

“The effect of governance structure choice on after-tax structural efficiency of cross-border residential real estate investment: Evidence from a Berlin–Montreal family office portfolio”

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THE EFFECT OF GOVERNANCE STRUCTURE CHOICE ON AFTER- TAX STRUCTURAL EFFICIENCY OF CROSS-BORDER RESIDENTIAL REAL ESTATE INVESTMENT: EVIDENCE FROM A BERLIN–MONTREAL FAMILY OFFICE PORTFOLIO

Abstract

Family offices allocate much of their long-horizon capital to directly held real estate, yet the holding vehicle for cross-border property is usually chosen as a tax-minimization detail rather than analyzed as an investment decision. This study aims to determine whether the choice of governance structure affects the after-tax structural efficiency of cross-border residential real estate investment through the alignment between the structure's tax treatment and the portfolio's return composition, rather than through statutory tax rates alone. A stylized counterfactual simulation applies five domestic fiscal regimes (German GbR, asset-managing GmbH, commercial GmbH, Canadian individual ownership, and Canadian CCPC) to each of 42 residential and mixed-use properties (34 in Berlin, 8 in Montreal), using audited accounting data for 2017–2023 and a 2018–2028 horizon; after-tax structural efficiency is measured by input-oriented, variable-returns-to-scale Data Envelopment Analysis estimated separately for each regime on the same 42 properties. Mean scores are 0.9583 (GbR), 0.9477 (Canadian individual), 0.9381 (commercial GmbH), 0.9246 (CCPC), and 0.9183 (asset-managing GmbH); 33 of 42 properties change rank across regimes, with gaps up to 10 percentage points. The ranking contradicts statutory tax burdens: the lowest-taxed structure is the least efficient. A pre-tax capital gains ratio, identical under every regime, moderates the efficiency effect of capital gains taxation (interaction 15.4 percentage points, $p = 0.009$), and the association strengthens with the tax differential (up to $\rho = -0.759$). Efficient structure choice therefore depends on the fit between return composition and fiscal treatment, as well as on regulatory specificity, rather than on headline rates.

Keywords

governance, taxation, efficiency, real estate, family office, DEA

JEL Classification

G11, H25, D23

INTRODUCTION

Real estate occupies a distinctive position in investment and finance: it is at once a capital allocation decision, a governance problem, and a regulatory problem, because directly held property cannot be separated from law, taxation, and the legal architecture through which ownership is organized. These characteristics intensify once investment crosses borders and investors must decide through which legal and fiscal vehicle the investment should be held (Hoesli & Lekander, 2008; Groh & Lieser, 2014; Lepers, 2024). The weight of that decision has grown with the rise of family offices as allocators of long-horizon capital with persistently large real estate allocations (Campden Wealth, 2023; UBS AG, 2023).



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Despite the scale of this capital, the holding-vehicle decision is usually framed as a tax-minimization problem: select the entity with the lowest statutory burden. That framing is simple and apparently objective, but theoretically unsettled. A governance structure may lower the tax on one return component while penalizing another, reduce annual rental taxation but erode exit value, or exempt capital gains while creating frictions in reorganization and control. Whether the correct criterion is the structure's visible price, the statutory rate, or its alignment with the transaction it governs is a question about how organizational economics extends into cross-border taxation, and it has not been answered.

The scientific problem is therefore twofold. Conceptually, tax research and governance theory have developed side by side without a framework linking legal-entity selection to after-tax structural efficiency; family office research identifies governance and investment management as its central clusters yet leaves the efficiency consequences of structure selection underexplored (Villanueva-Villar & Rivo-Lopez, 2025). Empirically, the question resists observational study because structure choice is endogenous: investors sort particular assets into particular entities, so raw comparisons confound governance with property selection. What is missing is a design that holds the property constant while varying only its fiscal treatment, together with an account of why after-tax structural efficiency should depend on that treatment at all, within the broader question of how governance structures should be matched to the transactions they organize when institutions, tax codes, and return profiles interact across borders (North, 1990; Scott, 2001; Kostova, 1999). The design used here evaluates a cross-border portfolio under the domestic fiscal regimes of each jurisdiction: the cross-border element lies in the portfolio and the institutional comparison, not in cross-border holding structures.

1. LITERATURE REVIEW AND HYPOTHESES

The question lies at the intersection of four literatures: real estate allocation, tax planning, family office research, and Transaction Cost Economics; the review moves from the investment case, through the fiscal environment of cross-border ownership, to the governance theory that integrates them.

The case for real estate in mixed-asset portfolios rests on imperfect return correlations with financial assets and on the capacity of property to improve the risk–return profile (Markowitz, 1952; MacKinnon & Al Zaman, 2009), refined by steady cash flow, collateral value, and inflation protection (Hudson-Wilson et al., 2005; Delfim & Hoesli, 2019; Fleischmann et al., 2019; Muckenhaupt et al., 2025). Return premia differ between public and private exposure, so the form of ownership shapes realized performance (Kroencke et al., 2018), which explains the weight of real estate in long-horizon allocations (Hobbs & Teuben, 2014; Campden Wealth, 2023; UBS AG, 2023).

Within this allocation literature, governance structure has usually been an administrative af-

terthought. Yet an investor acquiring direct property is not only purchasing cash flow and appreciation but entering a framework of title, liability, tax treatment, reporting rules, control rights, and exit frictions; direct ownership means governing an operating asset rather than holding a security (Hoesli & Lekander, 2008). Once that is recognized, entity selection becomes inseparable from expected performance.

