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HOUSING PRICES, MARRIAGE AND BIRTH RATES IN AZERBAIJAN

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Housing prices, marriage and birth rates in Azerbaijan

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Abstract

Between 2012 and 2025, Azerbaijan experienced rising housing prices alongside falling marriage and birth rates. This study examines whether these changes are linked and whether marriage is one route through which housing conditions are associated with births. Quarterly series are reconstructed from data published by the State Statistical Committee and analysed with autoregressive distributed lag models that account for seasonal patterns and the sharp disruptions of 2015 and the COVID period. The estimates show a stable negative long-run relationship between housing prices and marriage. A 1 percent higher housing price index is associated with an approximately 1.6 percent lower marriage rate. Housing prices are also negatively associated with births, although a separate long-run relationship is not confirmed in the model relating housing prices directly to births. When the marriage rate from four quarters earlier is included, the joint model supports a long-run relationship among housing prices, marriage and births. The lagged marriage rate is positively associated with births, and the estimated negative association between housing prices and births weakens by 24.5 percent. This pattern is consistent with higher housing costs delaying marriage and reducing later births. It also leaves room for housing constraints after marriage. The results provide the first quarterly evidence for Azerbaijan that housing conditions, marriage and births are linked over time.

Keywords: household formation, childbearing, housing affordability, demographic change, time-series analysis

JEL classification: J12; J13; R21; R31

1. Introduction

Azerbaijan's housing and demographic series have moved apart for more than a decade. The total fertility rate fell from 2.3 children per woman in 2012 to 1.4 in 2025, and the crude birth rate declined even more sharply. Registered marriages also became less common. At the same time, the annual average of the chained housing price index rose by about 78 percent (The State Statistical Committee of the Republic of Azerbaijan).

Housing can enter family decisions before and after marriage. Young adults who expect to live independently must buy, rent or obtain a dwelling with help from relatives. A higher price increases the resources needed for each option and may postpone marriage. Once a couple has married, limited space may still delay a first or additional child. The direction of the aggregate relationship is not automatic because a price increase also raises the wealth and borrowing capacity of existing homeowners.

Do housing prices, marriage rates and birth rates in Azerbaijan form stable long-run relationships? The empirical argument has three parts. Higher housing prices should accompany a lower marriage rate. Higher prices should also accompany a lower birth rate. Finally, marriage should predict births with a delay, and the housing coefficient in the birth equation should decline when earlier marriages are taken into account.

Quarterly series for 2012Q1-2025Q4 are constructed from the State Statistical Committee's cumulative demographic releases and quarterly housing price comparisons. Quarterly counts are converted into annualized marriage and birth rates per 1,000 people. Three ARDL bounds models then estimate the housing-marriage relationship, the housing-birth relationship and a joint birth equation that uses the marriage rate from four quarters earlier. Seasonal indicators and separate controls for the 2015Q3 break and the COVID period isolate unusually large disruptions from the regular dynamics.

The estimates are economically large. The long-run housing elasticity of the marriage rate is -1.61. Housing alone has an implied birth-rate elasticity of -1.41, although the corresponding bounds test does not confirm a bivariate long-run relationship at the 5 percent level. In the joint birth equation, the model passes the bounds test, the housing coefficient is -1.06 and the coefficient on marriage four quarters earlier is 0.30. Adding marriage reduces the absolute housing coefficient by about one quarter.

The contribution is both substantive and empirical. This is the first study to estimate long-run relationships among housing prices, marriage and births in Azerbaijan with quarterly data. It also separates two mechanisms that are often discussed together: housing may postpone marriage, and it may continue to constrain childbearing after couples marry. Using marriage four quarters earlier gives the first mechanism a clear temporal order, while the remaining housing coefficient in the joint birth equation speaks to the second. The quarterly dataset reconstructed from official cumulative releases also provides a reproducible basis for later research and reveals short-lived disruptions that annual data would conceal.

2. Literature review

Housing is both a household expense and an asset. For prospective buyers and renters, higher prices tighten the budget and can delay a move into an independent dwelling. Established owners may instead gain wealth or collateral. This distinction explains why the empirical literature does not produce one universal sign for the housing-birth relationship (Becker, 1960; Doepke et al., 2023).

Aggregate studies usually find a negative relationship. Yi and Zhang (2010) report that higher house prices reduced fertility in Hong Kong, and Mulder and Billari (2010) link low fertility to housing systems that combine high homeownership with restricted mortgage access. Li (2024) finds a similar negative association across countries, while van Wijk (2024) relates the Dutch fertility decline after 2010 to regional housing pressure. Household evidence reveals the other side. Price appreciation is associated with fewer births among non-owners and more births among owners in the United States (Dettling & Kearney, 2014; Lovenheim & Mumford, 2013). Dutch register data likewise show lower conception rates among renters in rapidly appreciating markets and higher rates among long-term owners (van Wijk & Feijten, 2025). Tenure turns the same price increase into a cost for one group and a wealth gain for another.

