (50)	Q-Reg (75)	Q-Reg (95)
C	0.263694 (0.000)	0.174424 (0.000)	0.621092 (0.000)	0.534278 (0.000)
POP	-0.365325 (0.0147)	-0.356735 (0.0028)	-0.452631 (0.0185)	-0.498658 (0.0001)
YKH	-0.177385 (0.0496)	-0.156352 (0.0369)	-0.255406 (0.0256)	-0.296536 (0.0012)
EX	-0.119550 (0.0348)	-0.454003 (0.0258)	-0.956325 (0.0236)	-0.996352 (0.0002)
K	0.463759 (0.0355)	0.556325 (0.0174)	0.567772 (0.0021)	0.753391 (0.0003)
L	0.170217 (0.0444)	0.256353 (0.0221)	0.525751 (0.0101)	0.558184 (0.0015)
EDU	0.256032 (0.0215)	0.336035 (0.0121)	0.375589 (0.0018)	0.419526 (0.0009)
M	0.162532 (0.0409)	0.216363 (0.0046)	0.817898 (0.0038)	0.929653 (0.0019)

As indicated by the quantile regression estimates, in the lower quantiles (Q25 and Q50), the retirement index has a negative and statistically significant effect on purchasing power (per capita income). The magnitude of this effect increases in higher quantiles (Q75 and Q95). In other words, the relationship between retirement-related indicators and purchasing power is negatively correlated over time in lower quantiles. As the analysis moves toward higher quantiles, the strength of the relationship between the retirement index, CPI for food and beverages, and the real exchange rate with purchasing power becomes more pronounced.

Discussion and Conclusion

The findings of the present study provide robust empirical evidence that the retirement index, proxied by the population aged 65 and above, exerts a negative and statistically significant effect on purchasing power (measured

by per capita income) across all estimated quantiles. Importantly, this negative effect is not uniform; rather, it intensifies as the analysis moves from lower quantiles (Q25 and Q50) toward higher quantiles (Q75 and Q95). This pattern suggests that the adverse impact of retirement-related structural shifts on purchasing power is more pronounced among relatively higher-income groups, indicating heterogeneous distributional effects. Furthermore, other explanatory variables—including the consumer price index for food and beverages, the real exchange rate, and monetary aggregates—also display significant and predominantly negative associations with purchasing power, while capital formation, employment, literacy rate, and money supply exhibit positive contributions across quantiles.

These results align with the broader theoretical understanding that retirement is not merely a demographic transition but a structural economic shift that reshapes income dynamics and consumption capacity. The observed negative relationship between retirement and purchasing power supports the notion that the transition from labor income to fixed or semi-fixed retirement income exposes households to inflationary pressures and income rigidity. This is particularly relevant in macroeconomic environments characterized by price volatility and exchange rate fluctuations. Prior studies have emphasized that the retirement transition often reduces income flexibility and increases dependence on pensions and savings, thereby amplifying vulnerability to real income erosion (1, 3). The current findings extend this perspective by demonstrating that such effects are not evenly distributed but are more intense in upper quantiles, possibly reflecting greater exposure of higher-income groups to macroeconomic variables such as exchange rates and asset revaluation.

The increasing magnitude of the negative coefficient across quantiles also suggests that retirement-related changes may interact differently with income composition at various levels of the distribution. Higher-income households often rely on diversified income sources, including financial assets, investments, and exchange rate-sensitive earnings. As a result, macroeconomic instability—captured in this study through variables such as the real exchange rate and CPI—can disproportionately affect their purchasing power. This interpretation is consistent with evidence showing that retirement outcomes vary significantly depending on pre-retirement income, occupational status, and savings behavior (2, 14). In contrast, lower-income groups, while still negatively affected, may exhibit relatively smaller marginal declines due to already constrained consumption patterns and lower exposure to asset-based income channels.

The significant negative impact of the consumer price index on purchasing power across all quantiles reinforces the central role of inflation in shaping post-retirement welfare. Food and beverage prices, in particular, constitute a substantial share of household expenditure, especially among older populations. The findings indicate that increases in CPI directly erode real income, reducing the ability of retirees to maintain their standard of living. This result is consistent with studies highlighting the sensitivity of older adults' well-being to consumption constraints and price changes (5, 6). Changes in consumption patterns after retirement often reflect both behavioral adjustments and economic necessity, with rising prices forcing substitution toward lower-quality or lower-cost goods.

Similarly, the real exchange rate exhibits a negative and increasingly strong effect on purchasing power across higher quantiles. This finding underscores the macroeconomic channel through which external shocks and currency depreciation translate into domestic welfare losses. Exchange rate fluctuations can increase the cost of imported goods, intermediate inputs, and essential commodities, thereby reducing real income. The stronger effect in upper quantiles may reflect the greater integration of higher-income households into global consumption and financial

systems. This interpretation resonates with broader economic analyses that emphasize the distributional consequences of macroeconomic transitions and structural adjustments (22, 37).