Cross-border investment intensifies the point. International real estate flows respond to institutional quality, legal environment, and fundamentals (Groh & Lieser, 2014), and are driven more by growth expectations and location-specific opportunity than by interest-rate differentials (Lepers, 2024). The cross-border investor therefore faces a multi-level institutional architecture in which legal origin, tax code, and restructuring costs jointly shape the outcome of the same property.

That architecture matters because tax planning affects value and investment efficiency through conditional channels, mediated by organizational characteristics and governance quality (Hanlon & Heitzman, 2010; Schwab et al., 2022; Jacob, 2022). In the three-hurdle model a tax-reducing arrangement must be available, desirable, and imple-

mentable before it creates economic benefit, which places entity selection inside investment analysis (Feller & Schanz, 2017). For real estate, taxation shapes entity choice and capital structure (Gentry, 1994); rates alone cannot capture tax performance in systems of anti-avoidance provisions and entity-level integration (Amberger et al., 2021); and transfer taxes make later restructuring expensive, so the initial entity decision is sticky (Buettner, 2017).

Family office research adds the investor perspective. Family offices differ from most institutional investors in longer horizons, capital preservation, direct ownership, and a premium on control (Campden Wealth, 2023; UBS AG, 2023); family-controlled investors display patient capital and reluctance to dilute control (Maury, 2006; Hansen & Block, 2021; Zhu et al., 2025; Zellweger, 2007), with financing patterns distinct from private equity (Schickinger et al., 2022), while remaining exposed to heuristics and the overvaluation of control (Pompian, 2012) and to policy uncertainty (Ekemode & Olaleye, 2019). The family office is therefore a suitable setting for studying governance efficiency under realistic bounded rationality.

These strands converge on Transaction Cost Economics. Market exchange is costly (Coase, 1937), and economic activity is organized efficiently when governance structures are matched to transaction attributes under bounded rationality and possible opportunism (Simon, 1957; Williamson, 1985). The discriminating alignment hypothesis holds that governance structures differing in adaptive capacities and safeguards should be aligned with transactions differing in asset specificity, uncertainty, and frequency (Williamson, 1991, 2000, 2008). Read as a theory of comparative efficiency (Ketokivi & Mahoney, 2020; Cuypers et al., 2021), the framework implies that a holding structure is a governance mechanism whose cost profile interacts with the return profile of the asset.

Empirical assessments give the framework persistent though qualified support: governance choices respond systematically to asset specificity and uncertainty despite heterogeneous operationalizations (Shelanski & Klein, 1995; Geyskens et al., 2006; Macher & Richman, 2008; David & Han, 2004), and misalignment between governance and transaction attributes is associated with infe-

rior performance (Nickerson & Silverman, 2003). Critiques warn that the theory can be undersocialized and inattentive to institutional diversity (Ghoshal & Moran, 1996; Granovetter, 1985), and that its predictive force varies with institutional distance (Verbeke & Greidanus, 2009), reasons to model the institutional environment explicitly rather than to discard the framework.

Applications to real estate remain thin. Studies of REIT organization, vertical integration, and governance quality in listed vehicles point to governance effects that are priced only conditionally (Ambrose & Linneman, 2001; Lind, 2017; Bauer et al., 2010; Bebchuk et al., 2009; Capozza & Seguin, 2003), but none provides a theory of tax-governance selection for direct cross-border ownership. Standard asset specificity may also mis-specify the relevant hazard: a structure that penalizes capital gains is inefficient for an appreciation-driven property regardless of its physical features, so the operative specificity may be regulatory. Model-based comparisons of private versus corporate holding in Germany likewise indicate that outcomes depend on horizon, yield, and appreciation rather than on rates alone (Bachmann et al., 2021).

In sum, the allocation literature establishes why real estate attracts long-horizon capital but treats the holding vehicle as incidental; the tax literature shows that fiscal effects are conditional on governance but stops short of entity-level efficiency measurement; and Transaction Cost Economics supplies the alignment logic but has not been extended to cross-border tax governance, where selection endogeneity has blocked clean tests.

This study aims to determine whether the choice of governance structure affects the after-tax structural efficiency of cross-border residential real estate investment through the alignment between the structure's tax treatment and the portfolio's return composition, rather than through statutory tax rates alone.

Three hypotheses are tested:

H1: For identical properties, alternative governance structures produce significantly different after-tax structural efficiency.

H2: The after-tax structural efficiency ranking of governance structures deviates from the ranking of statutory tax burdens, in both the German and the Canadian institutional environment.

H3: Governance-related efficiency differences are moderated by financial specificity, measured as the share of capital gains in total return, and not by physical asset specificity.

2. METHODOLOGY

The study uses a simulation-based counterfactual design whose objective is to isolate the effect of governance structure on after-tax structural efficiency while holding the underlying property constant. Because investors sort assets into entities strategically, observed portfolios confound governance effects with selection effects; the counterfactual design removes this confounding by subjecting every property to every governance structure within one analytical framework. The procedure comprises six steps.

Step 1: portfolio census and data sources. The empirical base is a complete enumeration of a single family office's cross-border residential and mixed-use holdings: 42 properties, 34 in Berlin and 8 in Montreal, acquired between 2017 and 2022, with 52,168 square meters of leasable area (44,906 in Berlin, 7,262 in Montreal) and roughly 80% residential use. Rental income and operating expenditure are taken from the family office's internal accounting records for 2017–2023, which rest on audited financial statements prepared in both jurisdictions. Because the design is a full-portfolio census evaluated under simulation rather than a sample drawn for inferential generalization, power analysis is not the relevant criterion; the 42 properties generate $42 \times 5 = 210$ property-regime observations, evaluated in five regime-specific DEA models of 42 decision-making units each, which satisfies the discrimination guideline that the number of units exceed three

times the sum of inputs and outputs ($42 > 15$; Cooper et al., 2007). The underlying records have not been used in previous studies and cannot be deposited in a public repository because they contain confidential tax and accounting information of a private family office; anonymized property-level model inputs and the full set of simulation parameters, which suffice to reproduce every calculation reported here, are available from the authors to the editors, reviewers, and researchers on reasonable request.