Affordability and financing help explain these differences. Mortgage-rate reductions increased births among households whose payments responded to monetary policy (Cumming & Dettling, 2024). In urban China, a higher house-price-to-income ratio lowers the probability of giving birth among both owners and renters (Qiu, 2025). Space matters as well. Moving into a suitable dwelling and becoming a parent often occur close together, especially around first births (Lersch, 2025; van Wijk & Feijten, 2025). A national price index cannot separate these margins, but it can reveal whether their combined movement is negative or positive.

Marriage provides a distinct route. Wrenn et al. (2019) estimate that a 1 percent increase in Chinese house prices lowered entry into first marriage by 0.31 percent. Zhao et al. (2023) use a change in urban land policy and find that the resulting price increase delayed first marriage. Qiu and Liu (2026) also report later marriage and first childbirth as urban prices rise. These studies treat housing as part of the cost of establishing a household rather than only as an input into decisions made after marriage.

The next link depends on how closely births follow marriage. Reimondos et al. (2025) show that fewer partnered adults contributed to lower birth rates in Australia. Wang and Li (2025) document parallel changes in marriage and fertility across Japan, South Korea and China. The connection is tighter in Azerbaijan, where premarital childbearing remains rare and marriage marks the beginning of exposure to a first birth (Torrisi, 2020). A fall in marriage can therefore feed into births more directly than in societies where cohabitation and non-marital births are common.

Evidence from the South Caucasus gives the mechanism a regional foundation. Young adults often move rapidly from marriage to parenthood, while parents or other relatives help finance or provide housing (Roberts et al., 2009). Family assistance shifts part of the burden across generations; it does not eliminate the need for a dwelling. Research on Azerbaijan has examined fertility decline, population ageing, household resources and son preference (Salayev & Kalmykova, 2024; Verdiyeva, 2019). Housing has not previously been studied together with quarterly marriage and birth rates in one long-run framework.

The literature motivates three hypotheses. The housing-marriage hypothesis (H1) predicts a negative long-run relationship between housing prices and the marriage rate. The housing-birth hypothesis (H2) predicts a negative long-run relationship between housing prices and the birth rate. The marriage-link hypothesis (H3) predicts that marriage four quarters earlier enters the birth equation positively and reduces the absolute housing coefficient. If housing remains negative under H3, limited or costly space after marriage may provide an additional explanation.

3. Data and method

3.1. Data construction

The data cover 2012Q1-2025Q4. Housing price indices, cumulative birth and marriage counts, and population figures come from the State Statistical Committee of the Republic of Azerbaijan. The housing series reports each quarter relative to the preceding quarter. These changes are linked into a continuous index with 2011Q4 set equal to 100.

Births and marriages are published cumulatively within each year. The first-quarter observation is already a quarterly count. For Q2-Q4, the preceding cumulative value is subtracted from the current value. If C_t is the cumulative number and N_t the number recorded in quarter t, then:

$$N_t = C_t \quad \text{for Q1}; \qquad N_t = C_t - C_{t-1} \quad \text{for Q2–Q4} \tag{1}$$

The population denominator is the average of the official population at the beginning and end of each quarter. For 2012Q1-Q3 and 2014Q1, where a quarter-end figure is unavailable, population is interpolated between the nearest published observations. Reconstructed quarterly counts are checked against the published cumulative totals and rates; the checks reveal no negative counts or material transcription differences.

Each quarterly count is divided by the quarter's average population, multiplied by 1,000 and multiplied by four. The last step places the quarterly observation on an annual scale without changing its within-quarter population adjustment. Let $\bar{P}_t$ denote average population:

$$R_t = \frac{N_t}{\bar{P}_t} \times 1{,}000 \times 4 \tag{2}$$

The resulting outcomes are annualized crude birth and marriage rates per 1,000 people. Using rates rather than counts accounts for the change in national population over the sample. Both measures are based on the total population, so their interpretation also reflects changes in demographic composition.

The housing price index is chained from the quarter-to-quarter comparisons. If g_t denotes the comparison with the preceding quarter, the index evolves as follows:

$$H_t = H_{t-1} \times \frac{g_t}{100} \tag{3}$$

Housing prices, the marriage rate and the birth rate enter the models in natural logarithms. Long-run coefficients can therefore be read as elasticities. Table 1 summarizes the 56 quarterly observations.

