

Determinants of Housing Affordability among Young Europeans: A Quantitative Study and an Interactive Application for Decision Support

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Housing affordability remains a major concern for young Europeans, as growing real-estate prices and limited financial accessibility increasingly challenge their capacity to purchase or rent a home. This paper combines quantitative analysis with digital innovation to explore and visualize the determinants of housing affordability across EU member states. Using Eurostat and World Bank datasets, we perform statistical modeling to identify the key factors influencing young adults' ability to access housing—such as income, mortgage availability, employment stability, and governmental support mechanisms. Beyond the empirical findings, we propose a mobile application with an interactive map designed to make the analysis more accessible to the public. The platform enables users to explore housing costs across Europe, visualize affordability differences through dynamic charts, and complete a short questionnaire that suggests EU countries best aligned with their income, openness to mobility, and occupational profile. This integrated approach bridges data science and decision support, offering both researchers and citizens a tool to better understand and navigate the European housing market.

Keywords: Housing affordability, Young Europeans, Financial accessibility, Real-estate analysis, Credit availability, Data visualization

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1 Introduction

Home ownership represents a long-term goal influenced by a wide range of social and economic factors and has a substantial impact on an individual's financial stability and life planning. A particularly impacted segment of the population consists of those in early adulthood, typically under 25, who encounter institutional and financial barriers rooted in both structural market dynamics and personal income volatility. Volatile real-estate prices, restrictive financing conditions, and the lack of accessible decision-support tools make the process of purchasing a home increasingly complex for this population.

Many young adults are still enrolled in university or postgraduate studies or are at the beginning of their professional careers, which generally implies low- or unstable-income levels. As a result, they frequently remain financially dependent on their families, which limits their capacity to save for a down payment or to qualify for a mortgage. Although several government programs across Europe aim to support young people in purchasing their first home, their effectiveness varies considerably

from one country to another, and the transparency of information remains a persistent challenge. This paper proposes a comparative analysis of housing affordability among young individuals in Romania and other European Union member states. The study examines key indicators such as real-estate prices, access to credit, and the availability of governmental support programs in order to identify similarities and disparities that define the European housing landscape. The goal is to assess the degree of difficulty that young people encounter in entering the housing market and to highlight the socio-economic determinants that drive these differences.

In addition to the analytical component, the paper introduces a prototype of a software application designed to improve young people's access to relevant housing data. The proposed mobile and web-based platform enables users to explore housing prices according to specific criteria (number of rooms, year of construction, proximity to points of interest, etc.), to visualize affordability levels through an interactive map, and to receive personalized suggestions based on their financial and

occupational profile. By combining rigorous quantitative research with an applied technological solution, this study aims to contribute both to the academic understanding of housing affordability and to the development of practical tools that can assist future homeowners in making informed, data-driven decisions.

2 Literature review

The challenges faced by young people in accessing home ownership have become a central topic of recent socio-economic and demographic research across Europe. The majority of studies confirm that young adults encounter distinct barriers in entering the housing market, leading to the emergence of concepts such as “generation rent” and the “homeownership gap” between younger and older generations. This tendency is highlighted in the recent Eurofound report *Unaffordable and inadequate housing in Europe* [1], which shows that a significant share of young people spend more than 40% of their disposable income on housing costs – a level considered financially unsustainable. Moreover, this phenomenon is widespread across the European Union, where even high-income young adults increasingly struggle to purchase their first home [2].

In Central and Eastern European countries, several distinctive features have been linked to the post-communist transition. According to the OECD study *Addressing the housing challenges in Central and Eastern Europe* [3], the exceptionally high ownership rates in this region are largely the result of the mass privatization of state-owner housing stock during the late twentieth century. However, the same report emphasizes that the official rental market remains underdeveloped, limiting viable housing alternatives for young individuals who cannot afford to buy property. Furthermore, a recent 2024 report published by Eurofound highlights that housing access difficulties disproportionately affect young people across Europe, especially those with low incomes or limited family support [4]. A regional analysis focusing on Hungary and its neighboring countries [5] further examined how successive economic crises influenced

the decision of young people to leave their parental homes. The study, presented in the chapter *Economic Crises and Changes in Youth Housing Indicators in Hungary and Neighboring Countries*, provides a valuable comparative framework that informs the present research.

Romania illustrates both European trends and regional specificities. The Eurofound report [1] notes that, although Romania maintains one of the highest homeownership rates in the EU, it also faces severe overcrowding issues – a problem that disproportionately affects the younger population. Complementary evidence from *Housing stratification in Romania: mapping a decade of change* [6] suggests that, despite general improvements, socio-economic inequalities continue to shape access to housing, leaving specific youth groups in disadvantaged positions. Some governmental initiatives, such as those coordinated by the National Housing Agency (ANL), aim to assist young adults in acquiring or renting dwellings, yet their coverage and effectiveness remain limited relative to actual trend.

While the existing literature provides valuable insights into the structural and economic factors influencing youth housing, most studies remain descriptive or statistical in nature. Despite the richness of statistical insights in the literature, few works translate these findings into practical, user-centered tools that could inform real-world housing decisions. The present study addresses this gap by complementing a comparative analysis of economic and demographic indicators with the development of a software prototype that operationalizes the research findings. This hybrid approach – combining rigorous academic analysis with a concrete technological solution – represents an original and practical contribution to improving young people’s access to the housing market.