Step 2: standardized holding model. All properties are modelled as acquired at the start of a common 2018–2028 window and held for its full duration, so the ten-year threshold of §23 EStG is met uniformly by construction, an assumption stated as such in Table 2. Actual rental and operating data are used through the most recent observed year; within-window years preceding acquisition are backcast to 2018 and remaining years forecast to 2028, with every property modelled as sold in 2028. Rental income is backcast from the entry rent and forecast from the last observed year at 5% per annum, and operating expenditure at 2.5% per annum; purchase costs are standardized at 6% of the purchase price; operating expenditure enters on a normalized basis to remove accounting-driven and pandemic-related distortions, an adjustment whose impact is assessed in the robustness stage. The projected 2028 exit price is obtained by the gross-rent-multiplier method: each property's entry multiple (purchase price divided by entry rent) is held constant and applied to projected terminal rent. Cash flows are aggregated at nominal values; because discounting shifts weight from the terminal gain to the annual rent stream, and regimes tax these two components differently, a discounted variant (7% per annum) is reported in the robustness analysis. The uniform 2028 exit is a valuation device that standardizes the terminal component, not a disposal plan.

Step 3: fiscal regimes. Each property is evaluated under five regimes, applied as if the property were located in the regime's jurisdiction and held by a resident

Table 1. Sample descriptives by location

Characteristic	Berlin	Montreal	Full sample
Number of properties	34	8	42
Acquisition years	2017–2022	2019–2022	2017–2022
Mean purchase price (€000)	3,713	3,992	3,766
Mean entry rent (€000)	186	200	188

investor through that vehicle, with the parameters in Table 2. The regimes are five domestic fiscal treatments of one identical cash-flow stream. No scenario involves a cross-border holding, so treaty relief, withholding taxes, and source-country taxation do not arise within any scenario; the cross-border element is the portfolio itself, which supplies the institutional variation between a civil-law and a common-law tax system. For a Berlin property, the three German regimes are the alternatives actually available to the family office and the two Canadian regimes are institutional counterfactuals; for a Montreal property the converse holds (Appendix, Table A1). Governance-choice conclusions are therefore drawn from within-country comparisons; cross-country comparisons serve *H2* only. Properties that fail the conditions of the extended trade tax reduction fall under the GmbH Gewerblich regime, which is modelled alongside. Corporate regimes are modelled at entity level with retained earnings, as a reinvesting family office operates; full distribution to shareholders is examined in the robustness analysis. Rates, capital gains treatment, and depreciation attach to the vehicle, not to the asset; the one property-specific element, the ten-year holding period of §23 EStG, is satisfied by the standardized horizon of step 2.

Step 4: after-tax transformation. Each property is run through all five regimes, and all three outputs – exit capital, cumulative rent, and net asset value – are taxed according to the rules of the relevant structure. Exit capital is measured as the gain on disposal (terminal sale value less purchase price, floored at ze-

ro), so that the capital already counted as an input is not double-counted among the outputs. This full transformation is essential: a partial transformation would leave some outputs insensitive to structure choice and understate governance effects. Taxable rental income is floored at zero in each year (no loss carry-forward), and depreciation recapture on disposal is not modelled, so corporate and Canadian exit taxation is, if anything, understated.

Step 5: efficiency measurement. After-tax structural efficiency is defined as the input-oriented BCC (variable-returns-to-scale) DEA score of a property under a given regime, estimated separately for each regime on the same 42 properties, with entry capital and cumulative operating cost as inputs and the three after-tax outputs of Table 3 (Charnes et al., 1978; Banker et al., 1984). For property *o* under a regime with $n = 42$ evaluated properties, the score θ solves

$$\begin{aligned} \theta^* &= \min \theta, \\ \text{subject to } \sum_{j=1}^n \lambda_j x_{ij} &\leq \theta x_{io}, \quad i=1,2, \\ \sum_{j=1}^n \lambda_j y_{rj} &\geq y_{ro}, \quad r=1,2,3, \\ \sum_{j=1}^n \lambda_j &= 1, \quad \lambda_j \geq 0, \quad j=1, \dots, n=42, \end{aligned} \quad (1)$$

so that θ is the fraction of committed capital and operating cost with which the regime's own best-

Table 2. Fiscal regimes: tax and depreciation parameters with legal basis

Governance structure	Rental income tax	Capital gains tax	Depreciation	Taxpayer level	Legal basis
German GbR	47.475%	0% (> 10-yr hold)	2% straight-line	Personal, single level	§§ 32a, 23(1) Nr. 1, 7(4) EStG; SolZG
German GmbH Vermögensverwaltend	15.825%	15.825%	3% straight-line (a)	Entity, retention	§ 23(1) KStG; SolZG; § 9 Nr. 1 S. 2 GewStG
German GmbH Gewerblich	30.825%	30.825%	3% straight-line (a)	Entity, retention	§ 23(1) KStG; SolZG; §§ 11, 16 GewStG
Canadian Individual	58.75%	29.375% (50% inclusion)	5% declining-balance (b)	Personal, single level	ITA ss. 38, 117; Taxation Act (Quebec) s. 750
Canadian CCPC	26.5% (c)	26.5% (c)	5% declining-balance (b)	Entity, retention	ITA ss. 38, 123; Taxation Act (Quebec) s. 771