3.2. Econometric approach

Persistent series can produce misleading level regressions when their integration orders are incompatible. The logged variables are therefore examined with augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and KPSS tests (Dickey & Fuller, 1979; Kwiatkowski et al., 1992; Phillips & Perron, 1988). ADF estimates the coefficient on the lagged level after adding lagged differences to absorb serial correlation. PP tests the same unit-root null but corrects the test statistic non-parametrically for serial correlation and heteroskedasticity. KPSS reverses the null: rejection indicates that the series is not stationary around its deterministic component. Each test includes a constant and Q2, Q3 and Q4 indicators so recurring seasonality does not determine the classification. The ADF equation is:

$$\Delta z_t = a + \rho z_{t-1} + \sum_i \psi_i \Delta z_{t-i} + \delta_2 Q2_t + \delta_3 Q3_t + \delta_4 Q4_t + u_t \tag{4}$$

The bounds procedure requires that no variable be integrated of order two. PP and KPSS classify all three series as I(1), and ADF reaches the same conclusion for the demographic rates. ADF is inconclusive for the differenced housing index. Taken together, the tests support an I(1) classification and provide no evidence of I(2).

An autoregressive distributed lag model relates the current outcome to its own lags and to current and lagged explanatory variables. This structure separates adjustment within a few quarters from the long-run relationship. In general form:

$$y_t = \alpha + \sum_i \phi_i y_{t-i} + \sum_j \beta_j x_{t-j} + \gamma' Z_t + \varepsilon_t \tag{5}$$

Here y_t is the logged marriage or birth rate, x_t contains the logged housing price index and, in Model 3, the logged marriage rate, while Z_t contains seasonal and intervention controls. The bounds F-test evaluates the joint significance of the lagged level terms. An F-statistic below the lower bound does not support a level relationship, a value above the upper bound supports one, and a value between the bounds is inconclusive. Because asymptotic critical values can be inaccurate in short samples, decisions use Narayan's (2005) finite-sample bounds for 50 observations. The dataset contains 56 quarters, but Model 3 requires the marriage rate at t-4. The first four quarters therefore supply lags, and all three models are estimated on the common 2013Q1-2025Q4 sample of 52 observations.

Lag orders were restricted to four quarters to preserve degrees of freedom. Candidate orders were compared using the Bayesian information criterion (BIC) and the Breusch-Godfrey LM(4) test for residual serial correlation, with economic timing also informing Model 3 (Kripfganz & Schneider, 2023). Model 1 uses ARDL(3,2), which was retained because it provided the preferred BIC specification, absorbed persistence in the quarterly marriage rate and left no detectable residual serial correlation. Model 2 retains the parsimonious ARDL(1,0) because one autoregressive lag is sufficient to capture short-run persistence in births, no residual serial correlation remains and additional dynamics do not alter the long-run conclusion. Model 3 retains the ARDL(1,0) birth dynamics and adds only the four-quarter marriage term. BIC supports the single four-quarter marriage term: its value is -264.49, compared with -262.64 when the third and fourth lags are included and -259.86 when lags one through four are included.

Model 1 estimates the housing-marriage relationship as:

$$\begin{gathered}\ln M_t = \alpha_1 + \phi_{11}\ln M_{t-1} + \phi_{12}\ln M_{t-2} + \phi_{13}\ln M_{t-3} \\ +\beta_{10}\ln H_t + \beta_{11}\ln H_{t-1} + \beta_{12}\ln H_{t-2} + \delta_1{}' Z_t^M + \varepsilon_{1t}\end{gathered} \tag{6}$$

where t indexes quarters; ln denotes the natural logarithm; M_t is the marriage rate; H_t is the housing price index; α_1 is the intercept; ϕ_{11}, ϕ_{12}, and ϕ_{13} are the coefficients on the first, second and third lags of the marriage rate, respectively; β_{10}, β_{11}, and β_{12} are the coefficients on the current housing price index and its first and second lags, respectively; Z_t^M is the vector of seasonal and marriage-equation intervention controls; δ_1 is its coefficient vector; and ε_{1t} is the error term.

Model 2 estimates the bivariate housing-birth relationship as:

$$\ln B_t = \alpha_2 + \phi_{21}\ln B_{t-1} + \beta_{20}\ln H_t + \delta_2{}' Z_t^B + \varepsilon_{2t} \tag{7}$$

where t indexes quarters; ln denotes the natural logarithm; B_t is the birth rate; H_t is the housing price index; α_2 is the intercept; ϕ_{21} is the coefficient on the one-quarter lag of the birth rate; β_{20} is the coefficient on the current housing price index; Z_t^B is the vector of seasonal and birth-equation intervention controls; δ_2 is its coefficient vector; and ε_{2t} is the error term.