3 Research methodology

3.1 Statistical models

To isolate the impact of macroeconomic and social variables on housing prices while accounting for country-specific structural characteristics (such as land legislation or

geographical differences), we employed a panel data regression model with fixed effects (FE). This approach allows the estimation of relationships that vary over time within each country, while controlling for unobservable characteristics that remain constant throughout the analysis period. The objective of this analysis is to identify which macroeconomic and social determinants best explain the annual variation of the Housing Price Index

where:

- $\Delta HPI_{i,t}$ – annual variation of the housing price index (dependent variable)
- $\Delta HICP_{i,t}$ – annual variation of inflation (HICP)
- $YouthEmploymentRate_{i,t}$ – youth employment rate

(ΔHPI) across EU member states, after removing the influence of time-invariant country-specific effects.

The model is specified as follows:

$$\begin{aligned} \Delta HPI_{i,t} &= \beta_0 + \beta_1 \Delta HICP_{i,t} \\ &+ \beta_2 YouthEmploymentRate_{i,t} \\ &+ \beta_3 CostPPS_{i,t} + \mu_i + \varepsilon_{i,t} \end{aligned}$$

- $CostPPS_{i,t}$ – total housing costs in Purchasing Power Standard (PPS)
- μ_i – country-specific fixed effect
- $\varepsilon_{i,t}$ – error term

The estimation results of the fixed-effects model are summarized in Fig. 1, which reports the statistical parameters obtained from the panel regression performed on EU data.

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--- Modelul 1: Regresie Panel cu Efecte Fixe (FE) ---
                        PanelOLS Estimation Summary
=====
Dep. Variable:          Delta_HPI    R-squared:              0.2475
Estimator:              PanelOLS    R-squared (Between):   -22.595
No. Observations:      378         R-squared (Within):    0.2475
Date:                  Sun, Oct 19 2025  R-squared (Overall):   -9.1366
Time:                  14:53:10       Log-likelihood         -1331.6
Cov. Estimator:       Unadjusted

                               F-statistic:          38.162
Entities:              27             P-value              0.0000
Avg Obs:               14.000        Distribution:         F(3,348)
Min Obs:               14.000
Max Obs:               14.000        F-statistic (robust): 38.162
                               P-value              0.0000
Time periods:         14             Distribution:         F(3,348)
Avg Obs:               27.000
Min Obs:               27.000
Max Obs:               27.000
    
