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Paid Fairly for Risk? The Post-Communist Property Premium across Europe

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ABSTRACT

Residential property prices in ten post-communist European housing markets grew at roughly 7.5% per year over 2015 to 2024, against 4.3% across ten never-communist markets. Investor survey evidence suggests this premium is priced as compensation for higher country risk. A competing view is that it reflects underpricing driven by a lingering communist-era reputation. This paper tests whether the premium exceeds what measurable risk justifies. A composite Country Risk Score is constructed for each of the twenty countries from six standardised risk variables. Three return measures are then regressed against it: gross rental yield, ten-year capital appreciation, and total return. Returns rise with risk as expected ($r = 0.62$ on capital appreciation). Once risk is controlled, returns no longer separate by region. In the capital appreciation model, the two countries whose actual returns differ most from what their risk predicts are both never-communist: Italy earns far less than predicted and Portugal far more. Romania, the post-communist market that earns less than its risk predicts on more than one return measure, is examined in a matched case study against Bulgaria, which has a similar risk score. The shortfall traces to credit depth and currency regime rather than to reputation. The results suggest that risk-adjusted return, rather than a country's communist past or its headline yield, is the appropriate basis for cross-country comparison.

INTRODUCTION

Residential property prices in post-communist Europe have risen significantly faster than in never-communist Europe. Over 2015–2024, prices grew at an average compound rate near 7.5% per year across the ten post-communist markets studied, against 4.3% across the ten never-communist markets.

A logical explanation is that post-communist countries are riskier. Generally, these countries have weaker institutions, more volatile economies, and thinner capital markets. However, several post-communist countries have been in the European Union for two decades. Their economies have largely stabilised with sovereign bond yields converging toward Western levels. If the risks have shrunk but the yield gap has not, then the discount may reflect a reputational bias.

The stakeholders

European residential real estate attracts significant foreign capital each year (Urban Land Institute & PricewaterhouseCoopers, 2024; Knight Frank, 2026). Where that capital flows depends on a set of judgments about which markets offer better value. Those judgments rest on a widely held sentiment, documented in investor surveys (Kurylchyk, 2019): property in post-communist nations is riskier than in never-communist nations, and the high rental yields in cities like Bucharest, Belgrade, and Sofia are fair compensation for that extra risk.

If the sentiment is true, investors chasing post-communist returns are bearing risks that headline numbers do not show, and the faster price growth is fair compensation rather than a bargain. If the sentiment is false, investors are avoiding profitable opportunities, and the affected countries pay an economic price for an outdated reputation, through less foreign investment, less construction, and less wealth for citizens.

Overview of the paper

The aim of this paper is to determine whether the premium in post-communist real estate returns is explained by measurable risk. Where a country's returns deviate significantly from what its individual risk score predicts, does this mismatch mainly stem from its communist past, or from its own country-specific circumstances?

The theoretical argument is that communism left an institutional legacy (whether it be in property law, judicial proceedings, sovereign credibility etc.) that raised measurable country risk. This led to investors expecting higher returns in exchange for bearing that risk, since weaker legal protection and less stable economies make an investment less secure (explained further in Section 3.2 and 4.3.1). However, since the fall of communism is still relatively recent, the stigma of being a post-communist country might turn investors away even though measured risk has fallen. This would create a pricing gap and present a reputational discount on properties. Returns in post-communist properties might be higher than what their risk justifies.

In order to investigate whether this investment opportunity exists, a composite Country Risk Score is built from six standardised risk variables for 10 post-communist countries and 10 never-communist countries in Europe. Three return measures (rental yield, capital appreciation and total return) are each regressed against the composite risk score. It is determined that Romania (a post-communist market) has a return that is lower than what its constructed risk score predicts. Bulgaria has a similar risk score to Romania, but earns a return close to what its risk score predicts. A case study primarily comparing Romania against Bulgaria is thus built to qualitatively study a mismatch in return and risk.

The risk gap between post-communist and never-communist markets is found to account for 82% of the capital appreciation premium and 94% of the total-return premium. Once risk is controlled, the post-communist countries are scattered on both sides of the regression lines, with no clear general

underpricing or overpricing relative to their risk. It is concluded that the premium in post-communist real estate returns is largely explained by measurable risk. The deviations that are identified are concluded to be due to country-specific reasons rather than a regional bias. This paper contributes a risk-adjusted test of the premium that existing literature has not performed. In its case study, it has identified credit depth and currency regime as factors that sit outside the risk score that explain a shortfall in Romania's returns. They should be included alongside the risk score when predicting returns in subsequent studies.

LITERATURE REVIEW

Investor risk perception

The existence of an appreciation premium in post-communist European property markets is well documented in industry data but has received limited academic attention. Kurylchyk (2019) examines international real estate investment risks in Central and Eastern Europe (CEE), finding that after the 2008 crisis, international investors shifted away from once-booming CEE markets and began attaching more importance to country-level risks over property-specific fundamentals, "with international investors unprepared to take high country risks even though property risks may be low." Kurylchyk identifies the perception problem through a questionnaire survey of investors, but does not test whether those perceptions are empirically justified.

Earlier work by Keivani, Parsa, and McGreal (2001) documented the rapid development of real estate markets in Prague, Warsaw, and Budapest during the early transition period, finding that international investment was crucial to market development but that lack of local finance remained a major obstacle. Writing in 2001, they captured a period when these markets were barely functional. It remains unclear whether the risk premium observed during the early transition period remains justified in contemporary markets.

The institutional legacy of Communism

A substantial body of research documents the persistence of communist-era institutional effects. Broulikova and Montag (2020) review housing privatisation across post-communist countries, documenting that almost one-third of the public housing stock was privatised by 1995, producing the thin rental markets and homeownership rates above 90% that characterise the region today. Kováts and Kohl (2024) extend this analysis by showing that within East-Central Europe, a persistent north-south divide in housing tenure exists. A northern group (Germany, Poland, Czechia) retained a stronger cooperative and non-profit rental tradition, while a southern group (Hungary, Romania, Bulgaria, and partly Slovakia) focused state support on home ownership under state socialism and privatised more radically after 1990. Their finding that post-communist Europe is not a single bloc supports the present paper's country-by-country approach rather than a regional generalisation.

At the individual level, Schaewitz, Wang, and Rieger (2022) show that even three decades after communism, measurable differences in financial risk and time preferences persist between Eastern and Western Europeans. Stronger risk aversion in gains and higher loss aversion were found in Eastern European populations. Critically, the authors distinguish between differences caused by the communist

experience itself (which may converge if institutions remain stable) and deeper cultural differences predating communism (which will not). If these individual-level preferences extend to investor behaviour, they may partly explain the yield premium: domestic investor pools in post-communist countries may be thinner than fundamentals justify.

Huber and Montag (2020) use the communist housing privatisation as a natural experiment to study homeownership's effects on political participation, finding that homeownership is associated with higher voter turnout and, in post-communist countries specifically, higher social trust. While not directly about property investment, Huber and Montag validate the analytical approach of treating the communist transition as a sharp, measurable institutional break with lasting consequences.

The regulatory side of this legacy, and its bearing on the risk variables used in the study, is set out in Section 3.2.

Measurement and empirical approaches in current literature

Composite index approaches are widely used in both industry and academic research to measure cross-country real estate conditions. Jones Lang LaSalle's Global Real Estate Transparency Index (2024) evaluates 256 indicators across 89 countries. Newell and Marzuki (2018) analyse the dynamics and linkages of these transparency sub-indices across 109 markets, establishing the academic credibility of composite measures for cross-country real estate analysis.

Similarly, Kettunen and Ruonavaara (2021) classify 33 European countries by rent regulation system and welfare state regime, finding only partial correspondence between the two and concluding that the role of rent regulation depends heavily on national context. Hartmann (2015) analyses European real estate valuations and highlights the importance of macroprudential oversight. Together, these studies demonstrate that cross-country comparison using standardised indicators is an established empirical approach and that property pricing is an established subject of policy-relevant analysis.

Research gap & formulation of the research question

No existing study combines the known drivers of real estate risk into a single risk score and uses it to test whether post-communist markets are underpriced once that risk is accounted for. Prior work addresses parts of this but not as a whole. Kurylchyk (2019) surveys investor perceptions but does not measure actual risk. Ghanbari-Parsa and Moatazed-Keivani (1999) documented these markets during the early transition around twenty-five years ago. Newell and Marzuki (2018) study transparency but not pricing. Broulikova and Montag (2020) and Kováts and Kohl (2024) examine the institutional legacy of communism but do not connect it to current returns. Schaewitz et al. (2022) study individual risk preferences but not market-level pricing.

This paper combines institutional analysis, risk measurement, and pricing evidence into a single test of whether the post-communist premium is justified. It then makes a second contribution. A risk score captures how dangerous a market is, not the fundamentals driving demand within it, so close examination of the country that deviates furthest from its predicted return reveals what such a score omits. The research question hence reads:

Post-communist European property markets generally deliver higher returns, in both price appreciation and rental yield, than non-post-communist Europe. Is this premium explained by measurable risk? And where returns depart from it, does the cause lie in a country's communist past or its own circumstances?

CONCEPTUAL FRAMEWORK

Scope of study & regional rationale

Post-communist Europe is the only group of countries that meets four conditions needed to test the research question. First, a sharp institutional break: housing stocks were privatised wholesale between 1989 and the mid-1990s, producing homeownership rates above 90% in several countries, compared to roughly 50% in Germany and 42% in Switzerland (Eurostat, 2024d). Second, comparable formal institutions: eight of the ten post-communist countries studied are EU members using shared legal, regulatory, and statistical frameworks. Third, standardised data availability through Eurostat, the ECB, IMF, World Bank, JLL, and Global Property Guide. Fourth, the right temporal distance: recent enough for legacy effects to plausibly persist, distant enough for surface institutions to have converged.

Risk variables are measured at the country level, as this is where governance, bond spread, and macroeconomic data resides. Country-level risk variables are treated as the institutional environment in which each city operates.

The regulatory legacy of communism

Post-communist countries are expected to score higher on risk variables. Under communism, courts, regulators and the civil service answered to the ruling party. Law governing private commercial transactions was barely developed. Land and a significant portion of urban housing were held by the state and allocated administratively, leading to a virtual absence of private housing markets (Broulikova & Montag, 2020). Land registries were neglected and market-based mortgage finance was underdeveloped. After the rapid fall of communism in 1989, these institutions had to be precariously rebuilt within a few years.

Hellman (1998) finds that the strongest resistance to reform came not from the people who lost out, but from those who profited from half-finished reforms and wanted to keep the status quo, even if it hurt everyone else. Hellman, Jones and Kaufmann (2003) find that in many transition countries, politicians and officials sold special favours to individual firms. The firms that bought favours performed better, but businesses as a whole performed measurably worse. Beck and Laeven (2006) find that the longer a country spent under communism, the more likely former communists were to stay in power, and the weaker the institutions a market economy needs. On housing, Broulikova & Montag (2020) show that state-owned homes were mostly sold to the tenants living in them, usually far below market value, while far fewer were returned to pre-communist owners. Stephens, Lux, and Sunega (2015) find that when the state stepped back, the institutions needed for a normal mortgage-based housing market did not take their

place, so most people ended up owning their homes outright without debt. Land registries had to be rebuilt with EU and donor money from 1992 onwards (Bogaerts, Williamson & Fendel, 2002).

Joining the EU forced eight of the post-communist members in this study (all except Serbia and North Macedonia) to adopt laws that looked 'Western' on paper, making their formal institutions comparable to their never-communist counterparts. However, these laws were not as efficiently enforced by their courts as in never-communist countries. Pistor, Raiser, and Gelfer (2000) find that how well laws were enforced mattered far more for firms trying to raise money than what the laws just said. Kurylchyk (2019) finds that international investors in the region pay more attention to country risk than to the property itself, so weaker scores mean investors demand higher returns. This thus affects the risk scores that will be further delineated in Section 4.3.1.

Prices are also heavily influenced by perceived risk rather than just measured risk. Kurylchyk (2019) finds investors in the region weighed country risk above the property itself, and avoided high-risk countries even where the property was safe. Schaewitz, Wang and Rieger (2022) find Eastern Europeans remain more risk-averse than Western Europeans even thirty years after communism ended, so the domestic buyer pool may also be thinner than what a country's risk level warrants.

Research design

The study is primarily quantitative with a single case study attached. The quantitative component constructs a composite Country Risk Score for each of the twenty countries from six risk variables, then regresses each return measure against it. If the post-communist markets sit above the fitted line as a group, the premium reflects a regional discount; if they scatter on both sides, it does not. This is the paper's central test.

The case study addresses a limit of that test. With twenty countries, finding no regional pattern may mean none exists, or it could be because the sample is too small to detect one. To distinguish the two, one post-communist country is examined directly. A reputational discount would mean these markets are too cheap, so they should earn more than their risk justifies. A post-communist country that earns less than its risk justifies therefore works against the discount, and is the most useful case to look at. Section 6.5 identifies which country that is. It is paired with a comparison country at a similar risk score that sits on the fitted line, so that anything the two share cannot explain why one underperforms and the other does not.

DATA

Countries Used

The paper uses information from twenty European countries, split evenly between post-communist and never-communist.

#	Post-communist	Never-communist
1	Poland	Germany
2	Czech Republic	Austria
3	Hungary	Norway
4	Romania	Netherlands
5	Latvia	France
6	Slovakia	Spain
7	North Macedonia	Italy
8	Serbia	Portugal
9	Bulgaria	Belgium
10	Croatia	Switzerland

Return measures

The paper measures the profitability of investable properties based on three measures of return. The gross residential rental yield, the annual house price (capital) appreciation rate, and the total return (sum of the two aforementioned measures).

Measure of Return	Definition	Rationale	Data Source

Gross Residential Rental Yield	Annual rental income as a percentage of property purchase price, before deducting taxes, maintenance, and management costs	Gross yield is used in preference to net yield to ensure cross-country comparability; net yield calculations embed country-specific tax and cost assumptions that would introduce non-systematic variables.	Global Property Guide
Capital Appreciation Rate	10-year compound annual growth rate (CAGR) of residential property prices, measured in local currency	A multi-year CAGR smooths short-term price volatility and captures the structural price trend relevant to medium-horizon real estate investors. Since this data cannot be extracted directly, the 10-year CAGR will be derived from index data	Eurostat House Price Index; national statistics offices where Eurostat coverage is incomplete
Total Return	The sum of gross residential rental yield and capital appreciation rate for a given country	Combines income and capital gain components into a single investable return metric	Derived from Capital Appreciation Rate & Gross Residential Rental Yield

Computation of the Capital Appreciation Rate

The 10-year capital appreciation rate is the compound annual growth rate (CAGR) of residential property prices over the 2015 to 2024 sample period, expressed as a single percentage per year. The CAGR is calculated using the following formula:

$$\text{CAGR} = \left(\frac{\text{End-period value}}{\text{Start-period value}} \right)^{\frac{1}{n}} - 1$$

where the start- and end-period values are the residential property price index in 2015 and 2024 respectively, and n = 10 years.

Eurostat's House Price Index covers 17 of the 20 countries; the remaining three use BIS residential property price data via FRED. Full derivations are in Appendix A.1.

Computation of Rental Yields

As rental yields are already expressed as a percentage in the Global Property Guide (GPG), there are no computations required. Gross rental yields are sourced from the GPG 2026 "Residential Rental Yields by Country" dataset, which reports country-level figures aggregated from median prices and rents across three to eight major cities per country. Figures reflect the snapshot last updated June 2026.

A rental yield is a snapshot rather than a window, so no 2015 to 2024 figure will be used. The risk variables move slowly, since governance scores, currency regimes, demographic trends and average bond spreads minimally fluctuate over a year. The capital appreciation rate, the primary return measure, uses the same window as the risk variables, so the timing gap only affects yield and total-return models.

Returns by country group

Averaged across each group, the three measures give the following:

	Gross Rental Yield	10-year Capital Appreciation Rate (CAGR)	Total Return
Post-Communist Averages	5.24	7.53	12.77
Never-communist Averages	4.71	4.34	9.05

Country-level figures for all twenty countries are given in Appendix B, Table B6, and are reproduced alongside their composite risk scores in Section 5.2.2.

Risk variables

Real estate investment returns do not depend solely on property market conditions. They are shaped by the broader risk environment of the country in which the asset sits. To capture this, the paper measures country-level investment risk using six variables, each drawn from a standardised international source.

The six variables are established determinants of international real estate risk and returns in empirical literature.

Institutional and governance quality is the most consistently identified driver of cross-country real estate returns and capital allocation (Geurts & Jaffe, 1996; Liao & Mei, 1999; Lieser & Groh, 2014). Post-communist countries are expected to score higher here because their courts, regulators and civil services were only rebuilt after 1989. Additionally, this rebuild was held back by groups that profited from half-finished reform (see Section 3.2).

Property rights and legal security shape required risk premiums and deter investment where legal frameworks are weak (Liao & Mei, 1999; Edelstein et al., 2011). Private property markets and land

registries had to be built almost from scratch after 1989, and laws adopted for EU membership eligibility were not always properly enforced.

Macroeconomic conditions and volatility are established pricing factors for international real estate (Pavlov, Steiner & Wachter, 2015). Post-communist countries are expected to score higher here. Fischer, Sahay and Vegh (1996) show these economies went through deep recessions and very high inflation in the early 1990s, and that growth only came back about two years after an inflation stabilisation programme was adopted. Their central banks and fiscal rules are only a few decades old, while the never-communist comparators have had theirs far longer. Lower incomes in post-communist countries also leave less cushion when a shock hits.