Note: Rates are stylized regime parameters, not realized effective rates, and attach to the vehicle, not to the asset. (a) The statutory rate for residential buildings held as business assets is 2% (§ 7(4) S. 1 Nr. 2b EStG); 3% is retained as a stylized corporate-versus-private differential, and all results are re-estimated at 2% in the robustness analysis. (b) Class 1 buildings, half-year rule. (c) General corporate rate at entity level under retention; the refundable tax on a CCPC's investment income is not modelled. CCPC = Canadian-Controlled Private Corporation.

practice combination of properties could have produced the property's after-tax outputs (Cooper et al., 2007). Frontiers are estimated per regime deliberately: every comparison is then the same property under different fiscal treatments, whereas one frontier over all property-regime observations would compare across properties and reintroduce the selection effect the design removes. Three features of the design give input minimization its meaning when the physical inputs do not vary across regimes. First, the score is relative to the regime's own frontier: it measures how the fiscal treatment reshapes a property's standing among its peers, not absolute after-tax wealth. Second, under variable returns to scale the input-oriented score is invariant to a proportional rescaling of all outputs (Pastor, 1996), so a regime taxing every return component at the same rate would leave every score unchanged; differences between regimes arise only from asymmetric treatment of rent and gains and from the depreciation and loss floors, which is precisely the alignment mechanism under test; a uniform shareholder-level layer leaves scores unchanged for the same reason. Third, the efficient set is identical under output orientation, and output-oriented scores are reported as a check. The outputs are the two channels through which regimes differ, the taxation of gains (exit capital) and of income net of depreciation (cumulative rent), and their horizon-level aggregate (net asset value), retained for continuity with the pre-tax baseline although it carries no information beyond the two components except the treatment of loss years (Appendix, Table A2; Dyson et al., 2001). A scalar such as net present value would fix the weight of income against appreciation in advance; DEA does not. Computations were carried out in R with the Benchmarking package (R Core Team, 2024; Bogetoft & Otto, 2011) and re-solved as linear programs in Python, with a translation correction (Pastor, 1996) so that properties with zero after-tax gains remain evaluable; scores are

compared at eight decimals, and “matches or outperforms” denotes a score at least as high. A pre-tax baseline DEA is estimated first: if rankings are identical across regimes before taxation, any after-tax divergence is attributable to regime-specific fiscal treatment.

Step 6: statistical testing. *H1* is assessed through the divergence of efficiency distributions and rankings across regimes (pairwise Spearman correlations), *H2* through within-country and cross-country rank comparisons. *H3* is tested in two forms: physical specificity (an index of size, price per square meter, and rent per square meter) with Mann–Whitney and t-tests, and financial specificity with the capital gains ratio, defined pre-tax as the projected gain on disposal divided by the sum of that gain and cumulative net operating income. The ratio contains no tax parameter and is identical under all five regimes, so it is not a function of any after-tax output or score; and because pre-tax rankings coincide across regimes, it cannot explain a property's efficiency level. It is therefore tested against the difference between two regimes for the same property, with Spearman correlations, a Kruskal–Wallis tercile comparison, and, as the confirmatory test, a pooled mixed-effects model over all 210 observations regressing efficiency on the ratio, the regime's capital gains tax differential to the partnership baseline, and their interaction, with property-level random intercepts (restricted maximum likelihood, Wald tests). The primary endpoint is the interaction term of this model: efficiency in percentage points is the dependent variable, the ratio, the differential and their product are fixed effects, and the property random intercept absorbs property-level differences, including any projection error in the gross-rent-multiplier exit values, so that identification rests on within-property variation across regimes. Tests are evaluated at the 5% level, two-sided except for the physical-specificity comparison, which is one-

Table 3. DEA model specification (BCC, variable returns to scale, input-oriented; all outputs after-tax)

Role	Variable	Definition (after-tax)
Input	Entry capital	Acquisition capital committed at purchase
Input	Operating cost	Cumulative operating expenditure over the horizon
Output	Exit capital	After-tax gain on disposal (2028 sale value less purchase price, floored at zero)
Output	Cumulative rent	Cumulative net operating income after rental income tax, with depreciation as a non-cash shield and an annual loss floor
Output	Net asset value	Horizon-level aggregate of after-tax net rent and after-tax gain, without the annual loss floor

sided as predicted by transaction-cost theory; the Benjamini-Hochberg adjustment is applied to the family of eight specificity and robustness correlations (Mann & Whitney, 1947; Kruskal & Wallis, 1952; Benjamini & Hochberg, 1995). Robustness comprises 75 after-tax DEA runs across 15 parameter scenarios, an adjusted-versus-unadjusted data comparison, and specification checks on orientation, output set, discounting, distribution, and the corporate depreciation rate (Appendix, Table A4).

3. RESULTS

The contrast between the pre-tax and after-tax models frames all findings. Under the pre-tax baseline, all regimes produce identical efficiency rankings (pairwise rank correlations of 1.000): property fundamentals fully determine relative