In contrast, variables such as gross capital formation, labor employment, literacy rate, and money supply exhibit positive and significant effects on purchasing power. These findings highlight the importance of productive capacity, human capital, and macroeconomic liquidity in supporting real income. Increased capital formation can stimulate economic growth and job creation, thereby enhancing income opportunities even in the presence of demographic ageing. Similarly, higher literacy rates improve individuals' ability to adapt to changing economic conditions, access information, and participate in economic activities, which can mitigate the adverse effects of retirement. The positive role of employment also indicates that continued labor market engagement—whether through part-time work or delayed retirement—can partially offset income losses associated with retirement.

The role of money supply in positively influencing purchasing power, particularly in higher quantiles, may reflect liquidity effects and the availability of financial resources that support consumption. However, this relationship must be interpreted cautiously, as excessive monetary expansion can also contribute to inflationary pressures, potentially offsetting its positive effects. The interplay between monetary policy and retirement welfare therefore requires careful calibration, especially in economies experiencing inflation volatility.

From a broader perspective, the findings of this study are consistent with the conceptualization of retirement as a transition process with heterogeneous outcomes. Similar to transition dynamics observed in other domains, such as energy sector restructuring, the timing, sequencing, and institutional design of retirement policies play a critical role in determining distributional outcomes (23, 27, 28). Just as early retirement of capital assets involves trade-offs between short-term costs and long-term benefits, changes in statutory retirement age involve trade-offs between fiscal sustainability and household welfare. The present results suggest that without adequate policy support, such changes may exacerbate inequalities in purchasing power.

Moreover, the negative association between retirement and purchasing power has important implications for the health and well-being of older adults. Economic constraints can limit access to healthcare, nutritious food, and social participation, thereby increasing the risk of adverse mental and physical health outcomes. Previous studies have demonstrated strong links between economic conditions and mental health among older populations, with factors such as loneliness, anxiety, and depression being influenced by financial security (8, 10, 11). The erosion of purchasing power may therefore have cascading effects that extend beyond economic welfare to broader dimensions of quality of life.

The heterogeneity observed across quantiles also underscores the importance of adopting distribution-sensitive analytical approaches. Traditional mean-based models may obscure important variations in how different groups experience retirement-related changes. By employing quantile regression, the present study captures the nuanced effects of retirement across the income distribution, providing a more comprehensive understanding of its economic implications. This approach aligns with recent empirical trends emphasizing the need to account for inequality and heterogeneity in policy analysis (4, 7).

Taken together, the results highlight the complex interplay between demographic ageing, macroeconomic conditions, and income distribution in shaping purchasing power. Retirement, as a structural transition, interacts with inflation, exchange rates, employment, and human capital to produce differentiated outcomes across the population. These findings contribute to the literature by providing empirical evidence on the quantile-specific effects of retirement in a developing economy context, thereby addressing an important gap in existing research.

One limitation of this study is that it relies on aggregate time-series data, which may not fully capture micro-level heterogeneity in household behavior, savings patterns, and consumption adjustments. In addition, the use of proxy variables such as population aged 65 and above to represent retirement may not perfectly reflect individual retirement decisions or variations in retirement timing. Another limitation concerns potential data constraints, including measurement errors and the availability of consistent long-term data for certain variables. Furthermore, while the model incorporates key macroeconomic factors, it may omit other relevant variables such as pension system characteristics, informal income sources, and regional disparities, which could influence purchasing power dynamics.

Future research should focus on incorporating micro-level household data to better understand the behavioral mechanisms underlying the relationship between retirement and purchasing power. Longitudinal panel data could provide insights into individual trajectories before and after retirement, allowing for more precise identification of causal effects. Additionally, future studies could explore the role of institutional factors, such as pension adequacy, social protection systems, and healthcare access, in moderating the impact of retirement. Comparative studies across countries or regions may also shed light on how different policy frameworks influence retirement outcomes. Finally, integrating qualitative approaches could enrich the analysis by capturing subjective experiences and perceptions of retirees.

From a practical perspective, the findings suggest that policymakers should carefully consider the distributional implications of retirement policies, particularly changes in statutory retirement age. Measures aimed at protecting purchasing power, such as inflation-indexed pensions, targeted subsidies, and support for continued labor market participation, may help mitigate the adverse effects identified in this study. Enhancing financial literacy and promoting savings behavior throughout the life cycle can also strengthen individuals' resilience to retirement-related income shocks. Moreover, macroeconomic stability, particularly in terms of inflation and exchange rate management, is crucial for preserving the real value of retirement income and ensuring the well-being of older populations.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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