Model 3 imposes a clearer temporal sequence. Current births depend on their first lag, the current housing index and the marriage rate four quarters earlier:

$$\ln B_t = \alpha_3 + \phi_{31}\ln B_{t-1} + \beta_{30}\ln H_t + \gamma_{30}\ln M_{t-4} + \delta_3{}' Z_t^B + \varepsilon_{3t} \tag{8}$$

where t indexes quarters; ln denotes the natural logarithm; B_t is the birth rate; H_t is the housing price index; M_{t-4} is the marriage rate four quarters earlier; α_3 is the intercept; ϕ_{31} is the coefficient on the one-quarter lag of the birth rate; β_{30} is the coefficient on the current housing price index; γ_{30} is the coefficient on marriage four quarters earlier; Z_t^B is the vector of seasonal and birth-equation intervention controls; δ_3 is its coefficient vector; and ε_{3t} is the error term.

Same-quarter marriages cannot account for births already recorded in that quarter and would allow contemporaneous shocks to enter both sides of the equation. The four-quarter lag approximates the time between marriage and a subsequent birth without claiming that every birth occurs exactly one year later. Model 3 is therefore reported as a restricted ARDL birth equation with M_{t-4} rather than ARDL(1,0,4), which conventionally contains the current value and all intermediate lags.

For each explanatory variable, the long-run elasticity equals the sum of its distributed-lag coefficients divided by one minus the sum of the autoregressive coefficients:

$$\theta = \frac{\sum_j \beta_j}{1-\sum_i \phi_i} \tag{9}$$

The equilibrium-correction form shows how quickly the outcome returns after a departure from the estimated long-run relationship:

$$\Delta y_t = \lambda EC_{t-1} + \textstyle\sum_i \delta_i \Delta y_{t-i} + \sum_j \omega_j \Delta x_{t-j} + \gamma' Z_t + u_t \tag{10}$$

The four-quarter marriage restriction does not change the variables counted in the long-run relation. The following identities rewrite the lagged regressor in terms of the conventional t-1 level and short-run differences:

$$H_t = H_{t-1} + \Delta H_t, \qquad M_{t-4} = M_{t-1} - \Delta M_{t-1} - \Delta M_{t-2} - \Delta M_{t-3} \tag{11}$$

Substitution into Model 3 yields lagged level terms for births, housing and marriage, together with restricted short-run marriage differences. The bounds null therefore tests the housing and marriage level coefficients jointly, exactly as in the standard conditional error-correction representation (Pesaran et al., 2001).

A negative and statistically significant lambda indicates adjustment back towards equilibrium. Long-run coefficients are reported with ordinary least-squares standard errors, exact p-values and 95 percent confidence intervals.

Q2, Q3 and Q4 indicators absorb recurring seasonality, with Q1 as the reference. A 2015Q3 indicator marks the exceptional fall in marriage registrations after the first 2015 devaluation. The annualized marriage rate dropped from 8.97 per 1,000 in 2015Q2 to 5.13 in 2015Q3 even though third-quarter registrations are normally high (The State Statistical Committee of the Republic of Azerbaijan). The dummy is included in all equations to keep the specifications comparable.

The intervention windows combine institutional timing with breaks visible in each dependent series. For marriage, the indicator equals one in 2020Q2-Q4, the continuous interval in which registrations departed sharply from their usual quarterly pattern during pandemic restrictions. For births, it covers 2020Q4-2021Q4, from the first sustained pandemic-period departure in the birth series until the quarterly pattern begins to normalize. The birth window is a control for the observed disturbance rather than an assumption that restrictions affected conception in a single fixed quarter. These indicators keep exceptional observations from determining the regular long-run coefficients.

Residual and stability tests assess whether the selected dynamics are adequate (Kripfganz & Schneider, 2023). The Breusch-Godfrey LM test detects remaining serial correlation, while Breusch-Pagan tests whether residual variance changes systematically with the regressors. Jarque-Bera compares residual skewness and kurtosis with normality. Ramsey RESET checks for omitted nonlinear combinations of the fitted values, and CUSUM traces recursive residuals to assess coefficient stability over the sample. Together these tests address the main specification risks in a short quarterly ARDL model.

4. Results

4.1. Descriptive patterns

The quarterly housing price index averages 129.04 and reaches 187.91 in 2025Q4. The annualized birth rate averages 14.10 per 1,000 people; the corresponding marriage rate averages 6.40. The wider range of the demographic measures reflects their regular seasonality and the exceptional pandemic disturbance.