Sovereign bond spreads provide the financial market's aggregate, real-time assessment of country risk. Communism does not directly act on this variable. Rather, a bond spread is largely affected by a country's governance and macroeconomic conditions as described in Section 3.2.

Currency volatility affects euro-denominated returns for investors holding assets outside the eurozone, and demographic trends shape long-run rental demand (Lieser & Groh, 2014; Wang, Nanda & Valtonen, 2023). Borders opened in the early 1990s, leading to a large exodus of people from post-communist nations to never-communist ones (Atoyan et al., 2016). Most of these emigrants were young and more highly educated. This population decline is still visible until today (Eurostat, 2024e).

The sample period ends in 2024 because the Worldwide Governance Indicators' data most recent available year is 2024. Two variables sit slightly outside this window: the IPRI property-rights score is the 2025 edition, and the rental yield is a June 2026 snapshot. Section 9 discusses what possible limitations may arise from this. Three of the six variables (macroeconomic volatility, currency risk, and sovereign bond spreads) involve either a multi-step computation or a benchmark choice, and are given their own subsections below. The remaining three (sovereign and institutional risk, property rights and legal security, and demographic risk) are read directly from their published sources without transformation, and are defined in full in the table that follows.

How these variables are combined into a single Composite Country Risk Score is explained in Section 5 and the Appendix.

Risk Variable	**Source & How it is measured**
Sovereign & Institutional Risk	World Bank Worldwide Governance Indicators

	Average percentile rank across six dimensions: political stability, government effectiveness, regulatory quality, rule of law, control of corruption, and voice and accountability.
Property Rights & Legal Security	International Property Rights Index (IPRI) Annual score across 126 countries measuring strength of physical property rights protection, land registration reliability, and access to property financing. Published annually by the Property Rights Alliance.
Macroeconomic Volatility	International Monetary Fund World Economic Outlook Standard deviation of annual GDP growth and annual inflation each calculated over the preceding 10 years using IMF WEO historical data series. The two standard deviations are averaged into a single volatility score.
Currency Risk	European Central Bank (ECB) Annualised volatility of each country's exchange rate against the euro, measured as the standard deviation of daily log returns from the ECB euro reference rate series (2015–2024), annualised by √252 (no. trading days in a year). Eurozone members and euro-pegged currencies score zero by definition.
Demographic (Population Decline) Risk	Eurostat Population Database Annual population growth (or decline) rate averaged over the sample period of 2015 to 2024
Sovereign Bond Spreads	Eurostat EMU Convergence Criterion Series, OECD Main Economic Indicators via Federal Reserve Bank of St. Louis Difference in percentage points between each country's 10-year government bond yield and Germany's 10-year government bond yield, averaged over 2015 to 2024.

Computation of macro-economic volatility scores

The macroeconomic volatility score for each country is constructed from two components: the standard deviation of real GDP growth and the standard deviation of consumer price inflation, each measured annually over the 2015 to 2024 sample period. These two series are averaged into a single raw volatility figure, which is then standardised to a 0 to 100 risk scale consistent with the other five risk variables used in this paper.

All data are drawn from the International Monetary Fund World Economic Outlook (WEO) database, October 2024 edition. The sample window is 2015 to 2024, producing 10 annual observations per series

per country, consistent with the capital appreciation window used elsewhere in this paper. Two series are used for each country, with complete steps on how these volatility scores are computed in this paper explained in Appendix A.2.

Justification for using Germany as the benchmark for sovereign bond spreads

Sovereign bond spreads measure the difference in percentage points between each country's 10-year government bond yield and Germany's, averaged over 2015 to 2024. Germany is the benchmark because the bund is the euro-area reference rate against which other euro-area sovereigns are quoted, so benchmarking against it reflects established market practice. Germany also carries the lowest and most stable average yield in the sample, which makes it a natural reference point for the extra return investors demand elsewhere. The spread aggregates default probability, political instability, and macroeconomic expectations into a single observable number, reflecting what investors with real capital at stake believe.

For 16 of the 20 sample countries, data are sourced from Eurostat's EMU Convergence Criterion Series, which publishes annual average 10-year government bond yields for all European Union member states. For Norway and Switzerland, data are sourced from the Organisation for Economic Cooperation and Development Main Economic Indicators series, accessed via the Federal Reserve Bank of St. Louis data platform. Germany's average yield of 0.607% over the period serves as the benchmark.

For Serbia and North Macedonia, standardised long-term government bond yield data covering the full 2015 to 2024 sample period was not available from any of the above sources due to the limited depth and liquidity of their domestic bond markets during this period. The methodology used to incorporate these two countries into the composite risk score is described in Section 5. The data table of sovereign bond yields & spreads by country is outlined in Appendix B.

Computation of currency risk score

Currency risk is measured as the annualised volatility of each country's exchange rate against the euro over 2015–2024. Using daily ECB euro reference rates, daily logarithmic returns are computed, their standard deviation is taken, and the result is annualised by multiplying by $\sqrt{252}$ (the conventional number of trading days in a year). A high value means an unpredictable currency that adds uncertainty to euro-denominated returns.

Eurozone members and euro-pegged currencies (Bulgaria, North Macedonia) score zero by construction. Norway anchors the high end of the scale as the most volatile currency against the euro, though this reflects exchange-rate movement alone rather than Norway's overall country risk. Full coverage details, including euro-adoption dates and the treatment of Croatia's mid-window switch, are given in Appendix A.3.

Raw risk scores attributed to each country

The raw values for all six variables across the twenty countries are reported in Appendix B, Table B4.

METHODOLOGY

Overview

The quantitative aim of the paper is to test whether the higher capital appreciation and yield premiums in post-communist European property markets are justified by measurable risk. Each return measure is regressed against the composite risk score, and three regression models are fitted. In every model, the independent variable (x-axis) is the composite risk score. The dependent variable (y-axis) is the return measure, which differs across the three models:

Model 1, Capital Appreciation: Are post-communist countries seeing faster property price growth than their risk level justifies?
Dependent variable: 10-year capital appreciation rate

Model 2, Gross Rental Yield: Are they earning more rental income relative to property price than their risk justifies?
Dependent variable: Gross rental yield

Model 3, Total Return: Is the overall investment return higher than their risk justifies?
Dependent variable: Total return (rental yield plus capital appreciation)

Once the lines are fitted, one country is examined in a single case study, selected by the criteria in Section 5.3.6 to test the discount hypothesis directly within the post-communist group.

Standardising raw risk scores

Each variable starts on a different scale. To make them comparable, each one is converted to a 0 to 100 risk scale where 0 means the lowest risk in the sample and 100 means the highest. The formula is the same for every variable:

$$\text{Risk Score} = \frac{\text{Country Value} - \text{Safest Value}}{\text{Riskiest Value} - \text{Safest Value}} \times 100$$

For variables where a high raw number means less risk (governance, demographics, property rights & legal security), the result is **flipped** so that 100 still means the most risky. The table below briefly shows all six variables:

Variable	**Measures**	**0 =**	**100 =**
Sovereign & Institutional Risk	Institutions, rule of law, corruption	Best governed	Worst governed

Property Rights & Legal Security	Property data quality, legal protections	Most transparent	Least transparent
Macro Volatility	GDP growth & inflation instability (mean of two std devs)	Most stable	Most volatile
Currency Risk	Currency movement vs euro	Eurozone (zero)	Most volatile
Demographics	Population growth/decline	Fastest growing	Fastest shrinking
Bond Spreads	Market verdict on country risk	Lowest Spread	Highest spread

Examples on how these scores are computed step by step are explained in Appendix A.4. The table of standardised risk scores across all 20 countries is listed in Appendix B, Table B5. These six scores are then combined into one composite Country Risk Score using the tiered weighting system described below.

Tiered weighting system

Section 5.2.1 left each country with six standardised scores. Combining them into one figure requires deciding how much each variable should count. The simplest option, a straight average, would treat currency risk as equal in importance to institutional quality. However, existing literature does not support this. This paper therefore groups the six variables into three tiers by the importance the literature assigns them, and assigns a weight to each tier.

The six variables are ranked by their relative importance according to existing literature. The key design is that each variable's weight is set by its tier, not by how many other variables happen to be in that tier. A Tier 1 variable always weighs more than a Tier 2 variable, which always weighs more than a Tier 3 variable. This prevents a lone Tier 2 variable from outweighing a Tier 1 variable simply because fewer variables share its tier.

Composite indices in this field do specify numeric weights, but for a different object. Lieser and Groh (2011) weight a global index of institutional real estate investment attractiveness across 66 countries, and Jones Lang LaSalle (2024) weights a transparency index across 89. Neither weights a residential country-risk composite for a European sample, so their weights do not transfer directly. This paper therefore assigns its own: each tier is assigned a base weight per variable. Tier 1 variables get a base of 20 points each. Tier 2 gets 10 points each. Tier 3 gets 5 points each. The base points are then added up and normalised to 100%. What the literature does establish is the ordering of importance across the variables, which the tiers reproduce, and the specific values are a deliberate, interpretable choice whose influence on the results is tested directly in the sensitivity analysis set out in Section 5.3.5 and reported in Section 6.4. The composite is therefore read as a transparent weighting of established risk factors rather than an estimation.

Tier 1: Sovereign & Institutional Risk; Property Rights & Legal Security

Institutional and legal quality is the single most consistent determinant of cross-country real estate returns.

Lieser and Groh (2011, 2014) find that weak institutional transparency suppresses real estate investment even where economic growth and demographics are strong, and Liao and Mei (1999) and Edelstein et al. (2011) show that legal-system quality and governance directly determine international real estate risk premiums. These two variables are weighted most heavily.

Tier 2: Macroeconomic Volatility; Sovereign Bond Spreads
Macroeconomic risk is an established but second-order pricing factor for international real estate (Pavlov, Steiner & Wachter, 2015). Bond spreads are placed here deliberately: a sovereign spread is the market's price of governance, macroeconomic and default risk, so it already reflects the Tier 1 fundamentals. Weighting it below them avoids counting sovereign credibility twice.

Tier 3: Currency Risk; Demographics
Currency risk is zero by construction for the twelve eurozone and euro-pegged countries in the sample, limiting its discriminating power. Demographics is a strong driver in Lieser and Groh's (2014) global sample, but is secondary here: variation across this European sample is compressed, and the variable captures decline risk rather than the urbanisation upside their global data reflected.

The robustness of these weights is tested in the sensitivity analysis set out in Section 5.3.5 and reported in Section 6.4, and the ordering is cross-checked against the variable–return correlations.

Tier assignments and weights

Tier	Variables	Base	No. of Variables (n)
1: Primary	1. Sovereign & Institutional Risk 2. Property Rights & Legal Security	20	2
2: Secondary	1. Macroeconomic Volatility 2. Bond Spreads	10	2
3: Tertiary	1. Currency Risk 2. Demographics	5	2

A worked example on how Romania's composite country score is computed is explained in Appendix A.5. The composite risk scores calculated for all countries are shown in the table below.

Final composite risk scores & returns

Country	Composite Risk Score	Current (June 2026) Rental Yield	10-year Capital Appreciation Rate	Total Return

Post-Communist Countries				
Poland	63.7	5.92	7.53	13.45
Czech Republic	45.1	3.39	8.32	11.71
Hungary	87.5	4.69	11.97	16.66
Romania	68.7	6.02	4.54	10.56
Latvia	54.3	7.20	7.12	14.32
Slovakia	55.9	4.59	6.15	10.74
North Macedonia	79.3	6.53	5.53	12.06
Serbia	83.3	5.63	8.97	14.60
Bulgaria	73.6	4.19	8.08	12.27
Croatia	57.1	4.21	7.10	11.31
Average	**66.9**	**5.24**	**7.53**	**12.77**
Never-Communist Countries				
Germany	23.1	3.42	4.00	7.42
Austria	28.1	3.82	5.01	8.83
Norway	23.0	4.58	4.34	8.92
Netherlands	28.3	6.28	7.08	13.36
France	28.3	4.83	2.37	7.20
Spain	50.2	5.43	4.83	10.26
Italy	45.8	7.23	1.11	8.34
Portugal	37.3	4.29	8.42	12.71
Belgium	33.1	4.32	3.45	7.77
Switzerland	7.0	2.91	2.79	5.70

Average	**30.4**	**4.71**	**4.34**	**9.05**

Testing the risk–return relationship

Section 5.2 reduced each country to a single composite risk score, and Section 4 gave each three return measures. This section sets out how the relationship between them is tested, and how a country that departs from it is identified for investigation in Section 7. If the conventional risk-return hypothesis holds, a country's return rises with its risk, since investors require more return to bear more risk.

Regression specification

For each return measure, a line of best fit is drawn through the twenty countries using ordinary least squares (OLS). This fitted line is the paper's benchmark for a fair return. Its height at any given risk score is the return the sample as a whole demands at that level of risk. Its slope is the additional return the sample requires per unit of risk. Its intercept is the return predicted at zero risk. A country's vertical distance from the line is its residual, or how far its actual return lies above or below what its risk justifies. Capital appreciation is designated the primary measure in advance. It is the only return measured over the same 2015 to 2024 window as the risk variables.

Regression Model	Dependent Variable (y)	Independent Variable (x)
1	10-year Capital Appreciation Rate	Composite Risk Score
2	Current Gross Rental Yield	Composite Risk Score
3	Total Return	Composite Risk Score

The slope (m) is the extra return the sample demands per point of risk while the intercept (c) is the return predicted at zero risk.

Measuring the fit

How closely the twenty countries adhere to each fitted line is quantified using Pearson's product-moment correlation coefficient, r.

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

where x_i is the composite risk score of country i, y_i is its return measure, and $\bar{x}$ and $\bar{y}$ are the sample means.

The coefficient of r is bounded on [−1, +1]. A value of +1 is a perfect positive relationship between risk and return, −1 a perfect negative one, and 0 no linear association at all.

In this paper, r also measures whether the market prices risk consistently across the sample. A high r would mean returns are almost fully accounted for by measurable risk. That would leave no room for a reputational effect to exist in. A low r means factors outside the risk score drive much of the variation. That unexplained space is exactly where a reputational effect, or any part of the communist legacy the six variables fail to capture, would operate. A weak fit is therefore the precondition for this paper's question rather than a defect in the model. The case study tests what fills the space it leaves. The square of the coefficient, r^2, gives the share of variation in returns that the risk score explains, and is reported alongside r for each model.

Statistical inferences

Pearson's r describes the pattern in the sample, but it does not establish whether twenty countries could have produced that pattern by chance. Random variation alone gives a scatter of twenty points some tilt, so an upward slope is not by itself evidence that returns rise with risk. This section sets out how each fitted gradient is tested against that possibility. The same test is applied to all three models, and the results are reported in Section 6.1.

The gradient being tested

Section 5.3.1 defined the gradient of each fitted line as the extra return the sample demands per point of risk. A gradient above zero means return rises with risk, while a gradient of zero means a flat line, where additional risk does not constitute additional return. The test asks, for each model, whether the fitted gradient differs from zero by more than random chance would produce. The test assumes the true gradient is zero, then measures how far the fitted gradient sits from zero relative to its standard error.

The p value and the significance level

The p value is the probability of obtaining a gradient at least as steep as the one observed, in either direction, if the true gradient were zero. A small p value therefore means a flat underlying relationship would rarely produce data such as this. The significance level, written α (alpha), is the cut-off fixed in advance for how small the p value has to be before the assumption of a zero gradient is abandoned. It is set at $\alpha = 0.05$. If a truly zero gradient would produce a slope this steep less than 5% of the time, that assumption is rejected and the upward relationship is treated as real. A gradient with p below 0.05 is described as statistically significant.

Confidence intervals

The p value states only that the premium exists. It does not state how large it is, and size is what this paper needs, since Section 6.1 uses the gradient to calculate how much of the observed post-communist premium measurable risk accounts for. A 95% confidence interval, the range of gradients the data is consistent with, is therefore reported alongside it. A narrow interval means twenty countries pin that figure down closely. A wide one confirms the premium is upward without fixing its size, which bounds how precisely the decomposition can be read.

Testing three models

The same test is applied to all three return measures. These are not three independent tests, since total return is by construction the sum of gross rental yield and capital appreciation, and the primary measure was fixed in advance. Robustness to multiple testing is nonetheless checked using a Bonferroni-adjusted threshold of $\alpha = 0.0167$, and the outcome of that check is reported alongside the main results in Section 6.1. The full regression output for all three models is given in Appendix C.

Scatter plots, predicted-versus-actual plots, and outlier identification

Each scatter plot is read in two ways. The first is at the group level: if the premium were regional rather than compensation for risk, the post-communist countries would sit above the line as a bloc, with the never-communist countries below it. Whether they do is visible directly from the plot and is the paper's primary test. The predicted-versus-actual plots, which show the same results with both axes in return units, are given in Appendix C (Figures C1 to C3).

The second is at the country level. For each model the standard deviation of the residuals is calculated, and any country lying more than one standard deviation from the line in either direction is flagged as an outlier. Flagged countries carry forward to the weighting checks in 5.3.5.

Sensitivity analysis

Because the tiered weighting (20/10/5) operationalises the ordering established in the literature rather than being estimated from the data, the outlier results are tested for robustness to the weighting choice. The composite score is recomputed under two alternative schemes: equal weights (16.7% per variable) and a reshuffled tier structure in which bond spreads are promoted to Tier 1 and property rights demoted to Tier 2. An outlier identified under the baseline weighting is treated as robust only if it remains an outlier under both alternative schemes. Countries that enter or exit outlier status across schemes are reported as weighting-sensitive and excluded from strong claims.