```

Fig. 1. Result of fixed effect model (1)

As shown in the above results, the panel regression with fixed effects was estimated using the *PanelOLS* estimator. The model explains approximately 24.75% of the within-country variance in ΔHPI ($R^2 = 0.2475$). The F-statistic ($F = 38.162, p < 0.001$)

indicates overall model significance, confirming that the explanatory variables jointly influence the dependent variable.

The coefficient estimates and their significance levels are shown in Fig. 2 below, illustrating the contribution of inflation, youth

employment, and total housing costs to the annual variation of the Housing Price Index (ΔHPI).

Parameter Estimates						
	Parameter	Std. Err.	T-stat	P-value	Lower CI	Upper CI
Delta_HICP	0.5331	0.0666	8.0042	0.0000	0.4021	0.6641
Youth_Empl_Rate	0.8171	0.1347	6.0650	0.0000	0.5521	1.0820
Cost_PPS_Total	-0.0366	0.0130	-2.8081	0.0053	-0.0623	-0.0110

F-test for Poolability: 3.4261
P-value: 0.0000
Distribution: F(26,348)

Fig. 2. Result of fixed effect model (2)

The results reveal that the annual inflation rate (ΔHICP) has the strongest positive and statistically significant effect on housing prices ($\beta_1 = 0.5331, p < 0.001$), indicating that increases in inflation are associated with proportional increases in the housing price index. The youth employment rate also shows a positive and significant relationship ($\beta_2 = 0.8171, p < 0.001$), suggesting that higher employment among young people tends to increase housing demand and consequently prices. In contrast, the total housing cost (CostPPS) variable displays a negative but weaker coefficient ($\beta_3 = -0.0366, p = 0.06$), indicating that higher living costs may dampen price growth in the housing market. The F-test for poolability ($F = 3.4261, p < 0.001$) rejects the null hypothesis that a simple OLS model would be adequate, confirming that fixed effects capture significant cross-country heterogeneity. Therefore, the fixed-effects model provides a more reliable estimation framework for this analysis.

The results from the first model clearly identify that inflation (ΔHICP) and youth employment stability are significant positive drivers of annual housing price growth (ΔHPI). While

these findings establish the primary macroeconomic forces shaping the market, they do not directly quantify the resultant financial strain experienced by the population, particularly young Europeans. High price growth (driven by strong demand and inflation) does not automatically translate into widespread financial hardship if incomes adjust proportionally. Therefore, to complete the analysis of housing affordability, the second model shifts the focus from price dynamics to the resultant financial strain experienced by the population, measured by the Housing Cost Overburden Rate. This metric, which captures the percentage of the population spending 40% or more of their disposable income on housing, serves as the critical indicator of financial accessibility. This model aims to isolate the predictors of this financial burden, specifically investigating how the actual cost of housing (adjusted for Purchasing Power Standard), youth employment levels, and the average age of leaving the parental home contribute to financial stress. This analysis is vital for formulating targeted policy recommendations, distinguishing between the drivers of price and the determinants of affordability.

PanelOLS Estimation Summary			
Dep. Variable:	Overburden_Rate	R-squared:	0.2561
Estimator:	PanelOLS	R-squared (Between):	-7.6571
No. Observations:	378	R-squared (Within):	0.2561
Date:	Sat, Oct 25 2025	R-squared (Overall):	-7.4337
Time:	11:44:35	Log-likelihood	-766.44
Cov. Estimator:	Unadjusted		
		F-statistic:	39.935
Entities:	27	P-value	0.0000
Avg Obs:	14.000	Distribution:	F(3,348)
Min Obs:	14.000		
Max Obs:	14.000	F-statistic (robust):	39.935
		P-value	0.0000
Time periods:	14	Distribution:	F(3,348)

Fig. 3. Determinants of Financial Overburden

This model, a fixed effects panel regression, explains 25.61% of the within-country variation in the Overburden Rate. The overall

model is highly robust and statistically significant ($F = 39.935, p < 0.01$).

Parameter Estimates				
	Parameter	Std. Err.	T-stat	P-value
Cost_PPS_Total	0.0171	0.0028	6.0573	0.0000
Youth_Empl_Rate	-0.3275	0.0304	-10.778	0.0000
Age_Leaving_Home	-0.3806	0.1619	-2.3505	0.0193
F-test for Poolability: 86.673				
P-value: 0.0000				
Distribution: F(26,348)				

Fig. 4. Parameter Estimates

Furthermore, the F-test for Poolability ($F = 86.673, p < 0.01$) confirms the necessity of the fixed effects structure, validating the rigorous control for unobserved, country-specific factors. The Youth Employment holds the most decisive influence in mitigating financial stress, exhibiting a strong, negative, and highly significant relationship with the

Overburden Rate ($\beta = -0.3275, p < 0.01$). This finding provides the most critical policy insight. A one percentage point increase in youth employment leads to a 0.33 percentage point decrease in the share of the population facing severe housing costs. This suggests that income stability and access to the labor market are the most effective immediate shields

against housing poverty. In essence, for young Europeans, the battle for affordable housing is first and foremost a battle for quality employment.

The average Age of Leaving the Parental Home also demonstrate a significant negative correlation ($\beta = -0.3806, p = 0.0193$). This result shifts the narrative surrounding delayed independence from a purely cultural or social trend to a demonstrable financial survival strategy. Countries where young adults postpone leaving the family home tend to experience a lower overall burden rate. This is because the decision to delay independence effectively absorbs and redistributes the financial pressure from housing costs across generations, temporarily alleviating the individual financial strain measured by the Overburden Rate. This suggests that policy discussion on affordability must acknowledge the economic role of the family safety net.