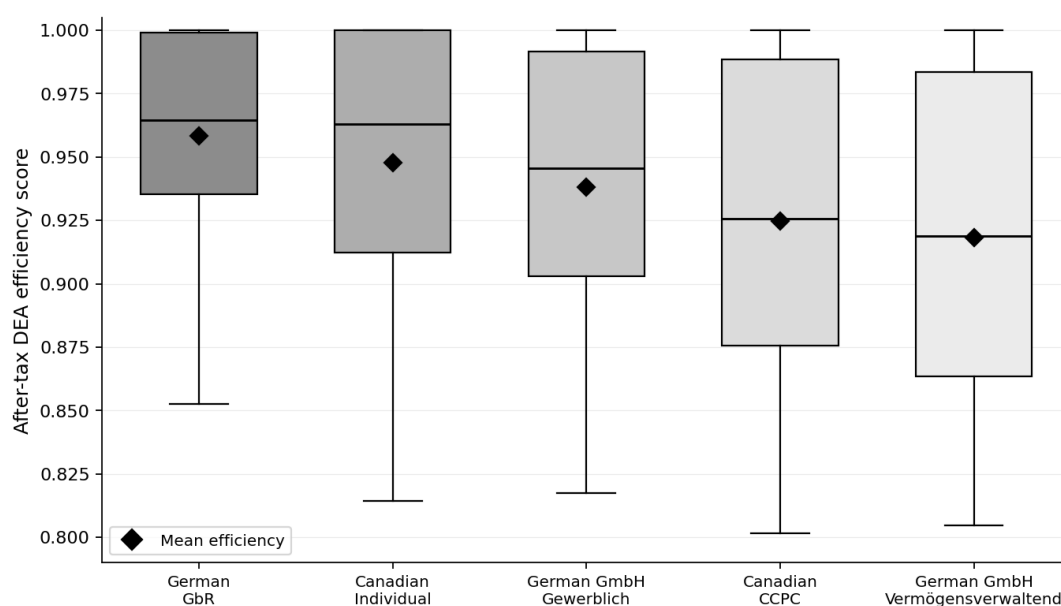
performance before taxation. Once the after-tax transformation is introduced, the five regimes produce distinct efficiency distributions with pairwise Spearman correlations between 0.916 and 0.992. Rankings remain highly associated but no longer identical: the regime changes a property's level and, often, its rank.

The mean-efficiency ordering is unambiguous: German GbR 0.9583, Canadian individual ownership 0.9477, German GmbH Gewerblich 0.9381, Canadian CCPC 0.9246, and German GmbH Vermögensverwaltend 0.9183 (Table 4). Fifteen properties are efficient under the Canadian individual regime, eleven under the GbR, ten under the GmbH Gewerblich, and nine each under the CCPC and the GmbH Vermögensverwaltend, with nine efficient under all five. At the property level, 33 of the 42 properties change rank between the

Table 4. After-tax structural efficiency by fiscal regime

Governance structure	Mean	SD	Min	Efficient (n)	% efficient
German GbR	0.9583	0.0387	0.8526	11	26.2
Canadian Individual	0.9477	0.0572	0.8142	15	35.7
German GmbH Gewerblich	0.9381	0.0571	0.8175	10	23.8
Canadian CCPC	0.9246	0.0642	0.8017	9	21.4
German GmbH Vermögensverwaltend	0.9183	0.0643	0.8048	9	21.4

Note: Efficiency is the input-oriented BCC (variable-returns-to-scale) DEA score, bounded at 1.0; n = 42 properties per structure. Rows are sorted by mean efficiency.



Note: Boxes = IQR, line = median, diamond = mean. Regimes, left to right, are the German GbR, Canadian individual ownership, German GmbH Gewerblich, Canadian CCPC, and German GmbH Vermögensverwaltend; n = 42 properties per regime.

Figure 1. After-tax structural efficiency distributions by fiscal regime

highest- and lowest-efficiency regime, and differences reach approximately ten percentage points. *H1* is therefore supported: governance structures produce differential after-tax structural efficiency for identical properties.

Crucially for *H2*, the efficiency ordering does not follow nominal tax rates. The GmbH Vermögensverwaltend carries the lowest statutory rate on both rental income and capital gains yet is the least efficient structure; the GbR carries the second-highest rental income rate yet is the most efficient; Canadian individual ownership, with the highest rental rate of all, ranks second. If total tax burden alone determined performance, the ordering would be reversed. The mechanism is visible in the return composition: the mean pre-tax capital gains ratio is 0.614 (median 0.678), so roughly three-fifths of projected total return derives from appreciation, and a regime that preserves appreciation outperforms regimes that merely minimize annual income taxation. The same alignment operates in Canada through a different legal route: individual ownership taxes capital gains at only the 50% inclusion rate (an effective 29.375%, against 58.75% on rental income) and therefore also rewards appreciation-dominated returns. That both top-ranked structures obtain their advantage through preferential capital-gains treatment, despite entirely different legal origins, is itself evidence of alignment rather than a quirk of one jurisdiction.

Property-level cases illustrate the mechanism: the largest single gap is 10.07 percentage points for a Berlin property whose mid-range gains profile interacts with the partnership exemption; one Berlin property scores 1.000 under all five regimes; and one Montreal property attains its highest score under the counterfactual German GbR, so the governance effect follows return composition, not geographic origin.

The within-country comparisons carry the governance-choice conclusions, because they compare the alternatives legally available for the same property. Within Germany, the GbR matches or outperforms the GmbH Gewerblich for 85.3% of properties (strictly for 67.6%; mean advantage 2.16 percentage points, $\rho = 0.965$) and the GmbH Vermögensverwaltend for all Berlin properties

(strictly for 82.4%; mean advantage 4.39 points, $\rho = 0.949$). Within Canada, individual ownership matches or outperforms the CCPC for all eight Montreal properties and strictly outperforms it for four (mean advantage 1.05 points, $\rho = 0.858$); the weaker separation reflects the narrower fiscal asymmetry between Canadian pass-through and corporate forms. The cross-country comparisons address institutional consistency (*H2*) only: corporate regimes behave almost identically under the general corporate rate (rank correlation 0.992 between the GmbH Vermögensverwaltend and the CCPC, 0.988 between the GmbH Gewerblich and the CCPC); country-level means confirm stability of direction (GbR: 0.9580 in Germany, 0.9595 in Canada; largest difference 0.9142 versus 0.9360 under the GmbH Vermögensverwaltend). Institutional environment thus affects the degree, not the direction, of governance effects, and *H2* is supported in both environments.