Case study design

The case study examines a post-communist market that earns less than its risk predicts. That deviation is the one that most directly contradicts a reputational discount, since the discount hypothesis holds that these markets earn more than their risk justifies, not less. The chosen market is paired with a comparison country at a similar composite risk score that sits on the fitted line for the models on which the case country deviates. Any characteristic the two share cannot explain why one deviates and the other does not, so the comparison isolates the country-specific factors behind the deviation.

QUANTITATIVE RESULTS

Regression results

This section reports the three fitted lines specified in Section 5.3.1. It covers how closely the twenty countries follow each line, whether each gradient is stronger than chance would produce, and how much of the post-communist premium the risk gap accounts for.

Strength of the risk–return relationship

Each return measure was regressed on the composite Country Risk Score across all twenty countries by ordinary least squares:

Regression Model	Slope (gradient)	Intercept (c)	r	r^2
Capital appreciation rate	0.0717	2.45	0.617	0.381
Current Gross rental yield	0.0238	3.82	0.431	0.185
Total return	0.0955	6.27	0.754	0.568

For the capital appreciation rate, the primary measure, the risk score explains 38% of cross-country variation ($r = 0.62$, $r^2 = 0.38$): over the matched 2015 to 2024 window, a little under 40% of the variation in price growth is accounted for by measurable risk. The appreciation gradient of 0.0717 means each additional point of risk corresponds to 0.0717 percentage points more annual appreciation, so across the observed risk range, from Switzerland at 7.0 to Hungary at 87.5, a span of 80.5 points, the fitted line implies a difference of about 5.8 percentage points in annual appreciation between the lowest-risk and highest-risk markets in the sample.

For total return, the risk score explains 57% of the variation ($r = 0.75$, $r^2 = 0.57$), but this fit must be read with caution, since total return includes the June 2026 yield snapshot and so partly reflects a component measured outside the risk window.

For gross rental yield, the risk score explains only 19% ($r = 0.43$, $r^2 = 0.19$). This is expected because yield is a current price-to-rent snapshot rather than a return accumulated over the risk window. The low correlation reflects a temporal mismatch rather than evidence that yield is unrelated to risk. The analysis therefore leads with capital appreciation and uses total return to confirm the broad pattern.

Significance of the risk–return relationship

The correlations in 6.1.1 describe how closely the countries follow each fitted line. This subsection applies the test set out in Section 5.3.3 to establish whether each gradient differs from zero by more than chance, and reports the confidence interval on each. The full regression output is in Appendix C.

Regression Model	t-value	p-value	95% confidence interval for Gradient
Capital appreciation rate	3.33	0.004	0.027 to 0.117
Current Gross rental yield	2.02	0.058	−0.001 to 0.049

Total return	4.87	<0.001	0.054 to 0.137

A result is significant if $p < 0.05$.

The two measures that share the 2015 to 2024 risk window both pass the significance test. For capital appreciation, the primary measure, there is only about a 4 in 1,000 chance of seeing a relationship this strong if risk and return were truly unrelated ($p = 0.004$). For total return the chance is smaller still, below 1 in 1,000 ($p < 0.001$). In both cases the upward relationship is very unlikely to be a fluke of the particular twenty countries chosen. The relationship also holds under a stricter version of the test that guards against reading too much into three models at once, so the finding does not depend on which model is used.

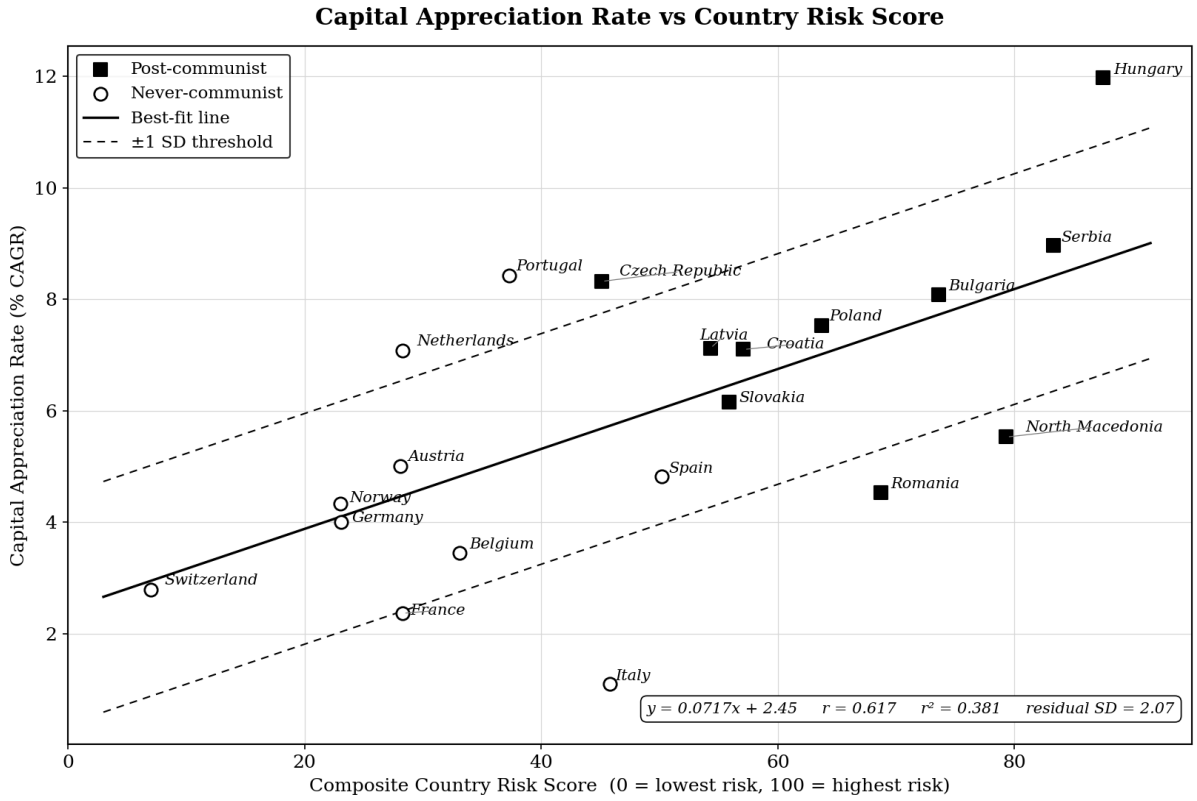
The 95% confidence interval on the appreciation gradient runs from a lower limit of 0.027 to an upper limit of 0.117. The data is consistent with any gradient in that range, so the sample fixes the direction of the premium but not its exact size. This is the level of precision twenty observations provide.

The gross rental yield measure does not pass the test, with about a 6 in 100 chance of arising by luck ($p = 0.058$), just above the cut-off. This is expected as the yield figure is a June 2026 snapshot, while every other figure is measured over 2015 to 2024, so the weaker result reflects that the yield is measured at a different time rather than an indication that risk and yield rates are uncorrelated. Because there are only twenty countries, this near miss means the test was not strong enough to confirm the relationship, not that the relationship is absent.

The fitted gradient also quantifies the share of the Section 1 premium attributable to measurable risk. Post-communist countries averaged a risk score of 66.9 against 30.4 for the never-communist group, a gap of 36.5 points. At 0.0717 percentage points per risk point, the fitted line predicts an appreciation premium of 2.62 points from this risk gap alone. The observed premium is $7.53 - 4.34 = 3.19$ points, so risk accounts for 82% of it. On total return the predicted premium is 3.49 points against an observed 3.72, or 94%. On yield the sign reverses: risk predicts a premium of 0.87 points against an observed 0.53, so post-communist yields sit 0.34 points below the level their risk predicts. This decomposition measures the share of the premium risk explained; it does not establish that the remainder is non-regional, which Sections 6.2 and 6.3 address.

Risk–return scatter plots

Figure 1: Capital Appreciation Rate against Country Risk Score

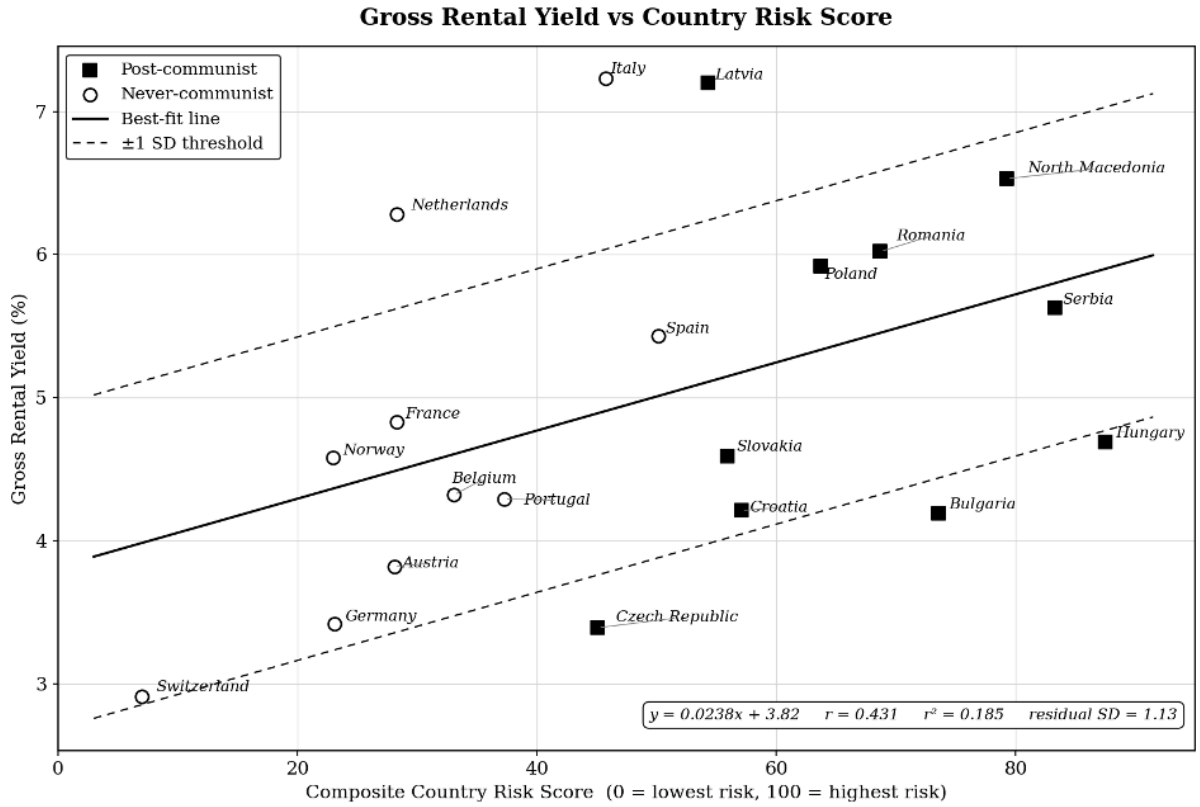


Best-fit by ordinary least squares: r = 0.617, r² = 0.381, residual standard deviation = 2.07

Analysis

The line slopes upward, so higher risk buys higher price growth across the sample as a whole. The fit is moderate. Risk explains 38% of the differences between countries, which leaves the majority of the spread to something else. This is examined in Section 7. The regional test is what the plot answers directly. If the premium were a reputational discount, the filled markers would sit above the line together and the hollow ones below. They do not. Hungary, the Czech Republic, Poland and Serbia sit above; Romania and North Macedonia sit below. The never-communist markers are spread the same way, with Portugal and the Netherlands high and Italy and France low. Italy produces the largest deviation in the study at 4.62 points below the line, and it is not post-communist.

Figure 2: Gross Rental Yield against Country Risk Score

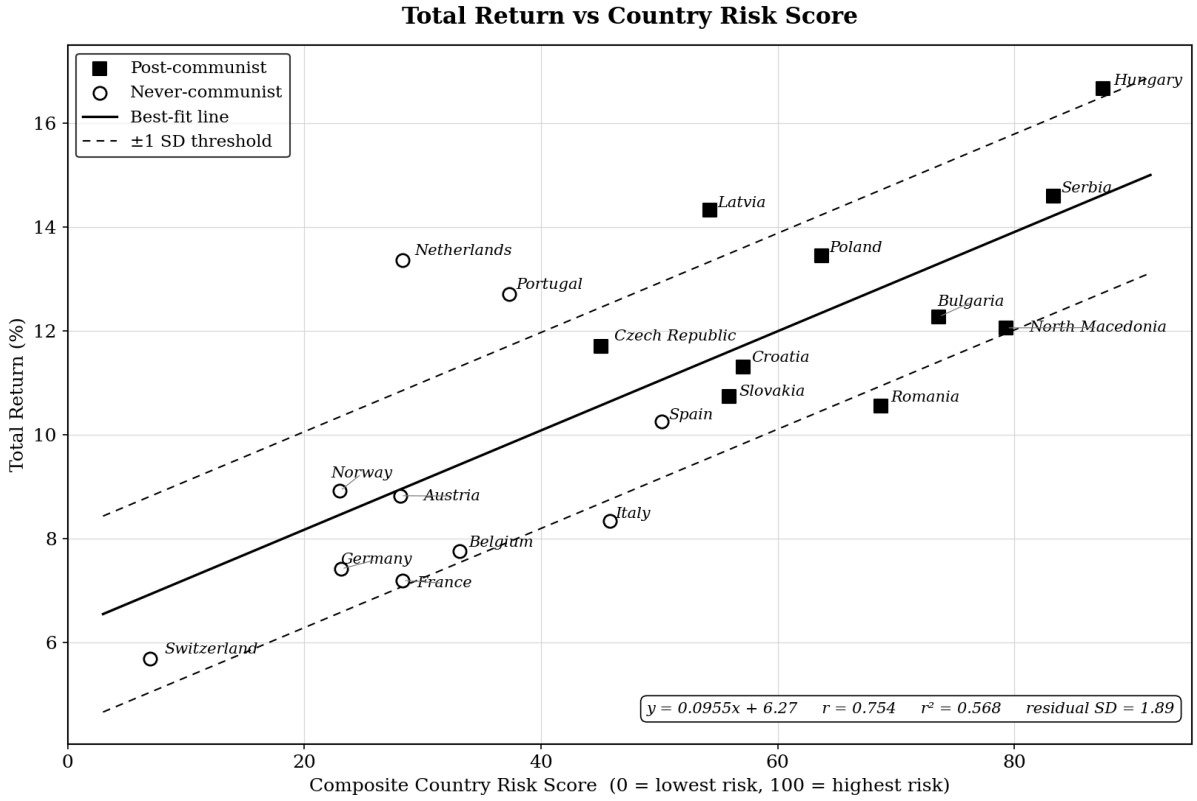


Best-fit by ordinary least squares: r = 0.431, r² = 0.185, residual standard deviation = 1.13

Analysis

This is the weakest of the three fits, with risk explaining 19% of the differences in yield. This is most likely because the yield variable was taken as a June 2026 snapshot while risk is measured over 2015 to 2024. Section 6.1.2 shows the gradient falls just short of significance for the same reason. The regional pattern is again absent, and here it runs mildly against the discount hypothesis. The three highest markers are Italy, Latvia and the Netherlands, two of them never-communist. The three lowest are the Czech Republic, Bulgaria and Hungary, all post-communist. Post-communist yields sit slightly below what their risk predicts rather than above, which is the reverse of what a reputational discount produces.

Figure 3: Total Return against Country Risk Score



Best-fit by ordinary least squares: r = 0.754, r² = 0.568, residual standard deviation = 1.89

Analysis

Total return gives the strongest fit of the three at 57%, though it inherits the yield snapshot and so is not measured cleanly against the risk window.

The plots do not show the post-communist countries sitting uniformly above the line. On capital appreciation, the primary model, post-communist countries are distributed on both sides of the fitted line, and total return shows the same pattern. The never-communist countries are similarly spread, with the Netherlands and Portugal sitting well above the line and Italy below it. This is itself a central result: once measurable risk is accounted for, post-communist returns are broadly in line with what their risk scores predict, rather than systematically exceeding them. The post-communist premium documented in Section 1 is therefore largely explained by measurable risk, and the deviations that remain are country-specific rather than regional. The predicted-versus-actual plots, which show the same results with both axes in return units, are given in Appendix C.

Outlier identification

Applying the pre-committed ±1 SD threshold to each model's residuals identifies the countries whose returns depart most sharply from what their risk predicts. Recall that a residual is the gap between a country's actual return and the return the best-fit line predicts for its risk score. A country is flagged as an outlier on a given model when its residual exceeds one standard deviation of that model's residuals in either direction.

The table below lists every flagged country. Each figure is the country's residual on that model, in percentage points of return. A positive figure marks a country earning more than its risk predicts (potentially underpriced); a negative figure marks one earning less (potentially overpriced). N/A means the residual falls within 1 SD of the fitted line. The final column counts how many of the three models flagged the country. A country flagged on more models has deviated more consistently, which later serves as a tie-breaker between candidates that otherwise meet the selection criteria. Residuals for all twenty countries, including the ten flagged on no model, are given in Appendix C, Table C7.

List of outliers in 1 or more models

Country	Capital Appreciation	Yield	Total Return	**Number of models flagged**
Italy	-4.62	+2.32	-2.30	**3**
Netherlands	+2.60	+1.79	+4.39	**3**
Hungary	+3.25	-1.21	+2.04	**3**
Romania	-2.84	N/A	-2.27	**2**
Latvia	N/A	+2.09	+2.87	**2**
Czech Republic	+2.64	-1.50	N/A	**2**
Portugal	+3.30	N/A	+2.88	**2**
Bulgaria	N/A	-1.38	N/A	**1**
North Macedonia	-2.60	N/A	N/A	**1**
France	-2.11	N/A	N/A	**1**

The remaining ten countries in the study were not flagged on any model. Their returns fall within ±1 SD.