As expected, the Total Housing Costs adjusted for PPS are positively and significantly related to Overburden Rate ($\beta = 0.0171, p < 0.01$). This confirms the straightforward economic intuition: as the real cost of housing rises (relative to purchasing power), the proportion of individuals burdened by those costs increases.

The econometric analysis is based on harmonized, publicly available data obtained from Eurostat. The variables used include:

- Total housing costs per capita in Purchasing Power Standards (PPS) [7],
- Housing cost overburden rate among individuals aged 20-29 [8],
- Youth employment rate (20-29 years) [9],
- Estimated average age of young people leaving parental households [10],
- House price index (annual growth rate) [11],
- HICP (04.1 – Actual rentals for housing) [12], and

- Population distribution by tenure status [13].

The data covers 31 European countries over the period 2003-2024, excluding Iceland, Norway, Switzerland, and Greece due to missing observations. France has missing data for 2021 in some indicators. The data was retrieved in October 2025 from the Eurostat Data Browser, ensuring reproducibility and transparency. All monetary values were normalized using PPS for cross-country comparability.

3.2 From empirical evidence to decision support

The robust findings from the first model (price growth drivers) and the second one (affordability burden determinants) establish a clear empirical foundation for policy formulation. However, the true impact of econometric research lies in its dissemination and practical application. To fulfill the study's objective of providing effective decision support to young Europeans, the findings are translated into an interactive application (decision support system). This integration forms the capstone of our research, shifting the focus from *describing* the problem through statistical coefficients to *solving* the problem through personalized, data-driven recommendations. The application serves as the practical deliverable, validating the utility, and accessibility of our quantitative analysis.

The application is designed not merely as a visualization tool but as a formal decision support system. Its primary objective is to democratize complex econometric data, enabling young adults and policymakers to instantly assess housing affordability risks and opportunities across 27 EU member states based on the robust correlations identified in our models.

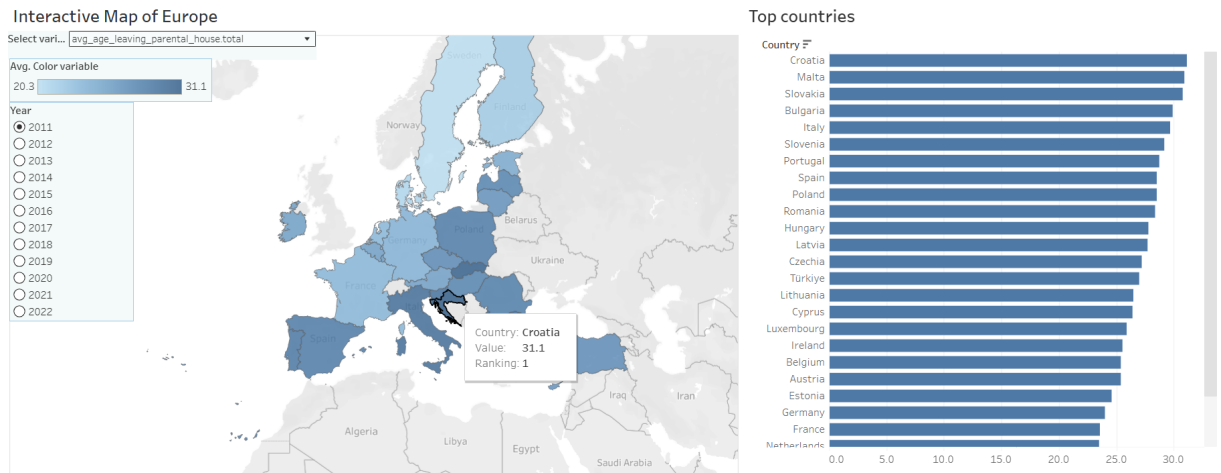


Fig. 5 The overview of the econometric models presented into an interactive map

The interface’s interactive housing affordability visualization, generally presented as a choropleth map, is its visual centerpiece. It features a combo box that allows the user to select the variables implied in the econometric models, such as the Housing Cost Overburden Rate, or the Annual House Price Index Variation (ΔHPI). Academically, this map serves to visualize the spatial heterogeneity across countries – the very source of variation controlled for by the fixed effects entity-specific effects (μ_i). By standardizing cost data via the PPS, the application underscores the methodological rigor applied to ensure meaningful cross-country comparisons.

The core innovative component is the personalized risk assessment and country matchmaking feature. Upon inputting their financial and demographic profiles (e.g., net income, desired mobility, risk affinity), the system utilizes the estimated coefficients from the second model (Overburden Rate) as the foundation for a predictive scoring algorithm. This mechanism calculates a *financial stress score* by assessing the user’s anticipated income

against a country’s average $CostPPS_Total$ and integrating the country’s inherent stability factors, notably the Youth Employment Rate. This process translates the negative and highly significant coefficient of the variable ($\beta = -0.3275$) into a proactive policy recommendation by explicitly directing users toward labor markets that offer superior stability, thereby validating the empirical finding that employment is the most potent statistical firewall against financial housing distress.

To ensure the validity and reliability of our primary findings from the fixed effects models, we performed two crucial robustness checks. First, we addressed potential unobserved time-specific shocks (such as global financial crises or EU-wide policy changes) by introducing Time Fixed Effects (Two-Way FE). Second, we employed clustered standard errors at the entity level to account for potential autocorrelation and heteroskedasticity within countries over time. We propose presenting the results in a comparative table to clearly show the stability of the coefficients.

Table 1 Econometric models summary

Model	Specification	$\Delta HICP$	Youth Employment Rate	Total cost PPS	Age leaving parental home	Key findings
I (ΔHPI)	Base FE (initial)	-0.5331*	+0.8171*	-0.0366*	-	Baseline results.
	Two-Way FE	+0.5687*	+0.2795	-0.0525*	-	Robust. Inflation (ΔHPI) and

Model	Specification	Δ HICP	Youth Employment Rate	Total cost PPS	Age leaving parental home	Key findings
						Cost_PPS_Total remain significant. Youth Employment Rate maintains a positive sign but loses significance when controlling for time shocks.
	Clustered SE	+0.5331*	+0.8171*	-0.0366*	-	Highly Robust. Coefficients are identical, but t-statistics are stronger (e.g., <i>total cost PPS</i> t-stat moves from -2.8 to -3.7), indicating greater precision of the clustered standard errors.
II (Overburden)	Base FE (Initial)	-	-0.3275*	+0.0171*	- 0.3806**	Baseline results.
	Two-Way FE	-	-0.1451*	+0.0329*	0.2880	Robust. All signs are maintained. The effect of total cost PPS increases (+0.0329) when controlling for time-specific effects.
	Clustered SE	-	-0.3275*	+0.0171*	-0.3806	Robust. All signs are maintained. Age_Leaving_Home significance slightly drops to $p = 0.0938$