For *H3*, the physical-specificity test fails while the financial-specificity test succeeds. The physical index of price per square meter, leasable area, and rent per square meter does not predict larger governance gaps (Mann–Whitney $W = 242$, $p = 0.297$; t-test and individual correlations likewise non-significant). The pre-tax capital gains ratio ranges from 0.000 to 0.866 (mean 0.614, median 0.678). Its correlation with the GbR-over-GmbH-Vermögensverwaltend advantage is $\rho = -0.319$ ($p = 0.040$; Benjamini–Hochberg adjusted $p = 0.065$, a conservative lower bound). The load-bearing confirmatory test is the pooled mixed-effects model over all 210 observations: the ratio significantly moderates the efficiency effect of a regime's capital gains tax treatment (interaction = 15.4 percentage points, $p = 0.009$), robust to excluding the nine always-efficient properties (20.0 points, $p = 0.010$); as a single confirmatory analysis it is not subject to the false-discovery-rate penalty. Two further pre-tax operationalizations, the entry multiple ($\rho = 0.321$, $p = 0.038$) and the appreciation factor, exit capital over entry capital ($\rho = -0.314$, $p = 0.043$), and a boundary-excluded subsample ($\rho = -0.447$, $p = 0.013$) point the same way.

The capital gains tax gradient provides the sharpest mechanism evidence and shows that the ratio adds information beyond the construction of the scores: since the ratio is identical under every

regime and pre-tax rankings coincide, any association can arise only in the difference between regimes and should scale with the fiscal asymmetry that separates them. It does: $\rho = -0.319$ at a 15.825% capital gains tax differential to the GbR (GmbH Vermögensverwaltend), -0.448 at 26.500% (CCPC), -0.759 ($p < 0.001$) at 29.375% (Canadian individual), and -0.566 at the largest differential (GmbH Gewerblich, 30.825%), so the gradient peaks at the Canadian individual comparison but is hard to explain by anything other than the interaction between return composition and capital gains treatment. The tercile analysis shows the ceiling effect: the mean GbR advantage falls from 4.99 percentage points in the low-gains tercile (mean ratio 0.404) through 4.70 (0.669) to 2.31 in the high-gains tercile (0.769), Kruskal–Wallis $H = 5.92$, $p = 0.052$, suggestive rather than significant, while the capital-loss-exclusion check is significant ($\rho = -0.410$, $p = 0.011$). Frontier-constrained properties leave governance little room to add advantage. H3 is supported in its financial form and rejected in its physical form.

The robustness stage confirms the ranking and locates the one assumption on which the moderation evidence depends (Appendix, Table A4). Across 75 after-tax DEA runs in 15 scenarios, the mean Spearman correlation with the base case is 0.979 (median 0.990, minimum 0.855 in the high-cost short-hold scenario), with a mean rank change of 1.38 positions; the GbR is the most assumption-sensitive regime (0.962) and the GmbH Vermögensverwaltend the most stable (0.990). The adjusted-versus-unadjusted data comparison yields $\rho = 1.000$. The specification checks leave the ranking intact: output orientation reproduces every efficient set ($\rho \geq 0.985$), dropping net asset value changes at most one frontier property per regime ($\rho \geq 0.982$), discounting at 7% preserves the

order ($\rho \geq 0.990$), and the GbR matches or outperforms the GmbH Gewerblich for 88.1% of properties under every variant. A uniform shareholder-level layer leaves within-regime scores unchanged by construction; in after-tax wealth it lowers the mean net asset value of the asset-managing GmbH from 2,730 to 2,010 thousand euros and of the CCPC from 2,651 to 1,724 thousand, against 2,941 thousand for the GbR, which then matches or exceeds the GmbH Vermögensverwaltend for 97.6% of properties (Appendix, Table A3). At the statutory 2% depreciation rate for the corporate regimes, H1 and H2 hold (GbR matches or outperforms the GmbH Gewerblich for every Berlin property, mean advantage 2.58 percentage points), but the German half of the H3 gradient loses significance ($\rho = -0.151$ for both GmbH comparisons; Kruskal–Wallis $p = 0.26$; interaction 11.8 percentage points, $p = 0.06$) while the Canadian correlations are unchanged (-0.448 , -0.759): the moderation effect is strongest where the depreciation shield leaves rental income nearly untaxed and the comparison isolates capital gains treatment. At the specified-investment-business rate that applies to a CCPC's rental income (50.17% on rent, 25.08% on gains), the CCPC's treatment becomes asymmetric and its mean efficiency rises to 0.9442 with 14 frontier properties, third behind Canadian individual ownership; the GbR still matches or outperforms it for 78.6% of properties, and the corporate cross-country correlation falls to 0.935, so the near-identity of the corporate regimes holds under the general corporate rate only. Overall, governance structure has after-tax consequences that nominal rates do not capture; in this portfolio, pass-through structures dominate corporate forms because a value-add, long-hold strategy is appreciation-intensive and is rewarded by capital-gains-preserving regimes.