The flagged countries do not divide along regional lines. On the primary model the two largest deviations both belong to never-communist countries and point in opposite directions: Italy at −4.62 and Portugal at +3.30. The largest deviation on total return, the Netherlands at +4.39, is also never-communist. A

discount operating on regional reputation could not place its two largest anomalies, of opposite sign, in never-communist Europe. Some countries change sign across models: Italy sits above the line on yield (+2.32) but far below it on capital appreciation (−4.62), a market with high rental income but almost no price growth. The stability of these outliers under alternative weightings is tested in Section 6.4.

Sensitivity of outliers to the weighting scheme

The composite risk score depends on a tiered weighting (Section 5.2.2) that follows the ordering established in the literature rather than being estimated from the data. A reasonable objection is that the outliers identified in Section 6.3 might be a product of those particular weights rather than a feature of the countries themselves, so that a different set of weights would place them on the line. To address this, the composite score is recomputed under two alternative weightings and all three regressions refitted under each. The two alternatives are equal weights, where every variable counts 16.7%, and a reshuffled tier structure, where bond spreads are promoted to Tier 1 and property rights demoted to Tier 2. Following the pre-committed rule in Section 5.3.5, an outlier is treated as robust only if it remains beyond ±1 SD under all three schemes.

The tables below report each outlier's residual under the three schemes for the capital appreciation and total return models. Capital appreciation is the primary measure; total return is the strongest fit ($r = 0.754$) and the one the case study draws on. The residual standard deviation, which sets the ±1 SD threshold, is given in the final row. A country is robust if its residual stays beyond that threshold in all three columns. The recomputed composite risk scores underlying all three schemes are given in Appendix C, Table C8.

Capital appreciation model residuals by weighting scheme

Country	Baseline	When equal weights are applied	When reshuffling variables	Robust?
Portugal	+3.30	+3.40	+3.02	Yes
Hungary	+3.25	+2.88	+3.53	Yes
Czech Republic	+2.64	+2.36	+2.56	Yes
Netherlands	+2.60	+2.91	+2.73	Yes
North Macedonia	−2.60	−2.26	−2.46	Yes
Romania	−2.84	−3.09	−3.23	Yes
Italy	−4.62	−4.69	−4.87	Yes

France	−2.11	−1.95	−2.35	**No (Below Threshold)**
Threshold (±1 SD)	**2.07**	**2.03**	**2.14**	

Total return model residuals by weighting scheme

Country	**Baseline**	**When equal weights are applied**	**When reshuffling variables**	**Robust?**
Netherlands	+4.39	+4.74	+4.61	**Yes**
Portugal	+2.88	+2.99	+2.53	**Yes**
Latvia	+2.87	+2.83	+3.38	**Yes**
Italy	−2.30	−2.40	−2.63	**Yes**
Romania	−2.27	−2.55	−2.83	**Yes**
Hungary*	+2.04	+1.65	+2.35	**No (Below Threshold)**
Threshold (±1 SD)	**1.89**	**1.88**	**1.99**	

**Hungary is the one country that does not hold: its residual drops to +1.65 under equal weights, just inside the 1.88 threshold, so it is excluded from strong claims.*

The yield model behaves the same way under all three schemes, and every baseline outlier survives. Switzerland goes the other way. It is not an outlier at baseline but crosses the threshold under equal weights, and sits marginally inside it under the reshuffled scheme, which shows the test can add countries as well as drop them. Because it does not hold across all three schemes it is not treated as robust, and no claim rests on it. The full table is in Appendix C, Table C9.

Selection of the case study country

Romania is selected for examination. Two post-communist markets earn less than the main model predicts, Romania at −2.84 and North Macedonia at −2.60, but only Romania also underperforms on total return (−2.27), and both its shortfalls hold across all three weighting schemes. North Macedonia's total-return residual of −1.78 falls inside the threshold.

It is paired with Bulgaria, at a near-identical composite risk score (73.6 against 68.7) sitting on the fitted line for both models on which Romania deviates. Bulgaria shares Romania's region, accession history, and demographic profile, which makes it the most informative available control.

Summary of quantitative findings

First, returns rise with risk across the twenty countries. The fit is strongest on total return and on capital appreciation. Both gradients are stronger than what random chance would produce. Yield fits more weakly due to a timing inconsistency.

Second, the difference between the two groups is largely a difference in risk. Post-communist countries carry 36.5 more points of risk on average. At the rate the sample charges for risk, that gap alone predicts roughly 82% of the observed appreciation premium and around 94% of the premium on total return.

Third, the part risk does not explain has nothing to do with region. The post-communist countries fall on both sides of the fitted line, and the two largest deviations in the study both belong to never-communist countries.

CASE STUDY: ROMANIA

Romania is the case that tests the discount hypothesis most directly from inside the post-communist group. The paper isolates the cause by pairing it with Bulgaria, a near-twin that sits on the fitted line for the two models on which Romania deviates.

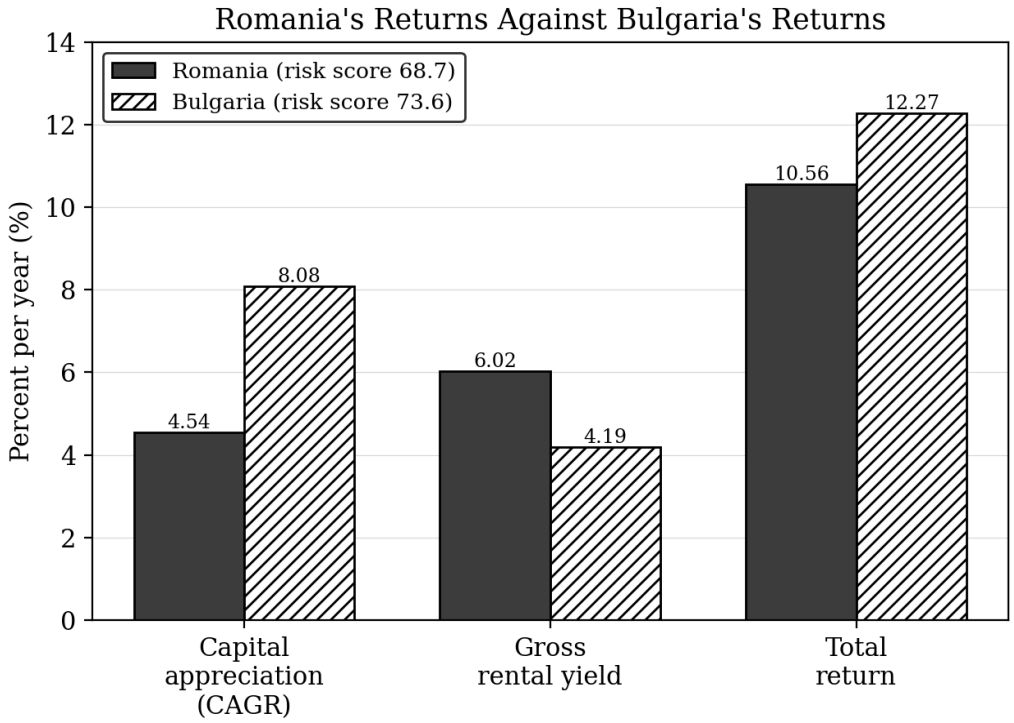
Quantitative anomaly

On capital appreciation, Romania's residual is −2.84, robust across all three weighting schemes. Romanian prices grew at 4.54% per year over the decade, against a post-communist average of 7.53% and Bulgaria's 8.08%. The model, reading Romania's composite risk score of 68.7, predicts a return well above what Romania delivered.

On gross rental yield, Romania runs the opposite way, at 6.02% against Bulgaria's 4.19%. Romania’s high yield is the residue of a market where credit never bid prices up in the first place, so prices stayed low relative to rents from the start.

On total return, Romania sits below what its risk predicts, with a residual of −2.27, returning 10.56% against Bulgaria's 12.27%. Romania's strong yield offsets part of the appreciation gap, so the total-return shortfall is smaller than the capital-appreciation shortfall. Romania is not a market that pays poorly overall; it is a market that pays through income rather than growth. That distinction shows Romania is not mispriced in the sense of being a bad investment, but rather structured so that its return arrives as yield while its prices stay flat.

Taken together, the three measures describe one market. Credit never pushed prices up, so they stayed low. Low prices made the yield look high. The total return lands a little below what the risk score predicts. Romania pays through rent, not rising prices. The returns chart sets the three measures against Bulgaria's.



Competing explanations

Three possible explanations are as follows:

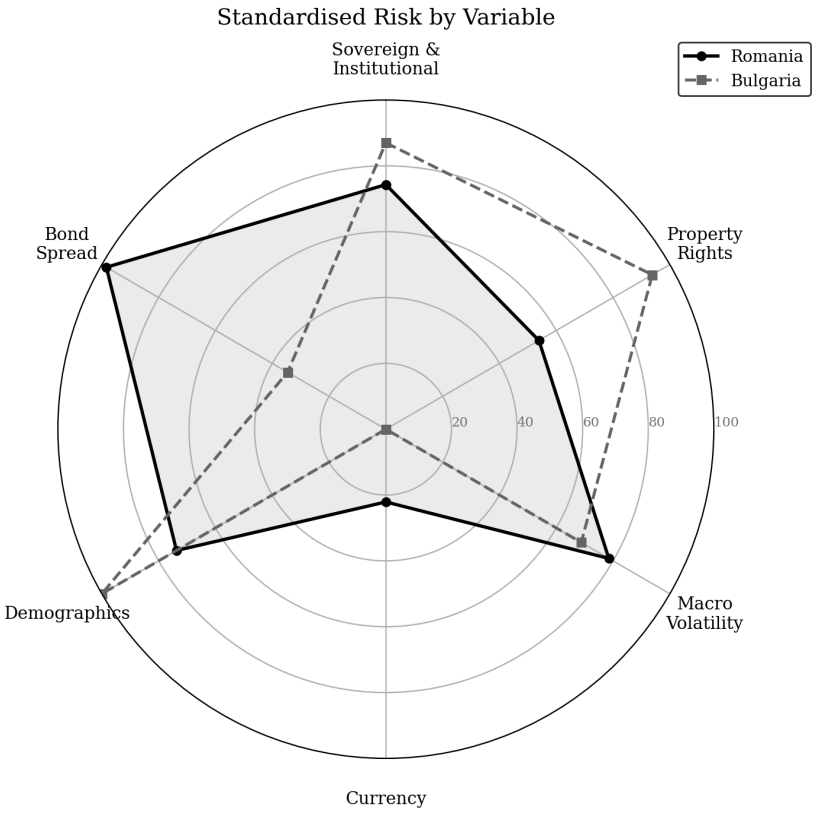
1. The composite overstates Romania's true risk, so the low return is fair for a market that is safer than it scores.
2. The return is depressed by structural factors the risk model does not capture.
3. Mispricing.

Bulgaria as a control

Bulgaria shares almost the entire profile that a regional or Balkan explanation would rely on. Both joined the EU on 1 January 2007, both entered the Schengen Area together in January 2025, both have lost population heavily since accession (Eurostat, 2024e), and both have low but converging incomes and high, cash-based homeownership arising from post-socialist privatisation rather than credit expansion (Cousin et al., 2025). Anything the two share cannot explain why Romania sits below the line and Bulgaria on it.

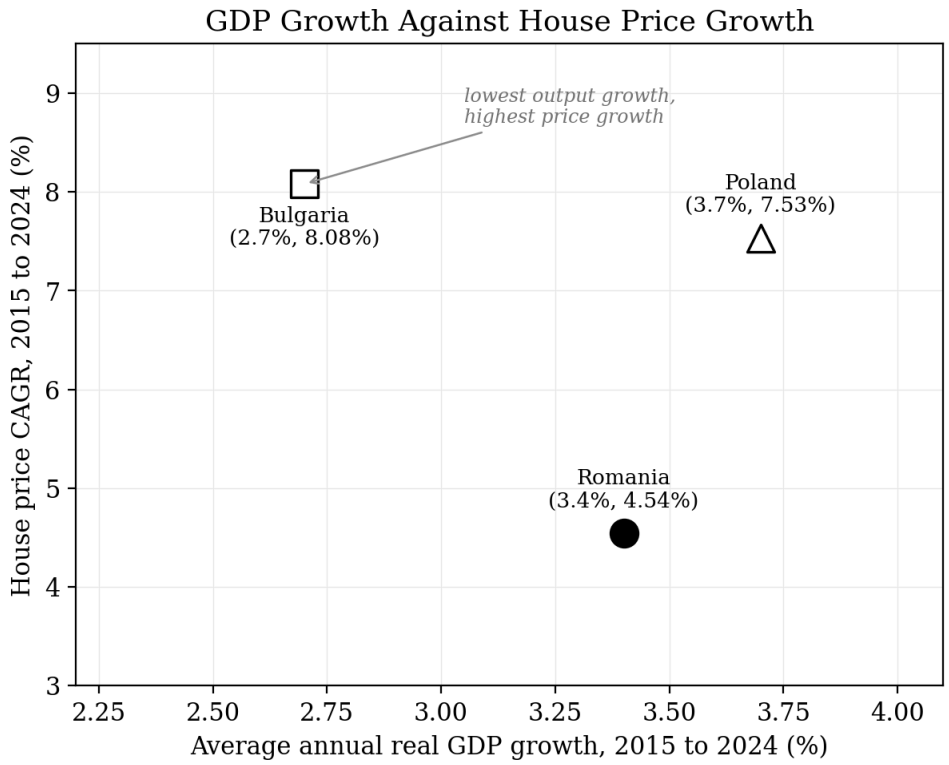
Two facts rule out the leading alternative explanations at once. Bulgaria's demographic decline is worse than Romania's. It is projected by the United Nations to have the fastest-declining population in the world (United Nations, 2024), and has lost about 21% of its population since 2000 against Romania's 16% (Eurostat, 2024e), and it scores the maximum 100 on the demographic risk variable against Romania's 73.7. Yet Bulgaria's prices grew nearly twice as fast. Demographic decline therefore cannot be what holds

Romanian prices down. Bulgaria also scores slightly riskier than Romania, 73.6 against 68.7. Romania therefore earns less while measuring marginally safer, so its shortfall is not the price of being the riskier market.



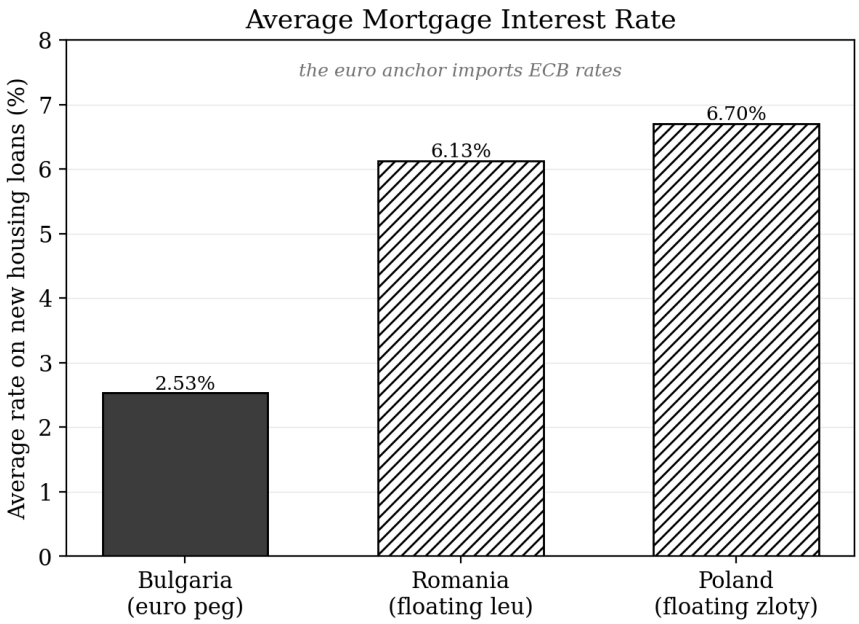
The figure above shows that the two countries reach similar total risk by opposite routes. Romania's risk is concentrated in its bond spread, the second highest in the sample at 98.4, just below Serbia's 100. Bulgaria’s risk sits instead in demographics, property rights, and governance. Its currency risk is zero because the currency board removes exchange-rate exposure, and its bond spread is 34.6 against Romania’s 98.4.

Poland enters as a supplementary benchmark. It floats its currency like Romania but records far higher appreciation, which separates the floating regime from shallow credit. Its boom ran on subsidised volume rather than cheap market credit, showing what a post-communist market does when plentiful credit reaches housing regardless of its price. Romania had no equivalent channel.