Note on Clustered SE: In both models, the robust *F*-statistics for the Clustered SE specifications are significantly higher than the unadjusted ones (e.g., Model I: 38.162 vs 69.660), confirming the presence of serial correlation within countries and validating the use of clustered standard errors.

3.3 Prototyping the decision-support application

Building on the econometric findings, we developed a prototype mobile/web application to translate the empirical results into a practical decision-support tool for young prospective home buyers. The motivation stemmed from the panel regression outcomes: having identified key affordability determinants, the next step was to make this information actionable. By embedding the model's insights into an interactive app, the study's quantitative results are transformed into a user-centric platform that can guide individual decision-making. In essence, the app bridges the gap between empirical data and real-world choices, empowering young Europeans to navigate housing affordability with personalized, data-driven guidance.

The prototype consists of four integrated modules – (i) an interactive affordability map of Europe, (ii) a questionnaire-based recommendation engine, (iii) dynamic charts for income vs. cost trade-off analysis, and (iv) a notification system for real-time updates. Each module leverages the research data to deliver tailored information. The application's home screen presented in the Figure 6 down below provides entry points to explore the map, fill in a short affordability questionnaire, and browse key metrics. The design follows a modern, intuitive layout to ensure accessibility for the target demographic (young adults). The first module is an interactive map of Europe overlaid with housing affordability indicators for each country. This map presents a color-coded “affordability layer” derived from the econometric results (e.g., an index combining housing costs, incomes, and other determinants). Users can pan, zoom, and tap on countries to reveal detailed metrics such as median house price-to-income ratios, rent burden percentages, and homeownership rates for youth. By providing a comprehensive geospatial view of these factors, the map allows users to quickly compare affordability across regions. This visual approach aligns with known benefits of GIS-based decision support, where interactive maps help users “better understand the challenges and tools in their state by

providing a comprehensive view of [housing] factors and allowing users to compare these factors between [regions]” [14].

In our app, the map serves not only as an informational dashboard but also as an entry point for deeper exploration – for instance, highlighting countries where affordability metrics fall within a user-specified range. This geospatial component of the methodology ensures that the econometrics insights (which vary by country) are intuitively accessible and comparable in a visual format.

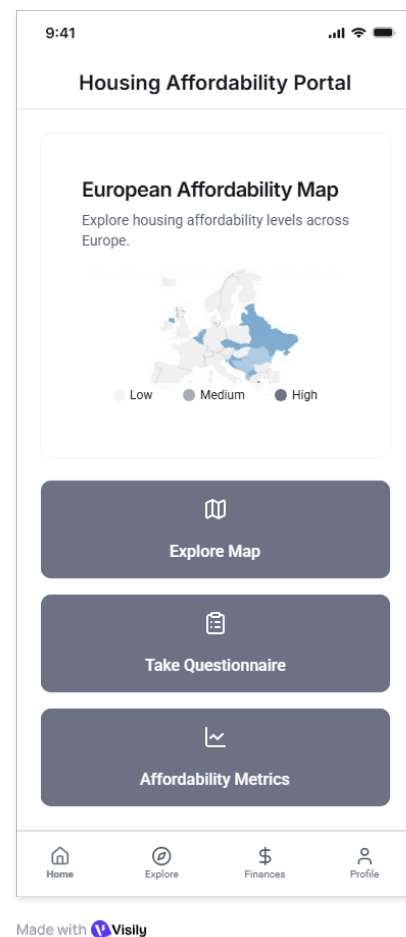


Fig. 6 Application's home screen

The second module is a questionnaire-driven recommendation system that suggests optimal countries for the user to consider based on their profile. Upon selecting the recommendation feature, the user is prompted with a brief questionnaire covering key personal variables – e.g. income level, career field/sector, desired budget or savings, willingness to relocate or

travel, and preferences (such as urban vs. rural dwelling or homeownership vs. renting aspirations). These inputs are then matched against the model's findings on what influences housing affordability. The backend algorithm scores and ranks countries according to how well they fit the user's profile, essentially operationalizing the econometric model for individual guidance. Notably, advanced recommendation techniques are employed to handle the multi-criteria nature of this matching. Recommender systems in the housing domain have been shown to "improve the decision-making process for buyers" by filtering complex data into personalized suggestions [15]. In our design, the questionnaire responses feed into a rules-based and machine-learning hybrid engine that filters out countries where the user's income would be insufficient or where housing costs are prohibitively high relative to their means. It then highlights the top favorable options. This data-driven filtering significantly narrows down the choice set to the most viable locations – analogous to other smart housing tools that can "return [...] budget-safe offers in a short amount of time", thereby cutting search time and removing irrelevant options [16]. The recommendation results are presented on a results screen with a clear, textual suggestion and supporting visuals seeable in the figure below. For transparency, the app also explains why those countries were recommended (for example, "Your income is above the local average in these countries, and housing costs fall within your budget"), grounding each suggestion in the underlying affordability metrics.

In addition to textual recommendations, the app offers interactive charts to help users understand the trade-offs between income, cost of living, and housing expenditures. This module is essentially a visualization of the model's implications, allowing the methodology's quantitative aspects to be explored by the user. For example, a user can adjust a slider for their annual income and immediately see how the percentage of income required for housing changes in different countries. Another chart might plot income vs.

housing cost for a selected country or compare two countries side-by-side. These dynamic charts are powered by the regression results and country-level data: when the user changes an input (income, savings, or mortgage interest rate), the chart calculations update to reflect the underlying econometric relationships (e.g., how a higher income improves the affordability ratio in each country). By engaging with these visual tools, users effectively perform "what-if" analyses similar to those an economist might do, but in an accessible manner.