Table 5. Specificity and robustness tests

Test	Statistic	p-value	Interpretation
Physical asset specificity (Mann–Whitney)	$W = 242$	0.297	Not significant
Pre-tax capital-gains ratio $\times$ GbR advantage (Spearman)	$\rho = -0.319$	0.040	Sig.; BH-adj. 0.065
Capital-gains tax gradient (GbR vs Can. Individual)	$\rho = -0.759$	< 0.001	Strongest gradient
Tercile comparison (Kruskal–Wallis)	$H = 5.92$	0.052	Suggestive
Capital-loss-exclusion robustness (Spearman)	$\rho = -0.410$	0.011	Significant
Both-boundary exclusion (Spearman)	$\rho = -0.447$	0.013	Significant
Pre-tax entry multiple (Spearman)	$\rho = 0.321$	0.038	Significant
Financial specificity moderation (pooled mixed model)	$b = 15.4$ pp	0.009	Confirmatory (N = 210)

4. DISCUSSION

The results warrant interpretation on three levels: prior evidence on tax and entity choice, Transaction Cost Economics, and cross-border allocation; their limits are set out in Section 5.

The first comparison concerns the tax literature. Gentry (1994) showed that taxation shapes entity choice and capital structure in real estate partnerships; the present findings extend that result from the choice to its efficiency consequences (up to ten percentage points of DEA efficiency). They sharpen the three-hurdle model of Feller and Schanz (2017): “desirable” cannot be assessed from statutory rates, since the lowest-rate structure here is the least desirable once return composition is considered. Consistent with Hanlon and Heitzman (2010) and Jacob (2022), tax effects operate through conditional channels, here the return composition of individual assets, and the result confirms on a real portfolio, across two jurisdictions, the rate-independence that Bachmann et al. (2021) derived for stylized single assets.

The second comparison concerns Transaction Cost Economics itself. Nickerson and Silverman (2003) demonstrated that governance–transaction misalignment depresses performance in trucking; the present study reproduces that penalty in a fiscal domain and identifies the alignment dimension that carries it. Where Williamson’s specificity concerns physical re-deployability (Williamson, 1985, 1991), physical characteristics have no explanatory power here ($p = 0.297$) while pre-tax return composition does (interaction 15.4 percentage points, $p = 0.009$). This motivates regulatory specificity: the degree to which the financial profile of a transaction is aligned with the tax treatment embedded in a governance structure. The concept keeps the discriminating-alignment logic but relocates the relevant characteristic from the asset’s physique to its return architecture (Ketokivi & Mahoney, 2020). The switching costs that make this specificity binding are fiscal: transfer taxes and the recognition of hidden reserves make restructuring expensive (Buettner, 2017), locking the asset into its regime much as site specificity locks a plant to its location. The robust-

ness evidence adds a boundary condition: the moderation is visible where a regime’s depreciation shield leaves rental income nearly untaxed, so that the comparison isolates capital gains treatment.

Third, the cross-country pattern speaks to the institutional critique of Transaction Cost Economics. Verbeke and Greidanus (2009) argued that the theory’s predictions weaken across institutional distance; the near-perfect cross-country correlation of corporate regimes ($\rho = 0.992$) alongside the weaker Canadian pass-through/corporate separation shows that the alignment logic travels intact across a civil-law and a common-law system, while the magnitude of differentials depends on the available structures: §23 EStG creates a sharper asymmetry than Canada’s inclusion rate. For the cross-border allocation literature (Groh & Lieser, 2014; Lepers, 2024), this adds a neglected dimension, the governance menu a jurisdiction offers. For family offices (Schickinger et al., 2022; Maury, 2006), misaligned entity choice is a systematic, avoidable drag on total return; whether it is capitalized in private-market pricing, as governance is in listed vehicles (Bauer et al., 2010; Capozza & Seguin, 2003), is an open question.

5. LIMITATIONS

The construct measured here is after-tax structural efficiency: the relative standing of a property among the same 42 properties under one fiscal regime, given its committed capital and operating cost. It is not comprehensive investor-level after-tax performance. Three components are excluded by design. Debt financing is excluded because the portfolio was acquired with equity; interest deductibility would narrow the GbR’s rental-tax disadvantage without touching its gains exemption, so the all-equity test is conservative. Currency effects are neutralized by a fixed conversion rate, which isolates fiscal treatment and leaves rank correlations unaffected. Shareholder-level taxation is excluded from the base case because a reinvesting family office retains earnings; it leaves within-regime scores unchanged and lowers corporate after-tax wealth. Four components are excluded by

data or model. Exit and switching costs are not modelled and would raise the cost of a misfitted initial choice. Depreciation recapture on disposal is not modelled; it would increase corporate and Canadian exit taxation and widen the GbR's advantage. Taxable income is floored at zero each year without loss carry-forward. Two rates are stylized: the corporate depreciation rate, at which the German moderation effect is strongest, and the CCPC rate, which uses the general corporate rate although a CCPC's rental income normally falls under the specified-investment-business rules with a refundable component; both are re-estimated at their statutory values in the robustness analysis. Discounting is the one omission that works against the

GbR, because it shifts weight from the terminal gain to annual rent; the 7% variant leaves the ranking intact. Finally, the empirical base is one family office, two cities, and one value-add, appreciation-heavy, long-hold style, so the GbR's dominance is contingent on that profile: in an income-dominant or short-hold portfolio a corporate form's low symmetric burden could dominate, and the sensitivity analysis shows the advantage narrowing under shorter-hold, higher-cost conditions. The 2018–2028 window with parameter-based projections is a comparability device, not a forecast. The contribution is a stylized simulation on a real portfolio: what generalizes is the alignment mechanism, not the winner.

CONCLUSION

This study aimed to determine whether the choice of governance structure affects the after-tax structural efficiency of cross-border residential real estate investment through the alignment between the structure's tax treatment and the portfolio's return composition, rather than through statutory tax rates alone.