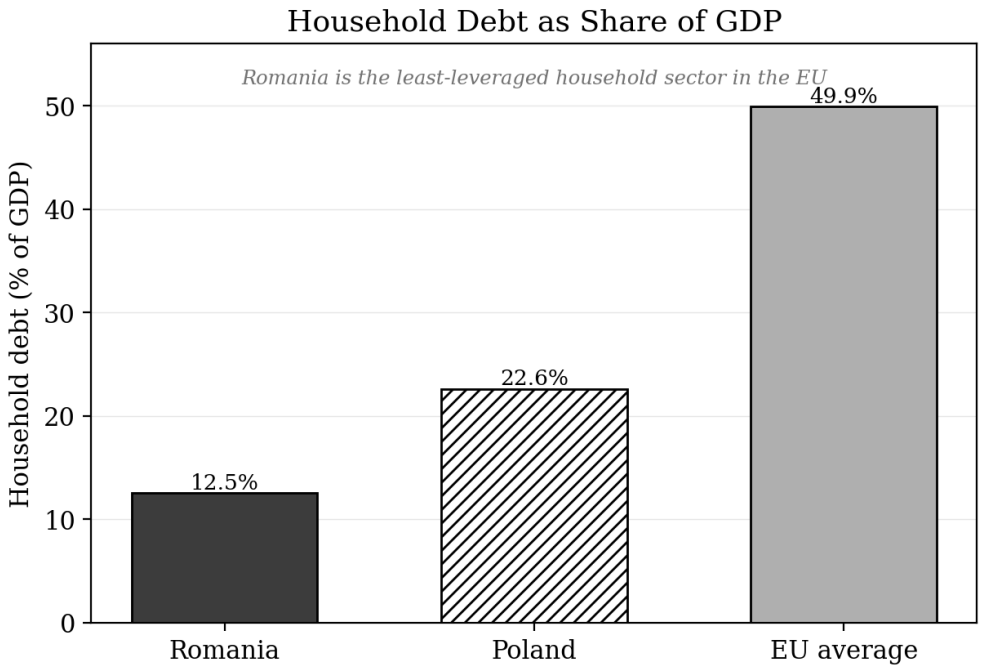


The above figure plots decade GDP growth against house-price growth for the three countries. There is no positive relationship: Bulgaria had the lowest output growth and the highest price growth, while Romania had higher output growth and the lowest price growth. Something other than the economy drove prices, and that something is credit.

Credit reached Bulgarian housing on terms Romania never offered. Across the 2015 to 2024 study window the lev was pegged to the euro, so Bulgaria imported the ECB's monetary conditions, and the average rate on a Bulgarian housing loan in 2024 was 2.53% (European Mortgage Federation, 2025a). Bulgaria went on to adopt the euro outright on 1 January 2026, after the window closed. Romania floats the leu, and its central bank has held the policy rate at 6.5%, among the highest in the EU, since August 2024 (Trading Economics, 2026), so Romanian mortgages cost roughly 6% (European Mortgage Federation, 2025b).



The above shows the gap and its source. Romania and Poland, both floating, sit together near 6 to 7%, while euro-anchored Bulgaria sits at half that, which identifies the currency regime rather than a Romanian peculiarity as the potential cause. The IMF attributes Bulgaria's house-price strength to high wage growth driving income convergence alongside rapid credit expansion, and expects euro adoption to reduce currency risk and strengthen investor confidence, with narrowing sovereign spreads already visible (International Monetary Fund, 2025). The depth of credit differs as much as its price.



The figure above shows that Romanian households carry the lowest debt in the EU, at 12.5% of GDP, roughly half Poland's 22.6% and about a quarter of the EU average of 49.9% (Eurostat, 2024c). Counting all household financial liabilities rather than loans alone, the figure rises to 15.8%, still the lowest in the EU. The market is largely cash-based. The credit-fuelled demand that lifted Bulgaria, where household liabilities grew faster than in any other EU country in 2024, at 19.2% (Eurostat, 2025b), and the subsidised demand that lifted Poland, where the 2% Safe Mortgage scheme pushed Warsaw offer prices up 13% (Cushman & Wakefield, 2026), never reached Romania.

A second structural feature reinforces this pattern. Romanian incomes rose quickly from a low base, converging toward Western living standards through wages rather than asset prices, so the price-to-income ratio stayed roughly stable and affordability held (Cousin et al., 2025). That is a healthy outcome rather than a sign of a weak market.

The risk-overstatement reading can now also be set aside. Romania's high score is not an artefact. Its 2024 deficit was the highest in the EU, at 9.3% of GDP, and remained the EU's largest into 2025, at 7.9% (European Commission, 2026). Its politics produced the most severe electoral disruption in its post-communist history: the Constitutional Court annulled the November 2024 presidential election on the basis of co-ordinated manipulation on social networks and campaign finance violations, and a repeat election was held in May 2025 (OSCE Office for Democratic Institutions and Human Rights, 2025).

Bulgaria was also politically unstable, holding seven parliamentary elections between 2021 and 2024, with anti-corruption protests forcing its government to resign in December 2025 and an eighth election following in April 2026 (OSCE Office for Democratic Institutions and Human Rights, 2026). Yet its euro and Schengen accession proceeded regardless, because the currency anchor and EU commitments held

independently of which government was in office. Romania's instability translated into market-relevant fiscal and sovereign risk; Bulgaria's did not. The high Romanian score is therefore logical.

Verdict

Romania's deviation is not unmeasured risk, because Bulgaria carries similar measured risk and sits on the line, and Romania's high score is validated rather than inflated by the 2024 to 2025 fiscal and electoral crises. Nor is it mispricing, because Romanian prices correctly reflect a shallow, cash-based credit market, a high-rate floating currency, and convergence absorbed into wages. The shortfall is country-specific structural economics, not regional reputation. Romania earns less than its risk predicts because the credit and currency machinery that turned income growth into price growth in Bulgaria and Poland was absent. Credit depth and currency regime sit outside the six risk variables by design, since they shape the level of demand rather than the danger attached to it, and they define the transmission channel a successor model could add.

Bearing on the research question

A reputational discount predicts post-communist markets earn more than their risk justifies, because fear is overblown. Romania does the opposite. It earns less on both capital appreciation and total return, under every weighting scheme tested. Read alongside the two largest residuals in the study, both never-communist and pointing in opposite directions (Section 6.3), the deviations that survive a risk adjustment are country-specific, not regional. A discount that was truly regional could not place its largest anomalies in the West while a post-communist market underperforms in the East.

Romania also points to a model refinement. A risk-adjusted framework would predict it better if it included a measure of credit depth or currency regime, the transmission channel the six variables do not capture.

DISCUSSION

Answering the research question

The premium is mostly justified by the extra risk, not a bargain investors are missing. Across the twenty countries returns rise as risk rises, and on capital appreciation, the primary measure, risk explains 38% of the variation, with an r of 0.62. The two groups differ by 36.5 points of risk, and that gap alone explains about 82% of the higher price growth and 94% of the higher total return. Once risk is controlled, the post-communist countries no longer sit above the line as a bloc. They fall on both sides of it, scattered like the never-communist countries. What risk leaves unexplained is country-specific, not regional.

Romania, the post-communist market examined here, also earns less than predicted. The cause identified is the depth of credit reaching housing rather than its headline price. Bulgaria's euro peg imported ECB conditions, with new housing loans averaging 2.53% in 2024, and its household liabilities grew faster than in any other EU country that year. Romania floats the leu at roughly 6.13%, and its households are the least leveraged in the EU at 12.5% of GDP, so credit never bid prices up. The rate level alone does not carry the explanation. Poland also floats and borrows more dearly than Romania, at 6.70%

(TheGlobalEconomy.com, 2026a), yet recorded 7.53% appreciation, because a subsidised lending scheme pushed credit into the market regardless of its price. What separates Romania from both comparators is therefore the volume of credit reaching housing, with the currency regime operating on that volume rather than on the rate alone. The model has no credit or currency-regime variable, so it could not see why Romania's prices stayed flat. The omission pushed the residual down: the model expected the return its risk score implied and Romania delivered less.

Contribution of the paper

Beyond confirming that the post-communist premium is largely fair compensation for measurable risk, the paper identifies structural return-determinants that lie outside a risk model. The Romania case demonstrates one directly: credit depth and currency regime, the channel that separated Romania from Bulgaria, are unmeasured by the six variables, yet they are what held Romanian prices flat while Bulgaria's rose. Two further determinants are implied by the variance the model leaves unexplained rather than shown in a case. The level or trend of growth, distinct from the volatility the composite captures, and the elasticity of housing supply (Cousin et al., 2025) both shape demand without appearing in any risk variable. Each of these shapes the level of demand rather than the danger attached to a return, which is why a risk model leaves them in the residual rather than in the score. A composite built on risk alone will therefore leave a country-specific gap wherever growth fundamentals and measured risk point in opposite directions.

One variable already inside the model needs a correction. Demographic decline currently enters as a compensated risk that raises predicted return, when in the market the same decline suppresses realised return, so it carries the wrong sign, and a successor model should move it to the return side. Section 10 develops these as extension recommendations.

Implications for investors

Firstly, a country’s communist past should not, in its own right, carry significant weight in a pricing decision. Once measurable risk is controlled the two groups no longer separate, so the 7.53% against 4.34% premium is fair compensation for higher risk rather than an attractive discount. Secondly, a high rental yield should be treated with caution. In Romania the high yield is the mirror image of weak price growth, and once risk is accounted for the market delivers a below-par total return despite an attractive headline figure. The value that does exist sits in the factors a risk screen cannot capture, above all the depth of credit. A risk score is therefore best used to set a fair-return benchmark and rule region out as a criterion. Value is then found along the dimensions the score omits.

LIMITATIONS TO THE PAPER

Data and timing

Most variables run over 2015 to 2024, but two sit slightly outside that window. Rental yields are a June 2026 snapshot, and the IPRI property-rights scores are 2025. Both gaps are small and fall on slow-moving measures, and the mismatch reaches only the yield and total-return models. The primary

capital-appreciation model still shares the same risk window and is unaffected. The yield timing gap is the most likely reason the yield model returns a low r^2 of 0.19. This is a mismatch in measurement period rather than evidence that yield is unrelated to risk.

Bond spreads are the least uniform variable. Sixteen countries use the full Eurostat series. North Macedonia is available only from March 2018 to July 2024, and Serbia has no consistent 10-year benchmark at all, so its spread is approximated from yields at issuance. Croatia's currency-risk score is likewise historical, measured over its kuna years before it adopted the euro in 2023.

Coverage gaps

A national index averages markets that behave differently within the same country. This matters most in large countries such as Germany, France, Italy, and Spain, where a booming capital and a stagnant periphery net out to a middling figure. Small, single-market countries such as Latvia and Croatia are impacted less. North Macedonia runs the other way, since its BIS series tracks Skopje rather than the whole country, though Skopje's share of national transactions keeps the distortion small. Section 10.2 proposes city-level data as an extension.

Method

The composite-index design carries several constraints. The six variables overlap, because governance, macroeconomic volatility, and bond spreads all partly capture sovereign credibility, so the score partially double-counts. The tiered weighting eases this by placing bond spreads below the Tier 1 fundamentals they reflect without entirely removing it.

The composite also assigns weights rather than estimating them, which is less rigorous than a multivariate regression that fits a separate coefficient to each variable. The weights here are constructed for this paper, justified by the ordering of importance existing literature establishes. It is then tested directly in the sensitivity analysis (Section 6.4).

The sample of twenty is small for regression, which leaves Pearson's r sensitive to single observations and limits statistical power. The one standard deviation outlier threshold is a working convention with no natural boundary behind it. The non-significant yield result in Section 6.1 should therefore be read as an effect not detected rather than one that is definitely absent, and the claim of regional non-separation is bounded the same way, since a modest regional effect could sit within residual variation that twenty observations cannot resolve. Finally, averaging each variable across the decade hides any movement within it, so a country whose risk shifted mid-window appears only at its mean.

Inaccurate positioning of the demographic risk variable

One limitation sits inside the model rather than in the data. The composite enters higher demographic decline as a higher risk, so a shrinking population raises a country's predicted return. In the markets studied the effect runs the opposite way, since decline shrinks the tenant pool and suppresses demand, and with it the realised return. This direction is the one the housing literature supports, with Mankiw and Weil (1989) and later cross-country work by Takáts (2012) and Jäger and Schmidt (2017) finding that a

shrinking and aging population lowers real house prices. The variable therefore belongs with the demand fundamentals rather than the risk factors. The consequence falls on Romania, the shrinking market examined closely, whose predicted return and negative residual are both inflated by it. The bias works against the paper's own outliers, since correcting this would pull both toward the fitted line and reinforce the finding of regional non-separation. Section 10 takes this up as the first extension, moving demographic change from the risk side of the model to the return side.

CONCLUSIONS AND EXTENSION RECOMMENDATIONS

Conclusions

In conclusion, the higher returns in post-communist European property do reflect the higher measurable risk. This paper set out to test whether the higher returns in post-communist European property markets reflect measurable risk or a discount driven by their communist past. **The evidence points to the former.** Across the twenty countries, returns rise with risk in the expected way, and the relationship is strongest on capital appreciation. Once that risk is controlled, the post-communist markets no longer stand apart. They fall on both sides of the fitted line, spread similarly to the never-communist markets, so the variation that risk leaves unexplained is country-specific rather than regional, and the premium is not a bargain held down by reputation.

The two largest residuals both fall in never-communist Europe pointing in opposite directions, so a discount that were truly regional could not exist in this form. Romania, the post-communist market examined in depth, confirms the same from inside the region: its deviation traces to credit and currency structure rather than its historical reputation. The practical weight of this sits in how capital is screened: an investor who judges these markets by their communist past or their headline yield is reading the wrong signal, and the value that does exist sits in factors a conventional risk model does not measure. Section 10.3 draws out who this finding serves and how.

Extension recommendations

The results and the Romania case point to several recommendations for a successor study:

1. **Move demographics to the return side**
   The composite treats demographic decline as a risk the market compensates, so a shrinking population raises a country's predicted return. In the market the effect runs the other way. Decline shrinks the tenant pool and pushes prices down, which is what the housing literature reviewed in Section 9 finds (Mankiw and Weil, 1989; Takáts, 2012; Jäger and Schmidt, 2017). This cannot be fixed by reversing the variable's scale, since population growth is not itself a risk. The variable is on the wrong side of the model. It describes the level of demand, as credit depth and growth do, rather than the danger attached to a return. A successor model should take it out of the risk composite, enter it as a demand fundamental, and re-estimate. On the evidence of Romania this should tighten the fit rather than loosen it.

2. **Estimate the variables jointly rather than weighting them**
   The present design fixes the weights in advance because no published study provides them, but a multivariate regression, with each risk variable entered separately and a post-communist dummy added, would let the data reveal which variables matter most and by how much, and would test directly whether any regional effect survives once every variable is controlled individually. This would replace the composite's assigned weights with estimated coefficients and address the main methodological limit of the current approach, at the cost of the interpretability the single composite score provides.

3. **Add a growth-trajectory variable**
   The level or trend of growth, distinct from its volatility, is not captured by any risk variable, yet the model leaves 62% of appreciation variance unexplained and growth level is a likely part of it. A measure of growth trajectory or convergence potential would test whether this closes the gap the present model leaves for stagnating markets.

4. **Add a credit-depth and leverage variable**
   The depth of household credit and the currency regime behind it separated Romania from Bulgaria. A measure of credit depth or household leverage would capture a factor the six variables omit entirely.

5. **Widen the sample and move to the city level**
   Investors also buy in specific cities rather than national markets, and a national average hides wide variation inside large countries such as Germany, France, Italy, and Spain. Extending the set, and moving to city-level price and yield data wherever available, would steady the regression and let a successor test whether the patterns hold within countries as well as across them.

6. **Introduce a perception variable**
   This paper measured objective risk and found no regional discount. A study that measured perceived risk alongside it, through sentiment or country-outlook data, could establish whether a gap between perceived and objective risk drives returns, which is the mechanism a reputational discount actually requires. This is the most direct test of the reputation hypothesis that the present design could not perform.

7. **Price development level explicitly**
   A given rate of growth is easier to achieve from a low base than a high one. Adding a development-level variable would price convergence potential directly, rather than leaving it to register as unexplained appreciation in lower-income markets.

The demographics correction in item 1 predicts a direction: Romania's residual should move toward the line once demographics is entered as a demand fundamental, and a successor that found it moving away

would have falsified the claim. The new variables in items 3 and 4 would be judged on whether adjusted r^2 rises when each is added in turn.

Wider relevance

The finding serves three audiences. For investors, it changes what to look at when comparing markets. A country's communist past does not indicate good value, because once risk is controlled the two groups no longer separate. Nor does a high headline yield, because in Romania the high yield sits alongside a below-par total return. What matters instead is the level of growth, the depth of credit, and the elasticity of supply. For governments, the result is diagnostic. Weak price growth relative to neighbouring countries can be structural or reputational, and each deserves its own tailored response. In Romania it is structural. Its low price growth is fully explained by shallow credit and a floating currency, and it is not damaging: affordability held because incomes converged instead of asset prices (International Monetary Fund, 2023). A government facing similar figures should establish which case it is in before spending to correct it. For future literature, the paper shows that a risk-only composite misreads any market where growth fundamentals and measured risk point in different directions. Any future cross-country property screen would be more accurate for carrying the factors this study identifies as sitting outside the model.