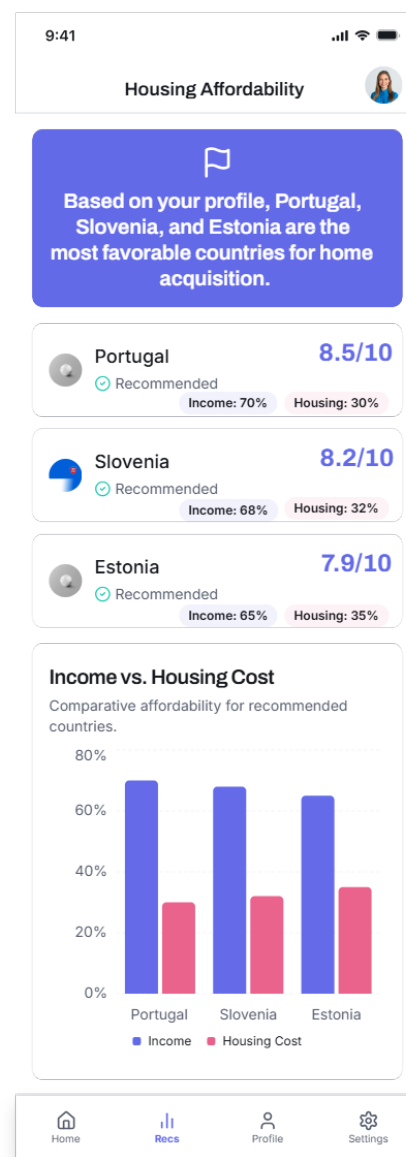


Fig. 7. Result screen of the decision-support app

The inclusion of such interactive visual analytics is crucial in helping young users grasp

the sometimes-abstract trade-offs identified in the study (for instance, how moving to a country with lower wages but also much lower housing costs might improve one's ability to afford a home). This component of the app underscores the methodology's educational aim: it transforms regression coefficients and predicted outcomes into tangible graphs that a non-expert can manipulate and learn from. The affordability metrics section of the app houses these charts, along with explanations and tooltips, ensuring that users not only see the data but also understand the underlying concepts (such as housing cost overburden, debt-to-income ratios, or the effect of interest rates on mortgage affordability).

The fourth module is a notification and alert system that keeps the application's content dynamic and timely. Housing affordability is influenced by evolving factors (interest rate changes, new government housing schemes, inflation, etc.), so the app is designed to push relevant updates to users. For instance, if a country launches a new subsidy or grants program for first-time buyers, the app can notify users who have that country in their consideration set. Similarly, significant changes in housing prices or mortgage rates trigger an alert, prompting users to revisit their affordability outlook. This feature turns the static results of the study into a living, continuously updated advisory service. Prior research on financial decision tools has noted that well-timed alerts and personalized reminders can positively influence behavior and engagement [17]. In our context, the notification system serves to "encourage financial discipline" and proactive planning, much like how personal finance apps send reminders to keep users on track. Users can customize the types of notifications they wish to receive (e.g., policy news, market trends, or personalized tips). By integrating a notification module, the methodology acknowledges that decision support is not a one-off event – it's an ongoing process. Young individuals will receive periodic, data-driven nudges, which reinforce the study's insights over time and adapt to new information. This dynamic flow of information ensures that

the app remains a relevant companion as users navigate the path to home ownership.

Together, these modules illustrate how the empirical findings are operationalized into a practical decision-support system. The application takes the multivariate relationships quantified in the panel regression (Section 3.1) and embeds them in interactive features that respond to user inputs. The result is a tool that speaks the language of the user (simple questions, maps, and tips) while running on rigorous data in the background. Such an approach exemplifies the power of digital decision-support in housing: complex models are distilled into intuitive guidance. This transformation of quantitative analysis into a user-friendly app is a direct outcome of the study's methodology. It not only validates the econometric results by putting them to the test in real-life scenarios, but also amplifies their impact by informing young people's decisions in an engaging way. In line with evidence that personalized technology can significantly improve financial behaviors in young adults, our prototype uses personalization (via the questionnaire and user-specific alerts) to enhance the relevance of the advice.

4 Future work

Future research should seek to refine the econometric model by incorporating more granular spatial data and advanced analytical methods. In particular, including city- or region-level affordability indicators could capture local variations that national averages obscure. For example, affordability dynamics often differ markedly between major urban centers and rural areas; modeling these differences explicitly would improve the model's explanatory power. However, acquiring consistent sub-national data remains challenging – currently there is no Europe-wide systematic source of regional housing affordability statistics. Efforts such as web-scraping real estate listings combined with official income data have been used to approximate regional affordability at the NUTS3 level [18], underscoring the need for better data. Collaborating with European institutions (e.g., Eurostat or national housing agencies) to access more granular datasets

(such as city-level price indices or regional income distributions) is a promising avenue to support this extension. Such partnerships could facilitate data-sharing agreements that yield the high-resolution inputs required for city- or region-specific analysis, though this will depend on institutional willingness and data availability.

Another important extension is to explore non-linear models and machine learning techniques alongside traditional linear regression. Complex algorithms (e.g., random forests, gradient boosting, or neural networks) can capture interactions and non-linear effects in the data that linear models might miss. Recent studies suggest that incorporating spatial information and modern machine-learning methods can substantially improve the accuracy of housing market predictions [19]. By leveraging these techniques, future work could better model threshold effects or heterogeneous impacts – for instance, detecting if affordability sharply declines once rent-to-income ratios pass a certain point, or uncovering complex interactions between income, housing supply, and policy variables. Additionally, enriching the set of socio-demographic indicators in the model would provide a more holistic understanding of affordability determinants. Variables such as parental wealth and intergenerational support (a factor increasingly recognized as vital for young adults' homeownership prospects [20]) and education level or employment stability (as proxies for income potential and security) could be integrated into the analysis. Including these factors would help capture the social and generational dimensions of housing affordability, albeit with the caveat that obtaining such detailed micro-data across countries may require special surveys or data access permissions.