The counterfactual evidence answers affirmatively. Under five domestic fiscal regimes applied to identical Berlin and Montreal properties, mean structural efficiency spans roughly four percentage points, most properties change rank, and the ordering inverts the ranking of statutory burdens: the German partnership form leads despite near-top rental taxation because it preserves the capital gains that dominate this portfolio's returns, while the lowest-taxed corporate form trails the field. Within each jurisdiction, the pass-through form matches or outperforms its corporate alternatives for nearly every property. The moderation analysis attributes these differences to the interaction between a regime's capital gains treatment and the pre-tax share of appreciation in total return, and shows that physical property characteristics play no comparable role.

Three conclusions follow. For theory, Transaction Cost Economics extends into tax governance once asset specificity is reconceived as regulatory specificity – the fit between a transaction's return architecture and the fiscal treatment embedded in its governance structure. For method, counterfactual simulation combined with frontier-based efficiency measurement offers a replicable way to study entity choice free of the selection endogeneity that limits observational tax research. For practice, investors and their advisers should select holding vehicles by stress-testing candidate structures against the expected composition of total return, not by comparing headline rates.

Further research should test the alignment mechanism where it is most likely to break: in income-dominant and short-hold portfolios, in jurisdictions whose fiscal asymmetries differ from the German exemption and the Canadian inclusion rate, in a model that carries shareholder-level taxation, depreciation recapture, and switching costs into the base case, and in the question of whether governance-driven efficiency differences are capitalized into private-market prices and refinancing terms.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Table A1. Legal availability of the five fiscal regimes by property location

Regime	Berlin property	Montreal property
German GbR	Available alternative (private asset management, §§ 705 ff. BGB)	Institutional counterfactual
German GmbH Vermögensverwaltend	Available alternative (extended trade tax reduction, § 9 Nr. 1 S. 2 GewStG; properties failing it fall under GmbH Gewerblich)	Institutional counterfactual
German GmbH Gewerblich	Available alternative	Institutional counterfactual
Canadian Individual	Institutional counterfactual	Available alternative (resident individual)
Canadian CCPC	Institutional counterfactual	Available alternative (resident-controlled corporation)

Note: “Available alternative” = a vehicle through which the family office could hold the property in its own jurisdiction; “institutional counterfactual” = the property evaluated as if located in the other jurisdiction, used for the cross-institutional test (H2) only. No scenario involves a cross-border holding.

Table A2. Output correlations and the two-output specification, by regime

Regime	r(exit, rent)	r(exit, NAV)	r(rent, NAV)	r(NAV, exit + rent)	p 3 vs 2 outputs	Efficient 3 / 2
German GbR	0.582	0.979	0.721	0.996	0.982	11 / 10
German GmbH Vermögensverwaltend	0.647	0.972	0.795	0.996	0.996	9 / 9
German GmbH Gewerblich	0.625	0.956	0.816	0.996	0.993	10 / 9
Canadian Individual	0.596	0.971	0.734	0.992	0.984	15 / 14
Canadian CCPC	0.638	0.966	0.794	0.996	0.998	9 / 9

Note: r = Pearson correlation between after-tax outputs across the 42 properties; p = Spearman correlation between the three-output and two-output (exit capital, cumulative rent) efficiency scores. Net asset value is the horizon-level aggregate of the other two outputs.

Table A3. After-tax wealth with and without full distribution to shareholders (means, thousand euros)

Regime	Exit capital	Cumulative rent	Net asset value	NAV after distribution	GbR NAV ≥ regime NAV (%), before / after
German GbR	2,097	887	2,941	2,941	100 / 100
German GmbH Vermögensverwaltend	1,765	973	2,730	2,010	92.9 / 97.6
German GmbH Gewerblich	1,451	965	2,482	1,828	90.5 / 90.5
Canadian Individual	1,481	962	2,812	2,812	64.3 / 64.3
Canadian CCPC	1,541	973	2,651	1,724	88.1 / 97.6

Note: Distribution layer: 26.375% (Kapitalertragsteuer plus solidarity surcharge) on distributed rent and gains of the German GmbH; for the CCPC, the Quebec top rate on non-eligible dividends (48.70%) on distributed rent and on the taxable half of gains, the other half passing through the capital dividend account; none for the pass-through regimes. Within-regime DEA scores are invariant to a uniform layer (step 5).

Table A4. Robustness of the efficiency ranking to model specification (mean efficiency by regime)

Specification	GbR	GmbH VV	GmbH Gew	Can. Ind.	CCPC	Efficient (n)	p with main	GbR ≥ GmbH Gew
Main (3 outputs, input-oriented)	0.9583	0.9183	0.9381	0.9477	0.9246	11/9/10/15/9	1.000	88.1%
Output-oriented	0.9585	0.9183	0.9382	0.9480	0.9246	11/9/10/15/9	0.985-0.997	88.1%
Two outputs (exit, rent)	0.9572	0.9174	0.9366	0.9417	0.9229	10/9/9/14/9	0.982-0.998	88.1%
Discounted at 7%	0.9472	0.9042	0.9233	0.9361	0.9095	11/9/9/14/9	0.990-0.997	88.1%
GmbH depreciation 2%	0.9583	0.9160	0.9353	0.9477	0.9246	11/8/9/15/9	n.a.	100.0%
CCPC at investment-income rate	0.9583	0.9183	0.9381	0.9477	0.9442	11/9/10/15/14	1.000 (CCPC 0.960)	88.1%

Note: Efficient (n) lists frontier counts in the order of the columns; p = range of within-regime Spearman correlations with the main scores; the last column is the share of all 42 properties for which the GbR score is at least as high as the GmbH Gewerblich score. Shareholder-level distribution leaves within-regime scores unchanged (step 5) and is reported in after-tax wealth in Table A3.