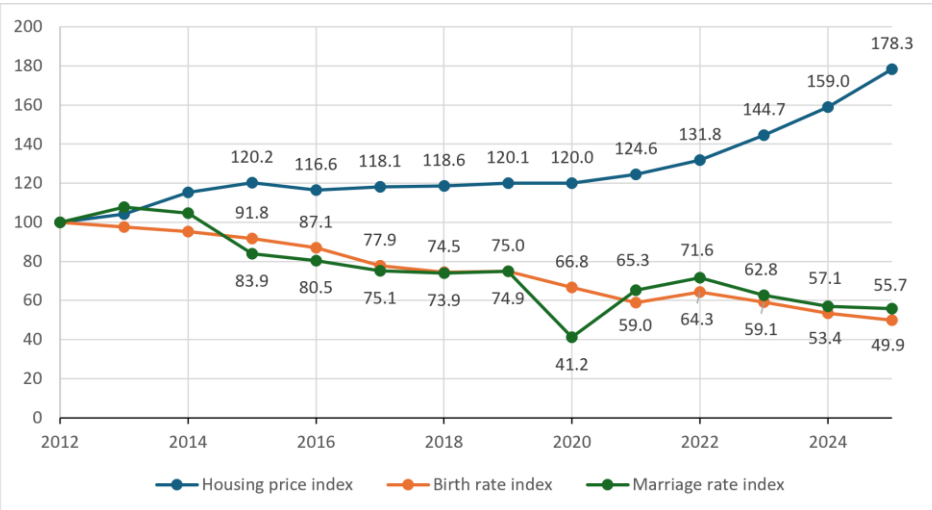
Table 1. Descriptive statistics, 2012Q1-2025Q4

Variable	Mean	Std. dev.	Minimum	Maximum
Housing price index (2011Q4 = 100)	129.04	21.05	101.22	187.91
Birth rate (per 1,000, annualized)	14.10	3.22	8.65	20.36
Marriage rate (per 1,000, annualized)	6.40	1.86	2.27	10.28

Note: N = 56 quarters. The housing index is chained from quarter-to-quarter comparisons. Birth and marriage rates are calculated from quarterly counts and average population. Source: The State Statistical Committee of the Republic of Azerbaijan; author's calculations.

Annual averages expose the broad divergence more clearly. Figure 1 normalizes each annual series to 2012 = 100. By 2025, housing reaches 178.3 while the birth and marriage indices fall to 49.9 and 55.7. Housing prices rise through 2015, ease during 2015-2016 and accelerate after 2020. Marriage falls sharply in 2015Q3 and 2020, recovers in 2021-2022 and then declines again. Births follow a smoother downward path with a brief recovery in 2022.

Figure 1. Housing prices, marriage rate and birth rate in Azerbaijan, 2012-2025, Index (2012=100)



Note: Annual averages are calculated from quarterly observations and normalized to 2012 = 100. The ARDL models use the unsmoothed quarterly logarithmic series. Source: The State Statistical Committee of the Republic of Azerbaijan; author's calculations.

4.2. Integration order

Table 2 reports the stationarity tests. None of the logged variables is stationary in levels. After one difference, PP rejects a unit root and KPSS does not reject stationarity for all three series. ADF confirms this result for births and marriages; its result for housing remains inconclusive. The combined evidence meets the ARDL requirement that no variable be I(2).

Table 2. Unit-root and stationarity tests

Series	ADF statistic (p)	PP statistic (p)	KPSS statistic	Assessment
$\ln(H_t)$, level	1.18 (0.996)	1.35 (0.997)	0.55**	Non-stationary
$\Delta\ln(H_t)$	-2.03 (0.273)	-3.50*** (0.008)	0.27	I(1) on PP/KPSS; ADF inconclusive
$\ln(B_t)$, level	0.29 (0.977)	-0.14 (0.945)	0.59**	Non-stationary
$\Delta\ln(B_t)$	-5.57*** (<0.001)	-16.53*** (<0.001)	0.14	I(1)
$\ln(M_t)$, level	-1.94 (0.314)	-2.49 (0.119)	0.50**	Non-stationary
$\Delta\ln(M_t)$	-9.30*** (<0.001)	-13.59*** (<0.001)	0.12	I(1)

Note: Every test equation includes a constant and Q2-Q4 indicators. ADF and PP test a unit-root null; KPSS tests stationarity. ** $p < 0.05$; *** $p < 0.01$. The 5 percent KPSS critical value is 0.463. Source: The State Statistical Committee of the Republic of Azerbaijan; author's calculations.

4.3. Long-run ARDL results

Model 1 supports H1. The long-run housing elasticity of the marriage rate is -1.612, with a 95 percent confidence interval from -1.947 to -1.277. A 1 percent higher housing price index is therefore associated with an approximately 1.6 percent lower marriage rate after the model accounts for quarterly dynamics and the two interventions. The bounds statistic of 37.742 far exceeds the upper critical value, and the error-correction coefficient is negative and significant.