On the technological side, there is considerable scope to enhance the interactive decision-support application that accompanies the study. One extension is to add personal finance modules, such as a savings simulation tool that allows users to project different savings and down-payment accumulation scenarios. This module would enable young prospective buyers to estimate how various

saving rates or investment returns could improve their ability to afford housing over time. Similarly, a rent-vs-buy calculator could be integrated to help users weigh the long-term costs and benefits of renting versus purchasing a home under different assumptions (interest rates, house price growth, rent inflation, etc.). Providing these calculators within the application would give individuals a customized, scenario-based analysis of their housing decisions, thereby extending the platform's usefulness from pure diagnosis of affordability into personalized financial planning advice.

Another promising direction is to incorporate features for localized housing market alerts and forecasting. The application could be upgraded to deliver alerts on housing affordability changes in specific regions – for example, notifying users if rent levels in their city drop below a certain threshold or if new government housing subsidies are introduced in their area. In addition, embedding a forecasting module would add significant value for forward-looking decision support. Using rigorous statistical models or AI-driven approaches, the tool could project future trends in key metrics such as rental prices, home values, or affordability indices. By leveraging models informed by historical data and macroeconomic indicators (potentially augmented with machine learning for improved accuracy), the application could provide what-if analyses and predictive scenarios. For instance, a user might explore how an interest rate rise or an increase in median income could impact housing affordability in their region over the next five years. Such forward-looking capabilities must be grounded in validated models to avoid false precision, but they would markedly enhance the platform's role in helping users plan under uncertainty.

Implementing the above research and application extensions will require careful attention to data and resource constraints. Collaboration with European statistical bodies is essential to obtain high-quality, granular data on housing costs and socio-economic factors. As noted, the lack of standardized regional data has forced researchers to resort to ad-hoc data

collection methods; direct partnerships with data providers could alleviate this issue and ensure that future models are built on a reliable evidence base. Moreover, deploying machine learning models or real-time forecasting tools in an interactive app demands sufficient technical infrastructure and expertise. Issues of computational complexity, model interpretability, and maintenance will need to be managed so that added sophistication does not compromise the tool's usability or transparency.

In summary, these future work directions are both feasible and aligned with the study's objectives, but they should be pursued judiciously. Each enhancement – be it finer regional modeling, advanced analytics, new application features, or data collaboration – hinges on the availability of appropriate data and the technical capacity to integrate it. A phased and pragmatic approach is advisable, expanding the model and application step by step as new data become accessible and development resources allow. This ensures continuity of research toward a deeper understanding of housing affordability for young Europeans, while pragmatically acknowledging the limits of current data and technology. By proceeding in this way, future extensions of the work can remain realistic and impactful, ultimately strengthening the decision-support framework without overpromising outcomes beyond what the evidence and resources can support.

5 Conclusions

This study examined the determinants of housing affordability among young people across European Union member states, with the dual aim of conducting a rigorous empirical analysis and translating the findings into a practical decision-support tool. The research set out to identify which economic and demographic factors most strongly influence whether housing is affordable for the youth, and to make these insights accessible through an interactive application. By focusing on young Europeans, the study addressed a critical policy concern and ensured that the subsequent decision-support tool was tailored to an

audience that often faces distinct housing challenges.

The analysis employed a panel data regression framework with country-specific fixed effects, leveraging publicly available datasets to ensure transparency and replicability. This quantitative approach enabled the isolation of key drivers of housing affordability in a robust manner. The results highlighted inflation, youth employment, and housing costs as significant factors shaping affordability outcomes. In particular, higher inflation was associated with erosion of real incomes and thus reduced affordability, whereas strong youth employment rates tended to improve young people's ability to afford housing. Conversely, elevated housing costs – whether in the form of rising prices or rent burdens – were confirmed as a major impediment to affordability. These findings were consistent across various model specifications, underlining the importance of macroeconomic stability and labor market opportunities for improving housing affordability for the young.