AUTHOR INFORMATION

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REFERENCES

Atoyan, R., Christiansen, L., Dizioli, A., Ebeke, C., Ilahi, N., Ilyina, A., Mehrez, G., Qu, H., Raei, F., Rhee, A., & Zakharova, D. (2016). Emigration and its economic impact on Eastern Europe (IMF Staff Discussion Note No. SDN/16/07). International Monetary Fund. https://doi.org/10.5089/9781475576368.006

Beck, T., & Laeven, L. (2006). Institution building and growth in transition economies. Journal of Economic Growth, 11(2), 157-186. https://doi.org/10.1007/s10887-006-9000-0

Bogaerts, T., Williamson, I. P., & Fendel, E. M. (2002). The role of land administration in the accession of Central European countries to the European Union. Land Use Policy, 19(1), 29-46. https://www.sciencedirect.com/science/article/abs/pii/S0264837701000412

Broulíková, H. M., & Montag, J. (2020). Housing privatization in transition countries: Institutional features and outcomes. Review of Economic Perspectives, 20(1), 51-71. https://doi.org/10.2478/revecp-2020-0003

Cousin, G., Frayne, C., Dias Martins, V., & Vašíček, B. (2025). Housing in the European Union: Market developments, underlying drivers, and policies (SUERF Policy Note No. 387). SUERF. https://www.suerf.org/publications/suerf-policy-notes-and-briefs/housing-in-the-european-union-market-developments-underlying-drivers-and-policies/

Cushman & Wakefield. (2025). *DNA of real estate Europe, Q3 2025.*

Cushman & Wakefield. (2026). *Small but mine? The housing situation in Poland today* [Housing sector report]. https://www.cushmanwakefield.com/en/poland/insights/housing-sector-report

Deloitte. (2025). *Property index: Overview of European residential markets* (14th ed.). Deloitte. Retrieved July 1, 2026, from https://www.deloitte.com/cz-sk/en/Industries/real-estate/research/property-index.html

Edelstein, R., Qian, W., & Tsang, D. (2011). How do institutional factors affect international real estate returns? *Journal of Real Estate Finance and Economics, 43*(1), 130–151. https://doi.org/10.1007/s11146-010-9245-4

European Central Bank. (2026). *Euro reference exchange rates* [Dataset]. Retrieved July 1, 2026, from https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/index.en.html

European Commission. (2026). *Economic forecast for Romania.* Directorate-General for Economic and Financial Affairs. Retrieved July 1, 2026, from https://economy-finance.ec.europa.eu/economic-surveillance-eu-member-states/country-pages/romania/economic-forecast-romania_en

European Mortgage Federation. (2025a). *HYPOSTAT 2025: Bulgaria country report.* Retrieved July 1, 2026, from https://hypo.org/sites/default/files/2025-09/Bulgaria.pdf

European Mortgage Federation. (2025b). *HYPOSTAT 2025: Romania country report.* Retrieved July 1, 2026, from https://hypo.org/sites/default/files/2025-09/Romania.pdf

Eurostat. (2024a). *EMU convergence criterion series: Long-term government bond yields (irt_lt_mcby_a)* [Dataset]. European Commission. Retrieved July 1, 2026, from https://ec.europa.eu/eurostat/databrowser/view/irt_lt_mcby_a/default/table

Eurostat. (2024b). *House price index (prc_hpi_a)* [Dataset]. European Commission. Retrieved July 1, 2026, from https://ec.europa.eu/eurostat/databrowser/view/prc_hpi_a/default/table

Eurostat. (2024c). *Household debt, consolidated (sectors S.14 and S.15)* [Dataset]. European Commission. Accessed July 1, 2026. https://ec.europa.eu/eurostat/databrowser/view/tipspd22/default/table

Eurostat. (2024d). *Housing statistics.* Statistics Explained, European Commission. Retrieved July 1, 2026, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Housing_statistics

Eurostat. (2024e). *Population on 1 January* [Dataset, tps00001]. European Commission. Retrieved July 1, 2026, from https://ec.europa.eu/eurostat/databrowser/view/tps00001/

Eurostat. (2025a). *General government gross debt (gov_10dd_edpt1)* [Data set]. European Commission. https://ec.europa.eu/eurostat/databrowser/view/gov_10dd_edpt1

Eurostat. (2025b). Households: Statistics on financial assets and liabilities. Statistics

Explained, European Commission. Retrieved July 1, 2026, from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Households_-_statistics_on_financial_assets_and_liabilities

Federal Reserve Bank of St. Louis. (2025a). *BIS residential property price index for North Macedonia (QMKN628BIS)* [Dataset]. FRED. Retrieved July 1, 2026, from https://fred.stlouisfed.org/series/QMKN628BIS

Federal Reserve Bank of St. Louis. (2025b). *BIS residential property price index for Serbia (QRSN628BIS)* [Dataset]. FRED. Retrieved July 1, 2026, from https://fred.stlouisfed.org/series/QRSN628BIS

Federal Reserve Bank of St. Louis. (2025c). *BIS residential property price index for Switzerland (QCHN628BIS)* [Dataset]. FRED. Retrieved July 1, 2026, from https://fred.stlouisfed.org/series/QCHN628BIS

Federal Reserve Bank of St. Louis. (2025d). *Long-term government bond yield for Norway (IRLTLT01NOA156N)* [Dataset]. FRED. Retrieved July 1, 2026, from https://fred.stlouisfed.org/data/IRLTLT01NOA156N

Federal Reserve Bank of St. Louis. (2025e). *Long-term government bond yield for Switzerland (IRLTLT01CHA156N)* [Dataset]. FRED. Retrieved July 1, 2026, from https://fred.stlouisfed.org/data/IRLTLT01CHA156N

Fischer, S., Sahay, R., & Vegh, C. A. (1996). Stabilization and growth in transition economies: The early experience. Journal of Economic Perspectives, 10(2), 45–66. https://doi.org/10.1257/jep.10.2.45

Geurts, T. G., & Jaffe, A. J. (1996). Risk and real estate investment: An international perspective. *Journal of Real Estate Research, 11*(2), 117–130.

Ghanbari-Parsa, A. R., & Moatazed-Keivani, R. (1999). Development of real estate markets in Central Europe: The case of Prague, Warsaw, and Budapest. *Environment and Planning A, 31*(8), 1383–1399. https://doi.org/10.1068/a311383

Global Property Guide. (2026). *Residential rental yields by country* [Dataset]. Retrieved July 1, 2026, from https://www.globalpropertyguide.com/rental-yields

Hartmann, P. (2015). Real estate markets and macroprudential policy in Europe. *Journal of Money, Credit and Banking, 47*(S1), 69–80. https://doi.org/10.1111/jmcb.12192

Hellman, J. S. (1998). Winners take all: The politics of partial reform in postcommunist transitions. World Politics, 50(2), 203-234. https://doi.org/10.1017/S0043887100008091

Hellman, J. S., Jones, G., & Kaufmann, D. (2003). Seize the state, seize the day: State capture and influence in transition economies. Journal of Comparative Economics, 31(4), 751-773.

Huber, P., & Montag, J. (2020). Homeownership, political participation, and social capital in post-communist countries and Western Europe. *Kyklos, 73*(1), 96–119. https://doi.org/10.1111/kykl.12218

International Monetary Fund. (2023). *Romania: Article IV consultation staff report.* International Monetary Fund.

International Monetary Fund. (2024). *World economic outlook database, October 2024* [Dataset]. https://www.imf.org/en/publications/weo/weo-database/2024/october

International Monetary Fund. (2025). *Bulgaria: 2025 Article IV consultation—Press release; staff report* (IMF Country Report No. 2025/306). https://www.imf.org/en/countries/bgr

Investing.com. (2026a). *EUR/RSD historical exchange rate data* [Dataset]. Retrieved July 1, 2026, from https://www.investing.com/currencies/eur-rsd-historical-data

Investing.com. (2026b). *Serbia 10-year government bond historical data* [Dataset]. Retrieved July 1, 2026, from https://www.investing.com/rates-bonds/serbia-10-year-historical-data

Jäger, P., & Schmidt, T. (2017). Demographic change and house prices: Headwind or tailwind? *Economics Letters, 160*, 82–85. https://doi.org/10.1016/j.econlet.2017.09.007

Jones Lang LaSalle. (2024). *Global real estate transparency index 2024* (13th ed.). https://www.jll.com/en-us/insights/global-real-estate-transparency-index

Keivani, R., Parsa, A., & McGreal, S. (2001). Globalisation, institutional structures and real estate markets in Central European cities. *Urban Studies, 38*(13), 2457–2476. https://doi.org/10.1080/00420980120094605

Kettunen, H., & Ruonavaara, H. (2021). Rent regulation in 21st century Europe. Comparative perspectives. *Housing Studies, 36*(9), 1446–1468. https://doi.org/10.1080/02673037.2020.1769564

Knight Frank. (2026). *The wealth report 2026* (20th ed.). https://www.knightfrank.com/research/reports/wealthreport

Kováts, B., & Kohl, S. (2024). Varieties of East-Central European housing tenure structure: The long life of a north-south cleavage line. *Journal of Urban Affairs.* Advance online publication. https://doi.org/10.1080/07352166.2024.2351397

Kurylchyk, K. (2019). *Risks in international real estate investment: The case of Central and Eastern Europe* [Conference paper]. European Real Estate Society (ERES).

Liao, H.-H., & Mei, J. (1999). Institutional factors and real estate returns: A cross-country study. *International Real Estate Review, 2*(1), 21–34.

Lieser, K., & Groh, A. P. (2011). The attractiveness of 66 countries for institutional real estate investments: A composite index approach. *Journal of Real Estate Portfolio Management, 17*(3), 191–211.

Lieser, K., & Groh, A. P. (2014). The determinants of international commercial real estate investment. *Journal of Real Estate Finance and Economics, 48*(4), 611–659.

Mankiw, N. G., & Weil, D. N. (1989). The baby boom, the baby bust, and the housing market. *Regional Science and Urban Economics, 19*(2), 235–258.

Ministry of Finance of the Republic of North Macedonia. (2024). *Government bond yield data* [Data set]. Retrieved July 1, 2026, from https://finance.gov.mk/en-GB/oblasti/dxv-info

Newell, G., & Marzuki, M. J. (2018). *Analysis of global real estate transparency dynamics and linkages* [Conference paper]. European Real Estate Society (ERES).

Organisation for Economic Co-operation and Development. (2025). *OECD economic surveys: Netherlands 2025.* https://www.oecd.org/en/publications/oecd-economic-surveys-netherlands-2025_2dd1f4aa-en.html

OSCE Office for Democratic Institutions and Human Rights. (2025). Romania, repeat presidential election, 4 and 18 May 2025: ODIHR limited election observation mission final report. https://odihr.osce.org/sites/default/files/f/documents/f/3/600295_0.pdf

OSCE Office for Democratic Institutions and Human Rights. (2026). Bulgaria, early parliamentary elections, 19 April 2026: ODIHR needs assessment mission report. https://odihr.osce.org/sites/default/files/documents/official_documents/2026/03/Bulgaria%202026%20early%20parliamentary_%20NAM%20report_03.03.2026.pdf

Pavlov, A., Steiner, E., & Wachter, S. (2015). Macroeconomic risk factors and the role of mispriced credit in the returns from international real estate securities. *Real Estate Economics, 43*(1), 241–270.

Pistor, K., Raiser, M., & Gelfer, S. (2000). Law and finance in transition economies. Economics of Transition, 8(2), 325-368.

Property Rights Alliance. (2025). *International property rights index 2025.* https://internationalpropertyrightsindex.org

Romanian National Agency for Cadastre and Land Registration. (2024). *National programme for cadastre and land book progress report.*

Schaewitz, J., Wang, M., & Rieger, M. O. (2022). Culture and institutions: Long-lasting effects of communism on risk and time preferences of individuals in Europe. *Journal of Economic Behavior and Organization, 202*, 785–829.

Stephens, M., Lux, M., & Sunega, P. (2015). Post-socialist housing systems in Europe: Housing welfare regimes by default? Housing Studies, 30(8), 1210-1234. https://doi.org/10.1080/02673037.2015.1013090

Takáts, E. (2012). Aging and house prices. *Journal of Housing Economics, 21*(2), 131–141. https://doi.org/10.1016/j.jhe.2012.04.001

TheGlobalEconomy.com. (2026a). Poland: Mortgage credit interest rate [Dataset]. Retrieved July 1, 2026, from https://www.theglobaleconomy.com/Poland/mortgage_interest_rate/

TheGlobalEconomy.com. (2026b). *Romania: Mortgage credit interest rate* [Dataset]. Retrieved July 1, 2026, from https://www.theglobaleconomy.com/Romania/mortgage_interest_rate/

Trading Economics. (2026). *Romania interest rate* [Dataset]. Retrieved July 1, 2026, from https://tradingeconomics.com/romania/interest-rate

United Nations. (2024). World population prospects 2024: Summary of results (UN DESA/POP/2024/TR/No. 9). https://www.un.org/development/desa/pd/content/world-population-prospects-2024-summary-results-0

Urban Land Institute & PricewaterhouseCoopers. (2024). *Emerging trends in real estate: Europe.* ULI/PwC.

Wang, R., Nanda, A., & Valtonen, E. (2023). *What drives foreign real estate investment? A country-level panel analysis* [Conference paper]. European Real Estate Society (ERES).

World Bank. (2024a). *Population growth (annual %) (SP.POP.GROW)* [Dataset]. Retrieved July 1, 2026, from https://data.worldbank.org/indicator/SP.POP.GROW

World Bank. (2024b). *Worldwide governance indicators*. Retrieved July 1, 2026, from https://www.worldbank.org/en/publication/worldwide-governance-indicators

APPENDIX A
COMPUTATION OF RETURN AND RISK VARIABLES

This appendix sets out the formulae and worked examples underlying the return measures (Section 4.2) and the risk variables (Section 4.3).

A.1 Capital Appreciation Rate (CAGR)

This section reports the price-index inputs and the resulting CAGR for each country. Index data for 17 countries are drawn from the Eurostat House Price Index (Eurostat, 2024b), base year 2015 = 100. For Switzerland, Serbia, and North Macedonia, data are drawn from the Bank for International Settlements Residential Property Price database via FRED (Federal Reserve Bank of St. Louis, 2025a, 2025b, 2025c), base year 2010 = 100. Because the base year cancels in the ratio, both sources yield directly comparable growth rates.

Table A1: *Sample CAGR Calculation: Poland*

Variable	Value
Start-period value (2015, by definition)	100
End-period value (2024, from Eurostat)	206.70
n (years in window)	10
Ratio (206.70 / 100)	2.0670
(2.0670) ^ (1/10) - 1	0.07530
CAGR	7.53% per year

Data from Eurostat (2024b)

Table A2: *Sample CAGR Calculation: Serbia (BIS via FRED)*

Variable	Value
Start-period value (Q1 2015, from FRED chart)	100.9196
End-period value (Q4 2024, from FRED chart)	238.3132
n (years in window)	10
Ratio (238.3132 / 100.9196)	2.3615
(2.3615) ^ (1/10) - 1	0.08968
CAGR	8.97% per year

Data from Federal Reserve Bank of St. Louis (2025)

Table A3: *10-Year CAGR for All 20 Countries*

Country	Start Value	End Value (2024)	CAGR (% per year)	Source
Post-Communist Countries				
Poland	100 (2015=100)	206.70	**7.53**	Eurostat
Czech Republic	100 (2015=100)	222.30	**8.32**	Eurostat
Hungary	100 (2015=100)	309.86 (p)	**11.97**	Eurostat
Romania	100 (2015=100)	155.89	**4.54**	Eurostat
Latvia	100 (2015=100)	198.90	**7.12**	Eurostat
Slovakia	100 (2015=100)	181.67	**6.15**	Eurostat
North Macedonia	92.9623 (Q1 2015)	159.1740 (Q4 2024)	**5.53**	BIS/FRED
Serbia	100.9196 (Q1 2015)	238.3132 (Q4 2024)	**8.97**	BIS/FRED
Bulgaria	100 (2015=100)	217.47	**8.08**	Eurostat
Croatia	100 (2015=100)	198.54	**7.10**	Eurostat
Post-Communist Average			**7.53**	
Never-Communist Countries				
Germany	100 (2015=100)	148.00	**4.00**	Eurostat
Austria	100 (2015=100)	163.06	**5.01**	Eurostat
Norway	100 (2015=100)	152.91	**4.34**	Eurostat
Netherlands	100 (2015=100)	198.24	**7.08**	Eurostat

France	100 (2015=100)	126.39	**2.37**	Eurostat
Spain	100 (2015=100)	160.25	**4.83**	Eurostat
Italy	100 (2015=100)	111.70	**1.11**	Eurostat
Portugal	100 (2015=100)	224.44	**8.42**	Eurostat
Belgium	100 (2015=100)	140.42	**3.45**	Eurostat
Switzerland	124.1854 (Q1 2015)	163.5224 (Q4 2024)	**2.79**	BIS/FRED
Never-communist Averages			**4.34**	

Data from Eurostat (2024b) and Federal Reserve Bank of St. Louis (2025a, 2025b, 2025c).

A.2 Macroeconomic Volatility

The raw macroeconomic volatility score is the average of two sample standard deviations: annual real GDP growth (series NGDP_RPCH) and annual consumer price inflation (series PCPIPCH), each measured over the ten years from 2015 to 2024. Both series are drawn from the International Monetary Fund World Economic Outlook, October 2024 edition (International Monetary Fund, 2024). A higher score indicates greater macroeconomic instability, and therefore higher risk. The computation proceeds in four steps, illustrated below for Poland.

Step 1: Extract the annual series and deviations from the mean

For each country, the ten annual values of real GDP growth and the ten annual values of consumer price inflation are extracted for 2015 to 2024. Each year's deviation from the ten-year mean is then computed for both series.