The two marriage interventions are also visible. The 2015Q3 coefficient is -0.382 log points and the 2020Q2-Q4 coefficient is -0.833; both have p-values below 0.01. These controls stop two unusual registration collapses from being absorbed by the ordinary housing and marriage dynamics.

Model 2 produces a negative housing coefficient in line with H2. Its implied long-run elasticity is -1.405 and is statistically different from zero. The bounds statistic is 4.701, below the 5 percent lower bound for one explanatory variable. The bivariate equation therefore does not establish a long-run level relationship at that threshold. It remains the appropriate benchmark for asking how the housing coefficient changes when earlier marriage enters Model 3.

Model 3 supports the timing prediction in H3. The marriage rate from four quarters earlier has a positive long-run coefficient of 0.304, with $p = 0.007$. The housing coefficient remains negative at -1.061. The bounds statistic rises to 5.402, exceeding the 5 percent upper bound of 5.090 for two explanatory variables. Its error-correction coefficient, -0.434, indicates that about 43 percent of a departure from the estimated relationship is corrected within the following quarter.

Adding lagged marriage reduces the absolute housing coefficient from 1.405 to 1.061, a decline of 24.5 percent. This attenuation is consistent with marriage explaining part of the housing-birth association. It is a comparison between two dynamic equations, not an estimate of a mediated causal share.

Table 3. Long-run ARDL estimates and diagnostic tests

Dependent variable	ln(marriage rate)	ln(birth rate)	ln(birth rate)
Estimate or test	**Model 1**	**Model 2**	**Model 3**
Panel A. Long-run coefficients			
ln(housing price index)	-1.612*** (0.166; p < 0.001)	-1.405*** (0.218; p < 0.001)	-1.061*** (0.178; p < 0.001)

95% confidence interval	[-1.947; -1.277]	[-1.845; -0.966]	[-1.419; -0.703]
ln(marriage rate), t-4			0.304*** (0.108; p = 0.007)
95% confidence interval			[0.087; 0.522]
Panel B. Intervention controls			
2015Q3	-0.382*** (0.119; p = 0.003)	0.053 (0.069; p = 0.453)	0.037 (0.066; p = 0.581)
COVID period	-0.833*** (0.091; p < 0.001)	-0.085** (0.037; p = 0.027)	-0.039 (0.040; p = 0.344)
Panel C. Long-run relationship			
ARDL order	(3,2)	(1,0)	Restricted: (1,0) + M(t-4)
Bounds F-statistic	37.742	4.701	5.402
Decision at 5%	Established	Not established	Established
Error-correction coefficient	-0.746*** (0.087; p < 0.001)	-0.295*** (0.097; p = 0.004)	-0.434*** (0.109; p < 0.001)
Observations	52	52	52
Panel D. Diagnostic p-values			
Breusch-Godfrey LM(4)	0.125	0.374	0.264
Breusch-Pagan	0.196	0.747	0.678
Jarque-Bera	0.331	0.766	0.972
Ramsey RESET	0.139	0.156	0.155
CUSUM	Stable	Stable	Stable

Note: Standard errors and exact p-values are shown in parentheses. Every model includes Q2-Q4 indicators and the 2015Q3 intervention. The marriage equation uses a COVID indicator for 2020Q2-Q4; the birth equations use 2020Q4-2021Q4. In the bounds test, k is the number of explanatory variables in the long-run level relationship; it excludes the dependent variable, deterministic controls and the number of distributed lags. Thus $k = 1$ in Models 1 and 2 (housing) and $k = 2$ in Model 3 (housing and marriage). The t-4 restriction on marriage changes the short-run difference terms, not its status as a long-run level variable, as shown in equation (11). The 5 percent finite-sample bounds are 5.125-6.045 for $k = 1$ and 3.987-5.090 for $k = 2$ (Narayan, 2005). ** $p < 0.05$; *** $p < 0.01$. Source: The State Statistical Committee of the Republic of Azerbaijan; author's calculations.

For Models 1 and 3, which pass the bounds test, the error-correction coefficients are negative and statistically significant. Model 2 also yields a negative coefficient, but it is not interpreted as adjustment to a confirmed long-run relationship because the corresponding bounds test does not establish one. Residual tests find no serial correlation, heteroskedasticity, non-normality or functional-form misspecification at the 5 percent level.