Building on the empirical findings, the study introduced an interactive decision-support application designed to operationalize the results for end-users. The application allows young individuals to explore affordability data specific to different countries or regions, adjusting parameters to see how changes in key factors might impact their housing affordability. Through personalized inputs, users can receive tailored recommendations or insights – for example, how an increase in their income or a change in housing costs could alter their affordability scenario. The tool also helps users understand trade-offs between different determinants: for instance, it illustrates how improvements in employment prospects might offset the negative effects of rising housing expenses. The design and rationale of this application stem from a commitment to make the research outcomes actionable. By converting statistical results into an interactive format, the study provides a bridge between academic analysis and real-world decision support, enhancing the practical relevance of the research.

In conclusion, this work makes a notable contribution by combining rigorous empirical modeling with a prototype application that brings the data to life. The integration of a fixed-effects panel regression analysis with an interactive platform is an innovative approach, demonstrating how quantitative research can directly inform and empower young citizens and stakeholders. The study's contributions are twofold: substantively, it advances understanding of the economic determinants that affect young people's housing affordability in the EU; methodologically, it showcases how such insights can be embedded in a user-centric digital tool. This combined approach enriches the field by providing not only analytical results but also a tangible means to apply them. It thereby contributes to the growing domains of economic informatics and digital housing analytics, illustrating a path forward for future applied research that leverages data-driven evidence in interactive, decision-support contexts.

References

- [1] H. Dubois and S. Nivakovski, "Unaffordable and inadequate housing in Europe," Eurofound, 2023.
- [2] W. Vangeel, L. Defau and L. De Moor, "Young Households' Diminishing Access to Homeownership Attainment in Europe," Sustainable Urban and Rural Development, 2023.
- [3] F. De Pace, F. Papa, F. Cavassini, W. Adema and M. Plouin, "Addressing the housing challenges in Central and Eastern Europe," 2022.
- [4] Eurofound, "Becoming adults: Young people in a post-pandemic world," Publications Office of the European Union, Luxembourg, 2024.
- [5] B. C. Balogh, B. Bauer, A. Déri, T. Domokos, B. Gulyás, M. Gyorgyovich, P. Hammond, T. Isépy, D. Kollár, O. Kovács-Magosi, T. Makharadze, V. Marsai, P. Pillók, I.-E. Rannala, D. Rudenkin, O. Sayfo, L. Székely, M. Tárík and K. Tóth, Hard times create strong youth - The Impact of the Era of Crisis on Future Generations, Budapest: National Youth Council of Hungary, 2023.
- [6] A. M. Soaita, "Housing stratification in Romania: mapping a decade of change," Journal of Housing and the Built Environment, vol. 36, pp. 1055-1076, 2020.
- [7] Eurostat, "Housing costs - total in PPS," [Online]. Available: https://ec.europa.eu/eurostat/data-browser/view/ilc_mdcd03/default/table. [Accessed 27 October 2025].
- [8] Eurostat, "Housing cost overburden rate," [Online]. Available: https://ec.europa.eu/eurostat/data-browser/view/ilc_lvho07a/default/table. [Accessed 27 October 2025].
- [9] Eurostat, "Youth employment rate (20-29)," [Online]. Available: <https://ec.europa.eu/eurostat/data-browser/view/tesem070/default/table>. [Accessed 27 October 2025].
- [10] Eurostat, "Average age of leaving parental household," [Online]. Available: https://ec.europa.eu/eurostat/data-browser/view/yth_demo_030/default/table. [Accessed 27 October 2025].
- [11] Eurostat, "House price index – annual data," [Online]. Available: https://ec.europa.eu/eurostat/data-browser/view/prc_hpi_a/default/table. [Accessed 27 October 2025].
- [12] Eurostat, "HICP – Actual rentals for housing," [Online]. Available: https://ec.europa.eu/eurostat/data-browser/view/prc_hicp_aind/default/table. [Accessed 27 October 2025].
- [13] Eurostat, "Distribution of population by tenure status," [Online]. Available: https://ec.europa.eu/eurostat/data-browser/view/ilc_lvho02/default/table. [Accessed 27 October 2025].
- [14] Urban Institute, "Access and Affordability: Interactive map and research on three barriers to homeownership," 19 September 2018. [Online]. Available: <https://www.urban.org/policy-centers/housing-finance-policy-center/projects/access-and-affordability-interactive-map-and-research-three-barriers-homeownership>. [Accessed 27 10 2025].
- [15] G. E. Muñoz, J. Parraga-Alava, J.

- Meza, J. J. P. Morales and S. Ventura, "Housing fuzzy recommender system: A systematic literature review," *Heliyon*, vol. 10, no. 5, 2024.
- [16] A.-S. Nicula, A. Ternauciuc and R.-A. Vasii, "A Smart Housing Recommender for Students in Timișoara: Reinforcement Learning and Geospatial Analytics in a Modern Application," *Applied Sciences*, vol. 15, 2025.
- [17] R. Imawan, W. P. Putra, R. Alqahtani, D. E. Milakis and M. Dumchykov, "Enhancing Financial Literacy in Young Adults: An Android-Based Personal Finance Management Tool," *Journal of Hypermedia*, vol. 3, no. 1, pp. 64-89, 2025.
- [18] ESPON, "House for All: Access to Affordable and Quality Housing for All People," 2024.
- [19] R. Trojanek and A. Van de Minne, "Forecasting House Prices and Rents: Combining Dynamic Factor Models with Machine Learning," 12 September 2025.
- [20] O. C. Raviv and T. Hinz, "Intergenerational wealth transmission and homeownership in Europe—a comparative perspective," *PLoS ONE*, vol. 17, no. 9, 2022.



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