Table A4(i): Macroeconomic volatility, Poland: annual deviations

Year	GDP Growth (%)	GDP Deviation from Mean	Inflation (%)	Inflation rate deviation from Mean
2015	4.383	4.383-3.654=+0.729	-0.924	-0.924-4.252 = -5.176
2016	2.954	2.954-3.654=-0.700	-0.677	-0.677-4.252 = -4.929
2017	5.140	5.140-3.654=+1.486	1.969	1.969-4.252 = -2.283
2018	5.945	5.945-3.654=+2.291	1.767	1.767-4.252 = -2.485

2019	4.450	4.450-3.654=+0.796	2.243	2.243-4.252 = -2.009
2020	-2.020	-2.020-3.654=-5.674	3.378	3.378-4.252 = -0.874
2021	6.935	6.935-3.654=+3.281	5.122	5.122-4.252 = +0.870
2022	5.638	5.638-3.654=+1.984	14.359	14.359-4.252 = +10.107
2023	0.161	0.161-3.654=-3.493	11.426	11.426-4.252 = +7.174
2024	2.956	2.956-3.654=-0.698	3.861	3.861-4.252 = -0.391
Mean	**3.654**		**4.252**	

Step 2: Compute the sample standard deviation of GDP growth

The mean GDP growth over 2015 to 2024 is 3.654%. Each year's deviation from this mean is shown in the table above. The standard deviation is computed as follows:

Table A4(ii)

Step	Calculation	Result
Sum of squared deviations	0.531 + 0.490 + 2.208 + 5.248 + 0.633 + 32.197 + 10.764 + 3.936 + 12.202 + 0.488	68.697
Divide by n-1 (sample std dev)	68.697 / 9	7.633
Take square root	√7.633	**2.763**

Step 3: Compute the sample standard deviation of inflation

The mean inflation is 4.252%. Each deviation from the mean is shown above. Applying the same procedure:

Table A4(iii)

Step	Calculation	Result
Sum of squared deviations	26.795+24.299+5.214+6.177+4.038+0.765+0.756+102.143+51.461+0.153	221.801
Divide by n-1 = 9	221.801 / 9	24.645

Square root (StDev Inflation)	√24.645	**4.964**

Step 4: Average the two standard deviations.
The two standard deviations are averaged into a single raw macroeconomic volatility score:

Macro Volatility = (StDev GDP Growth + StDev Inflation) / 2

Table A4(iv)

Variable	Value	Notes
StDev of GDP Growth	2.763	Computed in Step 2
StDev of Inflation	4.964	Computed in Step 3
Macroeconomic Volatility Score (raw)	(2.763 + 4.964) / 2 = **3.864**	

Thus, Poland's Raw MV Score is 3.864.
Raw macroeconomic volatility scores for all twenty countries are given in Appendix B, Table B1.

A.3 Currency Risk

Currency risk is the annualised volatility of each country's exchange rate against the euro over 2015 to 2024, computed from daily European Central Bank euro reference rates (European Central Bank, 2026):

1. For each currency, the daily exchange rate against the euro is read for every trading day in the window (roughly 2,560 observations).

2. Each pair of consecutive days is converted to a daily log return, ln(rate today / rate yesterday).

3. The standard deviation of those daily returns is calculated — the daily volatility.

4. The daily figure is annualised by multiplying by √252 (the conventional number of trading days in a year). This annualised percentage is the raw currency risk score.

Raw currency risk = standard deviation of daily log returns × √252

Table A5: Currency Risk Worked Example: Poland

Date	EUR/PLN	Daily log return
2 Jan 2015	4.3053	N/A (Starting Value)
5 Jan 2015	4.2979	ln(4.2979 / 4.3053) = −0.172%
6 Jan 2015	4.3075	ln(4.3075 / 4.2979) = +0.223%

7 Jan 2015	4.3108	ln(4.3108 / 4.3075) = +0.077%
8 Jan 2015	4.2902	ln(4.2902 / 4.3108) = −0.479%

The first trading days of the sample illustrate the daily-return calculation

Carried across the full window, this gives n = 2,560 daily returns with a standard deviation of 0.3516% per day. Annualising: 0.3516% × √252 = 0.3516% × 15.8745 = 5.58% per year. Poland's raw currency risk is therefore **5.58%.**

Coverage and edge cases

Ten countries used the euro for the entire sample window and score zero by definition: Germany, Austria, the Netherlands, France, Spain, Italy, Portugal, and Belgium (euro since 1999), plus Slovakia (2009) and Latvia (2014), both of which adopted it before the sample begins. Bulgaria (currency-board peg) and North Macedonia (de facto peg) are treated as effectively zero. Croatia is the only country to switch currency mid-window: its volatility is measured over the kuna years (2015 to 2022), before it adopted the euro in 2023, giving a low score of 1.53% because the kuna was tightly managed. Norway anchors the top of the scale as the most volatile currency against the euro over the period; this reflects exchange-rate movement only, not Norway's overall country risk.

A.4 Standardisation to a 0 to 100 Risk Scale

Each raw variable is rescaled so that 0 marks the lowest risk in the sample and 100 the highest:

$$\text{Risk Score} = \frac{\text{Country Value} - \text{Safest Value}}{\text{Riskiest Value} - \text{Safest Value}} \times 100$$

For governance, property rights, and demographics, where a higher raw value indicates lower risk, the result is inverted so that 100 still denotes the riskiest. The table below shows the standardisation of Romania across all six variables.

Worked example: scoring Romania on all six variables

Romania's score is calculated using the formula above. All figures are Romania's actual values from the dataset in Section 4.3.

Table A6: Standardisation of Romania Across Six Variables

Variable	Raw Risk Scores	Safest in Sample	Riskiest in Sample	Calculation of Normalised Score	Score
Sovereign & Institutional Risk	60.73	86.40 (Norway)	51.86 (Serbia)	(86.40 - 60.73) / 34.54 × 100	**74.3**

Property Rights & Legal Security	6.667	9.150 (Switzerland)	4.547 (Hungary)	(9.150 - 6.667) / 4.603 × 100	**53.9**
Macro Volatility	3.932	1.462 (Norway)	4.609 (Hungary)	(3.932 - 1.462) / 3.147 × 100	**78.5**
Currency Risk	1.98	0.00 (eurozone)	8.96 (Norway)	(1.98 - 0) / 8.96 × 100	**22.1**
Demographics	-0.4401	+0.951 (Switzerland)	-0.936 (Bulgaria)	(0.951 - (-0.440)) / 1.887 × 100	**73.7**
Bond Spreads	+4.193	-0.536 (Switzerland)	+4.269 (Serbia)	(4.193 + 0.536) / 4.805 × 100	**98.4**

Raw values from the dataset in Section 4.3. Governance from World Bank (2024); property rights from Property Rights Alliance (2025); bond spreads from Eurostat (2024a).

A.5 Composite Country Risk Score

The six standardised scores are combined under the tiered weighting described in Section 5.2.2: Tier 1 (Sovereign & Institutional Risk; Property Rights & Legal Security) at 20 base points each, Tier 2 (Macroeconomic Volatility; Bond Spreads) at 10 each, and Tier 3 (Currency Risk; Demographics) at 5 each, normalised to 100%. The table below works the composite for Romania.

Table A7: Romania Composite Risk Score

Variable	Tier Assignment	Standardised score	Weight	Contribution
Sovereign & Institutional Risk	1	74.3	28.57%	21.2
Property Rights & Legal Security	1	53.9	28.57%	15.4
Macro Volatility	2	78.5	14.29%	11.2
Bond Spread	2	98.4	14.29%	14.1
Currency Risk	3	22.1	7.14%	1.6

Demographics	3	73.7	7.14%	5.3
Composite Risk Score				**68.7**

A.6 Directly sourced variables

Three risk variables are taken directly from their published sources and therefore require minimal worked calculations. Sovereign & institutional risk is the average WGI percentile rank across the six governance dimensions (World Bank, 2024b). Property rights & legal security is the IPRI physical property rights score (Property Rights Alliance, 2025). Demographic risk is the annual population growth rate averaged over 2015 to 2024 (Eurostat, 2024e). Raw values for all three appear in Appendix B, Table B4.

APPENDIX B
INTERMEDIATE DATA TABLES

Table B1: *Raw Macroeconomic Volatility Scores for All 20 Countries*

Country	StDev of GDP Growth	StDev of Inflation	Raw Macro Volatility Score
Post-Communist Countries			
Poland	2.763	4.964	3.864
Czech Republic	3.081	4.733	3.907
Hungary	3.401	5.817	4.609

Romania	3.165	4.699	3.932
Latvia	2.806	5.357	4.082
Slovakia	2.362	4.340	3.351
North Macedonia	2.614	4.702	3.658
Serbia	2.232	4.256	3.244
Bulgaria	2.863	4.388	3.626
Croatia	5.263	3.822	4.543
Never-Communist Countries			
Germany	2.131	2.695	2.413
Austria	3.228	2.764	2.996
Norway	1.437	1.486	1.462
Netherlands	2.758	3.334	3.046
France	3.550	2.067	2.808
Spain	4.875	2.643	3.759
Italy	4.404	2.912	3.658
Portugal	4.039	2.615	3.327
Belgium	2.964	2.862	2.913
Switzerland	1.994	1.238	1.616

Standard deviations computed over 2015 to 2024. Data from International Monetary Fund (2024), World Economic Outlook, October 2024 edition

Table B2: *Sovereign Bond Yields and Spreads by Country*

Country	**Average 10-year bond yield (2015 to 2024)**	**Spread (from Germany's yield)**
Post-Communist Countries		
Poland	3.5540%	+2.9470%
Czech Republic	2.1300%	+1.5230%
Hungary	4.1930%	+3.5860%
Romania	4.8000%	+4.1930%
Latvia	1.2890%	+0.6820%

Slovakia	1.2560%	+0.6490%
North Macedonia	4.1480%	+3.5410%
Serbia	4.8762%	+4.2692%
Bulgaria	1.7350%	+1.1280%
Croatia	2.4330%	+1.8260%
Never-Communist Countries		
Germany	0.6070%	+0.0000%
Austria	0.9780%	+0.3710%
Norway	2.0031%	+1.3961%
Netherlands	0.8090%	+0.2020%
France	1.0550%	+0.4480%
Spain	1.6300%	+1.0230%
Italy	2.3000%	+1.6930%
Portugal	2.0320%	+1.4250%
Belgium	1.0600%	+0.4530%
Switzerland	0.0714%	-0.5356%

Spreads measured against Germany's average 10-year yield of 0.607%. Data for 16 countries from Eurostat (2024a), EMU Convergence Criterion Series; Norway and Switzerland from Federal Reserve Bank of St. Louis (2025d, 2025e). Serbia and North Macedonia spreads are from Investing.com (2026b) and the Ministry of Finance of the Republic of North Macedonia (2024) respectively.

Table B3: *Raw Currency Risk Scores for All 20 Countries*

Country	**Raw volatility (%)**
Post-Communist Countries	
Poland	5.58
Czech Republic	4.20
Hungary	7.30
Romania	1.98
Latvia	0.00
Slovakia	0.00
North Macedonia	0.00*
Serbia	2.32

Bulgaria	0.00
Croatia	1.53
Never-Communist Countries	
Germany	0.00
Austria	0.00
Norway	8.96
Netherlands	0.00
France	0.00
Spain	0.00
Italy	0.00
Portugal	0.00
Belgium	0.00
Switzerland	7.17

Annualised volatility of each currency against the euro over 2015 to 2024. Data from European Central Bank (2026); Serbia's euro exchange rate is from Investing.com (2026a). Eurozone members and euro-pegged currencies score zero by construction.

*North Macedonia operates a de facto euro anchor and is assigned a score of zero (see Section 4.3.4).

Table B4: *Raw Risk Scores Attributed to Each Country*

Country	Sovereign & Institutional Risk	Property Rights & Legal Security	Macroeconomic Volatility	Currency Risk	Demographic (Population Decline) Risk	Sovereign Bond Spreads
Post-Communist Countries						
Poland	67.56	6.350	3.864	5.58	-0.3896	+2.947
Czech Republic	75.66	6.993	3.907	4.20	+0.3544	+1.523
Hungary	59.98	4.547	4.609	7.30	-0.2794	+3.586
Romania	60.73	6.667	3.932	1.98	-0.4401	+4.193
Latvia	71.90	5.825	4.082	0.00	-0.6617	+0.682
Slovakia	65.32	5.479	3.351	0.00	+0.0063	+0.649
North Macedonia	55.13	4.985	3.658	0.00	-0.4982	+3.541*
Serbia	51.86	5.301	3.244	2.32	-0.7954	+4.269**

Bulgaria	56.35	4.833	3.626	0.00	-0.9362	+1.128
Croatia	63.81	7.625	4.543	1.53	-0.8319	+1.826
Never-Communist Countries						
Germany	80.24	7.601	2.413	0.00	+0.3081	0
Austria	78.77	7.348	2.996	0.00	+0.7130	+0.371
Norway	86.40	7.604	1.462	8.96	+0.8129	+1.396
Netherlands	83.21	6.706	3.046	0.00	+0.6477	+0.202
France	72.11	8.333	2.808	0.00	+0.3322	+0.448
Spain	69.28	6.042	3.759	0.00	+0.5012	+1.023
Italy	67.51	7.680	3.658	0.00	-0.2294	+1.693
Portugal	71.72	7.809	3.327	0.00	+0.2784	+1.425
Belgium	76.12	6.961	2.913	0.00	+0.5633	+0.453
Switzerland	85.66	9.150	1.616	7.17	+0.9510	-0.536

Sources: World Bank (2024b); Property Rights Alliance (2025); International Monetary Fund (2024); European Central Bank (2026); Eurostat (2024a, 2024e).

*North Macedonia bond-spread data available only from March 2018 to July 2024.
**Serbia spread approximated from yields at issuance across available bond maturities, due to the absence of a consistent 10-year benchmark series.

Table B5: *Standardised Risk Scores Across All 20 Countries*

Country	Sovereign & Institutional Risk	Property Rights & Legal Security	Macroeconomic Volatility	Currency Risk	Demographic (Population Decline) Risk	Sovereign Bond Spreads
Post-Communist Countries						
Poland	54.5	60.8	76.3	62.3	71.0	72.5
Czech Republic	31.1	46.9	77.7	46.9	31.6	42.8
Hungary	76.5	100.0	100.0	81.5	65.2	85.8
Romania	74.3	53.9	78.5	22.1	73.7	98.4
Latvia	42.0	72.2	83.3	0.0	85.5	25.3

Slovakia	61.0	79.8	60.0	0.0	50.1	24.7
North Macedonia	90.5	90.5	69.8	0.0	76.8	84.8
Serbia	100.0	83.6	56.6	25.8	92.5	100.0
Bulgaria	87.0	93.8	68.8	0.0	100.0	34.6
Croatia	65.4	33.1	97.9	17.1	94.5	49.2
Never-communist Countries						
Germany	17.8	33.7	30.2	0.0	34.1	11.2
Austria	22.1	39.1	48.7	0.0	12.6	18.9
Norway	0.0	33.6	0.0	100.0	7.3	40.2
Netherlands	9.2	53.1	50.3	0.0	16.1	15.4
France	41.4	17.8	42.8	0.0	32.8	20.5
Spain	49.6	67.5	73.0	0.0	23.8	32.4
Italy	54.7	31.9	69.8	0.0	62.5	46.4
Portugal	42.5	29.1	59.3	0.0	35.6	40.8
Belgium	29.8	47.6	46.1	0.0	20.5	20.6
Switzerland	2.1	0.0	4.9	80.0	0.0	0.0

Each variable is rescaled to a 0 to 100 risk scale (0 = lowest risk in sample, 100 = highest), per the procedure in Appendix A.4. These standardised scores feed the composite calculation in Section 5.2.2.

Table B6: Return Measures for All 20 Countries

	Gross Rental Yield	10-year Capital Appreciation Rate (CAGR)	Total Return
Post-Communist Countries			

Poland	5.92	7.53	13.45
Czech Republic	3.39	8.32	11.71
Hungary	4.69	11.97	16.66
Romania	6.02	4.54	10.56
Latvia	7.20	7.12	14.32
Slovakia	4.59	6.15	10.74
North Macedonia	6.53	5.53	12.06
Serbia	5.63	8.97	14.60
Bulgaria	4.19	8.08	12.27
Croatia	4.21	7.10	11.31
Post-Communist Averages	**5.24**	**7.53**	**12.77**
Never-communist Countries			
Germany	3.42	4.00	7.42
Austria	3.82	5.01	8.83
Norway	4.58	4.34	8.92
Netherlands	6.28	7.08	13.36
France	4.83	2.37	7.20
Spain	5.43	4.83	10.26
Italy	7.23	1.11	8.34
Portugal	4.29	8.42	12.71
Belgium	4.32	3.45	7.77

Switzerland	2.91	2.79	5.70
Never-communist Averages	**4.71**	**4.34**	**9.05**

Gross rental yields from Global Property Guide (2026). Capital appreciation rates are the 10-year CAGRs derived in Appendix A.1, Table A3.

APPENDIX C
FULL REGRESSION OUTPUT AND RESIDUALS

This appendix reports the complete output for the three regressions specified in Section 5.3.1, the residuals for all twenty countries under each model, the composite risk scores recomputed under the two alternative weighting schemes of Section 5.3.5, and the two predicted-versus-actual plots not reproduced in Section 6.2.

Table C1: Summary of Model 1, Capital Appreciation Rate on Composite Risk Score

Dependent variable: 10-year capital appreciation rate (% per year). Fitted equation: y = 0.0717x + 2.450.

Statistic	Value
Multiple R	0.6175

R^2	0.3813
Adjusted R^2	0.3469
Standard error of regression (n − 2)	2.124
Residual standard deviation (n − 1)	2.068
Observations	20

Table C2: Model 1's Coefficients

Term	Coefficient	Std error	t	p	CI lower	CI upper
Intercept	2.450	1.149	2.132	0.047	0.035	4.865
Risk score	0.0717	0.0215	3.330	0.004	0.0265	0.1169

Note. The risk-score gradient is significant at $\alpha = 0.05$ and at the Bonferroni-adjusted $\alpha = 0.0167$. The intercept is reported for completeness and is not interpreted. CI = 95% confidence interval.

Table C3: Summary of Model 2, Gross Rental Yield on Composite Risk Score

Dependent variable: current gross rental yield (%). Fitted equation: $y = 0.0238x + 3.816$.