5. Discussion

The evidence is strongest for H1. Housing prices and marriage form a negative long-run relationship, and the bounds statistic clears the upper critical value by a wide margin. H2 receives only partial support. The bivariate birth equation yields the expected negative housing coefficient, but does not confirm a separate long-run relationship between housing prices and births at the 5 percent level. H3 receives support in the joint model. When the marriage rate from four quarters earlier is included, the bounds test supports a long-run relationship among housing prices, marriage and births.

In the joint birth equation, marriage is positive and the housing coefficient becomes about one quarter smaller. This timing agrees with evidence that costly housing can delay marriage (Qiu & Liu, 2026; Wrenn et al., 2019; Zhao et al., 2023) and that fewer partnerships can reduce births (Reimondos et al., 2025; Wang & Li, 2025). The sequence is particularly relevant in Azerbaijan because childbearing is still closely tied to marriage (Torrisi, 2020). The coefficient change identifies a pattern consistent with the proposed link; aggregate time series cannot assign it a causal mediated share.

Housing retains a sizeable negative coefficient after marriage enters. That result leaves room for a second constraint. A married couple may postpone a first or later birth if its dwelling is too small, insecure or expensive to replace. Evidence from the Netherlands finds the strongest housing-market differences around first births and between renters, recent buyers and established owners (van Wijk & Feijten, 2025). National data cannot identify these groups, so the paper cannot measure the space channel separately.

The intervention coefficients clarify two breaks in the series. The 2015Q3 marriage fall remains large after seasonality and housing prices are controlled. It followed the first devaluation, when inflation, uncertainty and financing conditions changed together (World Bank, 2016). The dummy prevents this quarter from determining the long-run housing estimate; it cannot identify which part of the macroeconomic shock reduced registrations.

Marriage registrations fell even more sharply in 2020Q2-Q4. The later COVID coefficient is negative and significant in the bivariate birth model, then becomes small and insignificant after marriage from four quarters earlier enters Model 3. That change is compatible with disrupted marriages accounting for some of the later movement in births. Health conditions and mobility restrictions also changed during the same period, so the coefficient shift is not proof of a pandemic marriage pathway.

The national housing index measures prices rather than affordability. Baku illustrates the scale without representing the country as a whole. The Azerbaijan Chamber of Appraisers reports December 2025 median prices of AZN 2,640 per square metre for new apartments and AZN 2,520 for older apartments (Azerbaijan Chamber of Appraisers, 2026). A 60 square metre dwelling costs about AZN 151,200-158,400. This equals close to nine years of one employee's gross annual wage at Baku's 2025 monthly average of AZN 1,381 (Baku City Statistical Office, 2026). Mortgage terms, household earnings and district prices determine the burden faced by any particular couple.

The estimates cannot separate housing prices from every condition that changes alongside them. Income and credit conditions shifted sharply around the 2015 devaluations (World Bank, 2016), and mortgage exposure can itself affect births (Cumming & Dettling, 2024). Migration and population ageing also change crude birth rates by altering the population at risk (Reimondos et al., 2025; Verdiyeva, 2019). Finally, an aggregate price rise can burden renters and prospective buyers while increasing wealth for established owners, a contrast documented in household studies (Dettling & Kearney, 2014; Lovenheim & Mumford, 2013; van Wijk & Feijten, 2025). The quarterly controls and population adjustment reduce some of these concerns but do not remove them. Regional panels and household histories are needed to distinguish the groups and identify causal effects.

The policy implication is correspondingly narrow. Affordable rentals, lower mortgage deposits and targeted housing support deserve evaluation as possible ways to reduce the cost of establishing an independent household. The models do not estimate the demographic effect or economic return of any such programme. Pilot measures should therefore be evaluated before housing support is presented as fertility policy.

6. Conclusion

Housing prices, marriage and births changed markedly over the study period, but the evidence for their long-run relationships differs across the models. The quarterly evidence is clearest for marriage: housing prices and the marriage rate move together in a stable negative relationship even after regular seasonality and the exceptional disruptions of 2015 and the COVID period are taken into account.

Marriage also helps connect the housing market to later births. Marriages recorded four quarters earlier are positively related to the current birth rate, and accounting for them reduces the estimated housing relationship. The housing coefficient nevertheless remains negative. The two findings fit a setting in which costly housing can postpone marriage and may continue to limit childbearing when married couples lack secure or adequate space.

The scientific novelty lies in documenting these relationships for Azerbaijan for the first time with a quarterly empirical design. Reconstructing marriage and birth rates from official cumulative releases makes the timing visible, while the joint model distinguishes the marriage link from housing constraints that may persist after marriage. The results establish long-run aggregate associations rather than causal effects, but they move the Azerbaijani discussion beyond a comparison of annual trends.

Housing conditions should therefore be considered part of the broader economic environment shaping family formation in Azerbaijan. The findings suggest that housing affordability may matter for both the timing of marriage and subsequent childbearing. This provides a basis for examining housing policy alongside employment and family-support measures, while leaving the effects of specific interventions to future evaluation.

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AZƏRBAYCANDA MƏNZİL QİYMƏTLƏRİ, NİKAH VƏ DOĞUM ƏMSALI

Vaqif Məmmədzadə Rəhim

Xülasə

2012–2025-ci illərdə Azərbaycanda mənzil qiymətləri yüksəlmiş, nikah və doğum əmsalları isə azalmışdır. Məqalədə bu göstəricilər arasındakı əlaqə və nikahın mənzil şəraiti ilə doğum arasındakı əlaqədə mümkün rolu araşdırılır. Dövlət Statistika Komitəsinin məlumatları əsasında rüblük zaman sıraları qurulmuş və mövsümi dəyişmələr, 2015-ci ildə baş verən kəskin dəyişikliklər və pandemiya dövrü nəzərə alınmaqla avtoreqressiv paylanmış gecikmə (ARDL) modelləri qiymətləndirilmişdir. Nəticələr mənzil qiymətləri ilə nikah arasında sabit mənfi uzunmüddətli əlaqənin olduğunu göstərir. Mənzil qiyməti indeksinin 1 faiz yüksəlməsi nikah əmsalının təxminən 1,6 faiz azalması ilə əlaqəlidir. Mənzil qiymətləri ilə doğum arasında mənfi əlaqə müşahidə olunur, lakin bu iki göstəricinin ayrıca nəzərdən keçirildiyi model uzunmüddətli əlaqəni təsdiqləmir. Dörd rüb əvvəlki nikah əmsalı modelə daxil edildikdə isə mənzil qiymətləri, nikah və doğum arasında birgə uzunmüddətli əlaqə təsdiqlənir. Bu modeldə nikah göstəricisi doğumla müsbət əlaqəlidir və onun nəzərə alınması mənzil qiymətləri ilə doğum arasındakı mənfi əlaqəni 24,5 faiz azaldır. Alınan nəticələr mənzil xərclərinin artmasının nikahların gecikməsində, bunun da sonrakı doğumların azalmasında rol oynaya biləcəyini göstərir. Eyni zamanda, nikahdan sonrakı mənzil şəraitinin də doğum səviyyəsinə təsir edə bilməsi nəticələrdən görünür. Tədqiqat Azərbaycanda mənzil şəraiti, nikah və doğum arasındakı əlaqəyə dair rüblük məlumatlar əsasında ilk empirik nəticələri təqdim edir.

Açar sözlər: ailənin qurulması, uşaq doğumu, mənzil əlçatanlığı, demoqrafik dəyişiklik, zaman sıralarının təhlili

ЦЕНЫ НА ЖИЛЬЕ, БРАЧНОСТЬ И РОЖДАЕМОСТЬ В АЗЕРБАЙДЖАНЕ

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Аннотация

В 2012–2025 годах в Азербайджане цены на жильё росли, тогда как коэффициенты брачности и рождаемости снижались. В статье исследуется взаимосвязь между этими показателями, а также возможная роль брачности во взаимосвязи жилищных условий и рождаемости. На основе данных Государственного комитета по статистике сформированы квартальные временные ряды и оценены модели ARDL с учётом сезонности, резких изменений 2015 года и периода пандемии. Результаты показывают наличие устойчивой отрицательной долгосрочной связи между ценами на жильё и брачностью. Повышение индекса цен на жильё на 1 процент связано со снижением коэффициента брачности примерно на 1,6 процента. Между ценами на жильё и рождаемостью также наблюдается отрицательная связь, однако в модели, напрямую связывающей цены на жильё с рождаемостью, отдельная долгосрочная связь не подтверждается. При включении коэффициента брачности с лагом в четыре квартала совместная модель подтверждает долгосрочную связь между ценами на жильё, брачностью и рождаемостью. В этой модели показатель брачности положительно связан с рождаемостью, а отрицательная связь между ценами на жильё и рождаемостью ослабевает на 24,5 процента. Полученные результаты указывают на то, что рост расходов на жильё может способствовать более позднему вступлению в брак, что, в свою очередь, может быть связано со снижением рождаемости в последующие периоды. Результаты также указывают на возможную роль жилищных условий в принятии решений о рождении детей уже после вступления в брак. В работе впервые для Азербайджана представлены эмпирические оценки взаимосвязи жилищных условий, брачности и рождаемости на основе квартальных данных.

Ключевые слова: создание семьи, деторождение, доступность жилья, демографические изменения, анализ временных рядов

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