Statistic	Value
Multiple R	0.4305
R^2	0.1853
Adjusted R^2	0.1401
Standard error of regression (n − 2)	1.162
Residual standard deviation (n − 1)	1.131
Observations	20

Table C4: Model 2's Coefficients

Term	Coefficient	Std error	t	p	CI lower	CI upper
Intercept	3.816	0.628	6.072	<0.001	2.496	5.136
Risk score	0.0238	0.0118	2.024	0.058	−0.0009	0.0485

Note. The gradient is not significant at $\alpha = 0.05$ ($p = 0.058$). See Section 6.1.2 on the timing mismatch between the June 2026 yield snapshot and the 2015 to 2024 risk window, and on statistical power at n = 20. CI = 95% confidence interval.

Table C5: Summary of Model 3, Total Return on Composite Risk Score

Dependent variable: total return (%). Fitted equation: y = 0.0955x + 6.266.

Statistic	Value
Multiple R	0.7537
R^2	0.5681
Adjusted R^2	0.5441
Standard error of regression (n − 2)	1.937
Residual standard deviation (n − 1)	1.885
Observations	20

Table C6: Model 3's Coefficients

Term	Coefficient	Std error	t	p	CI lower	CI upper
Intercept	6.266	1.048	5.979	<0.001	4.064	8.468
Risk score	0.0955	0.0196	4.866	<0.001	0.0543	0.1367

Note. The risk-score gradient is significant at α = 0.05 and at the Bonferroni-adjusted α = 0.0167. Total return is by construction the sum of the Model 1 and Model 2 dependent variables, so this model is not independent of them. CI = 95% confidence interval.

Table C7: Residuals for All 20 Countries Under All Three Models

Country	Composite Risk Score	Residual: Capital Appreciation	Residual: Gross Rental Yield	Residual: Total Return	No. of Models Flagged
Post-Communist Countries					
Poland	63.7	+0.51	+0.59	+1.10	0
Czech Republic	45.1	+2.64	−1.50	+1.14	2
Hungary	87.5	+3.25	−1.21	+2.04	3
Romania	68.7	−2.84	+0.57	−2.27	2
Latvia	54.3	+0.78	+2.09	+2.87	2
Slovakia	55.9	−0.31	−0.56	−0.86	0
North Macedonia	79.3	−2.60	+0.83	−1.78	1

Serbia	83.3	+0.55	−0.17	+0.38	0
Bulgaria	73.6	+0.36	−1.38	−1.02	1
Croatia	57.1	+0.56	−0.97	−0.41	0
Never-Communist Countries					
Germany	23.1	−0.10	−0.94	−1.05	0
Austria	28.1	+0.55	−0.66	−0.11	0
Norway	23.0	+0.24	+0.22	+0.46	0
Netherlands	28.3	+2.60	+1.79	+4.39	3
France	28.3	−2.11	+0.34	−1.77	1
Spain	50.2	−1.22	+0.42	−0.80	0
Italy	45.8	−4.62	+2.32	−2.30	3
Portugal	37.3	+3.30	−0.41	+2.88	2
Belgium	33.1	−1.37	−0.28	−1.66	0
Switzerland	7.0	−0.16	−1.07	−1.24	0

Note. Residuals in percentage points of return. A positive residual indicates a country earning more than its risk score predicts; conversely a negative residual means that country earns less than predicted. A country is flagged where its residual exceeds one residual standard deviation of that model: ±2.07 for capital appreciation, ±1.13 for gross rental yield, ±1.89 for total return. Ten countries are flagged on no model. Flagged countries are carried forward to Section 6.3.

Table C8: Composite Risk Scores Under the Three Weighting Schemes

Country	Baseline (20/10/5)	Equal Weights (16.67%)	Reshuffled Tiers
Post-Communist Countries			
Poland	63.7	66.2	65.4
Czech Republic	45.1	46.2	44.5
Hungary	87.5	84.8	85.4
Romania	68.7	66.8	75.1
Latvia	54.3	51.4	47.6
Slovakia	55.9	45.9	48.0

North Macedonia	79.3	68.7	78.5
Serbia	83.3	76.4	85.6
Bulgaria	73.6	64.0	65.1
Croatia	57.1	59.5	59.4
Never-Communist Countries			
Germany	23.1	21.2	19.8
Austria	28.1	23.6	25.2
Norway	23.0	30.2	24.0
Netherlands	28.3	24.0	22.9
France	28.3	25.9	28.7
Spain	50.2	41.0	45.2
Italy	45.8	44.2	47.9
Portugal	37.3	34.6	39.0
Belgium	33.1	27.4	29.2
Switzerland	7.0	14.5	7.0

Note. Under equal weights each of the six standardised scores carries 16.67%. Under the reshuffled scheme, sovereign bond spreads are promoted to Tier 1 (20 base points) and property rights demoted to Tier 2 (10 base points), all other assignments unchanged and the weights renormalised to 100%.

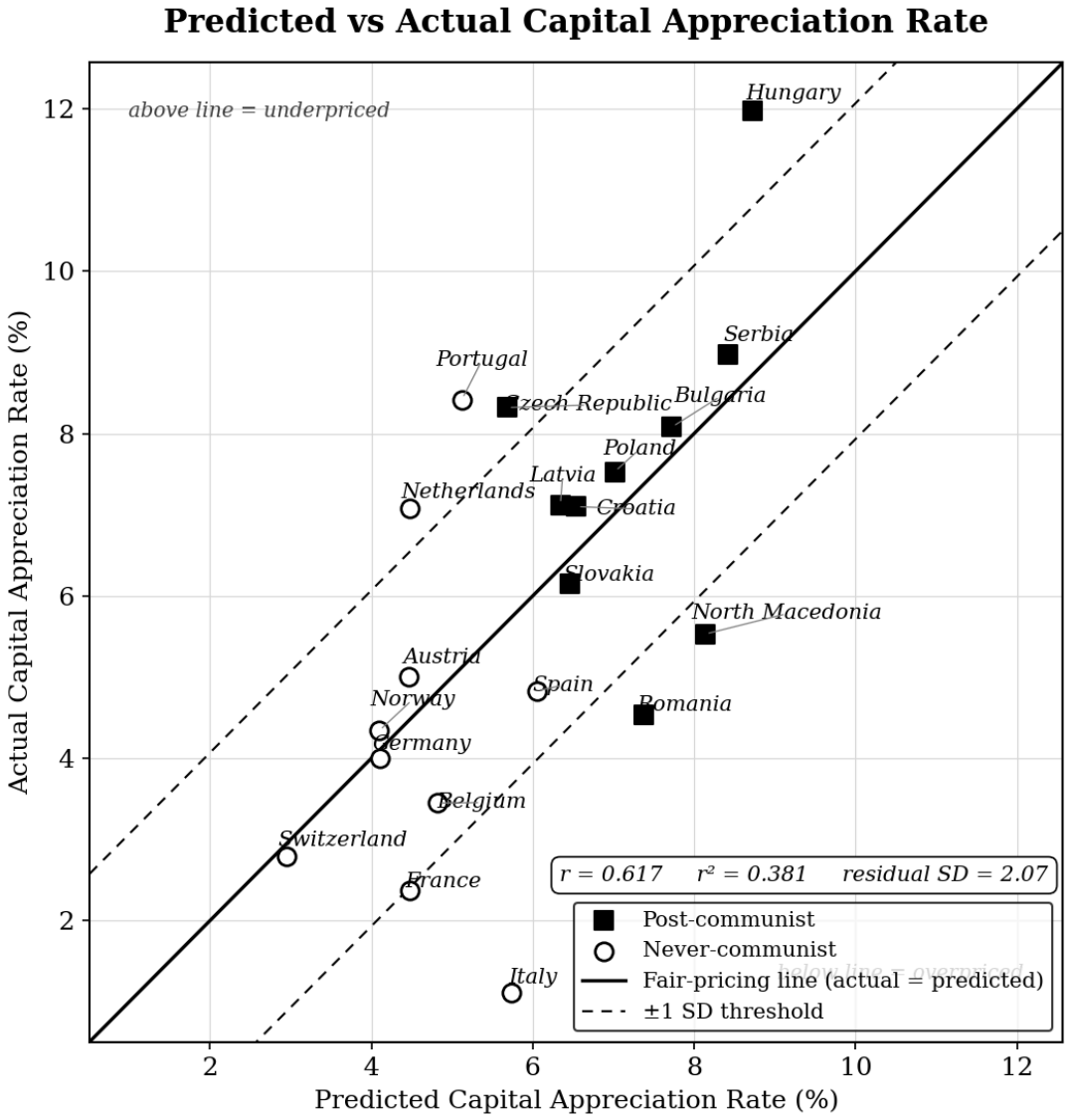
Table C9: Yield Model Residuals by Weighting Scheme

Country	Baseline	Equal Weights	Reshuffled Tiers	Robust?
Italy	+2.32	+2.30	+2.24	Yes
Latvia	+2.09	+2.09	+2.22	Yes
Netherlands	+1.79	+1.84	+1.87	Yes
Hungary	−1.21	−1.23	−1.18	Yes
Bulgaria	−1.38	−1.23	−1.20	Yes
Czech Republic	−1.50	−1.59	−1.52	Yes
Switzerland*	−1.07	−1.30	−1.12	No
Threshold (±1 SD)	1.13	1.15	1.13	—

Note. *Switzerland is not an outlier under the baseline. It crosses the threshold under equal weights (−1.30 against 1.15) but falls marginally inside it under the reshuffled scheme (−1.12 against 1.13), so it is not robust under the rule in Section 5.3.5. It is reported to demonstrate that the test can add countries as well as drop them.

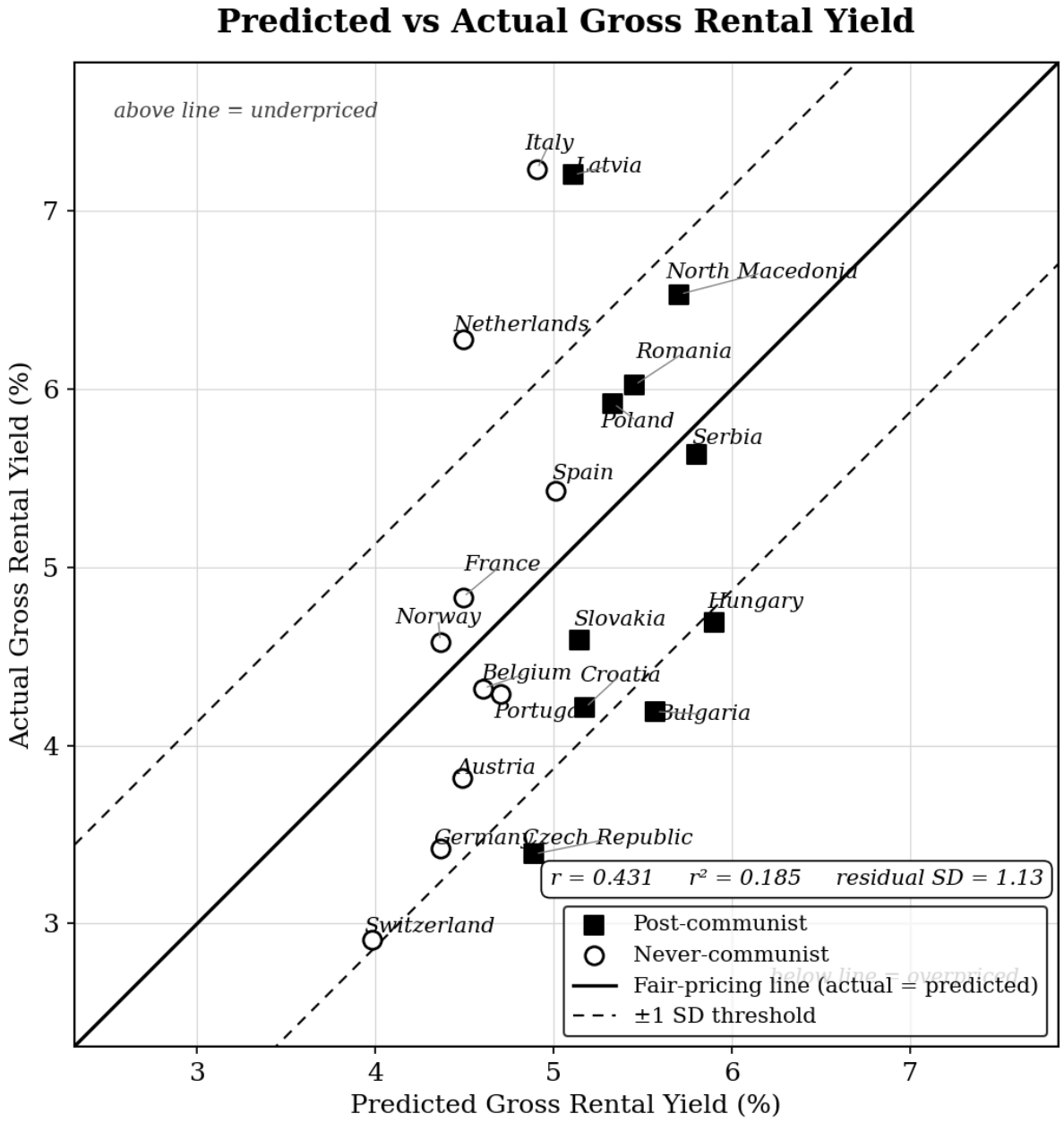
The three figures below re-express each regression with both axes in return units. Each country's predicted return is plotted against its actual return, so the diagonal marks fair pricing and vertical distance from it reads directly as over- or underpricing. The capital-appreciation plot is the primary measure; the yield and total-return plots follow.

Figure C1: Predicted vs Actual Capital Appreciation Rate



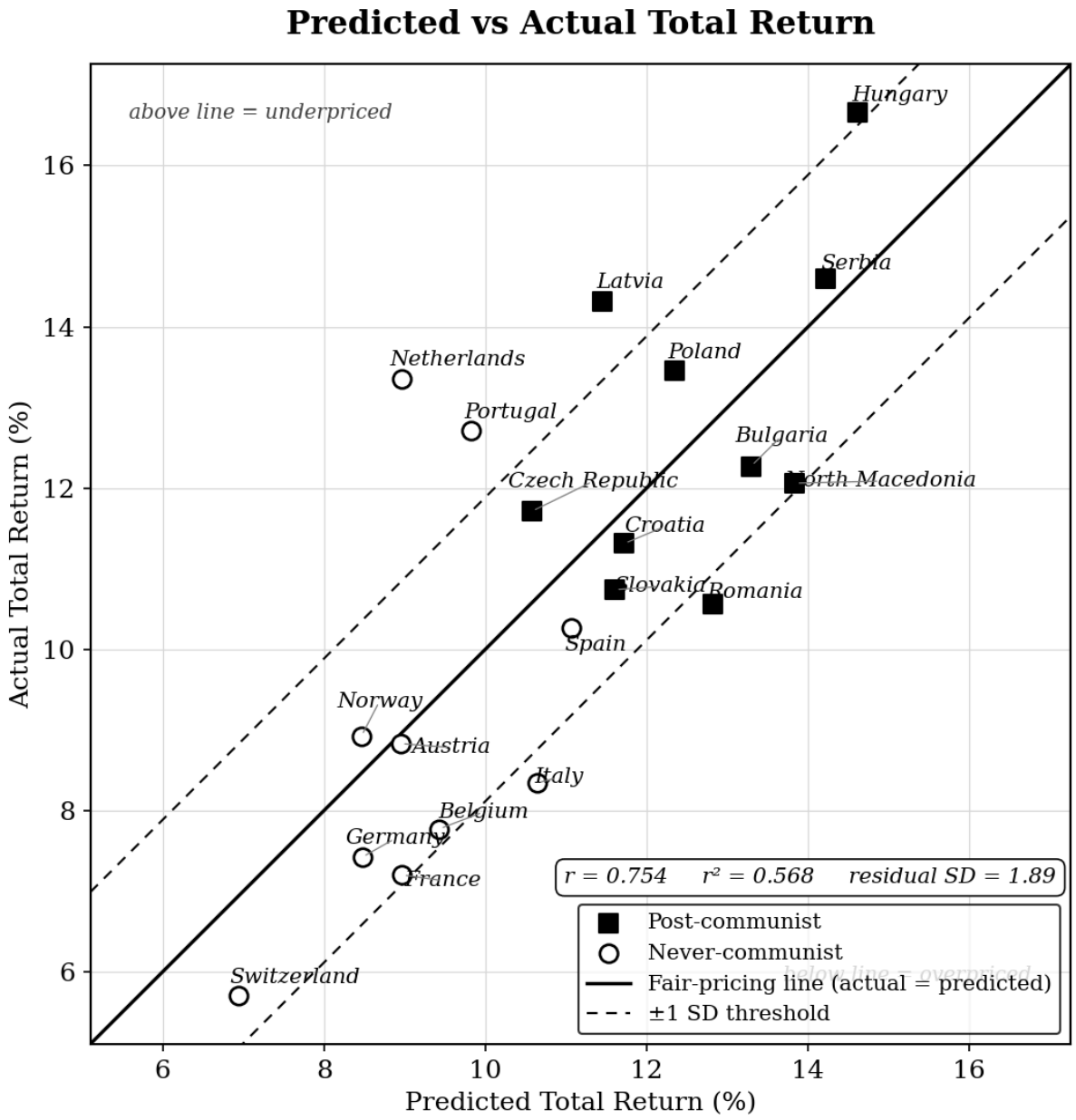
Best-fit by ordinary least squares: r = 0.617, r² = 0.381, residual standard deviation = 2.07

Figure C2: Predicted vs Actual Gross Rental Yield



Best-fit by ordinary least squares: r = 0.431, r² = 0.185, residual standard deviation = 1.13

Figure C3: Predicted vs Actual Total Return



Best-fit by ordinary least squares: r = 0.754, r² = 0.568, residual standard deviation = 1.89