Exit, Pursued by a Bill: Lock-in Rents and Portability in European Cloud and Software

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Draft working paper v0.12, 2026-09-17. Theory, with a bound a buyer can apply to its own prices. Every proposition carries an appendix proof and an independent numeric cross-check. The empirical record of 2022 to 2026 is used for what it supports, a floor on the cost of leaving, and the paper says why it does not identify the rent.

Abstract

European organisations spend about EUR 400 billion a year on cloud and software services. Fewer than 1% of cloud customers switch provider in a year, while the two largest providers earn returns sustained above their cost of capital. This paper asks what a buyer pays for being unable to leave its incumbent supplier and how portability changes it. In a holdup model with heterogeneous exit costs, the incumbent's markup over the alternative equals the marginal buyer's exit cost under a posted price and each buyer's own exit cost under negotiated prices: the rent is the exit cost. A revealed-preference argument turns a price path and a switching rate into a floor under the exit cost plus the value of staying, under buyer rationality alone; the buyers that leave reveal the mirror-image ceiling. The floor holds whatever moved the price; it says nothing about rent. Over 2022 to 2026 every price the paper can verify moved with currency, energy, memory or bundled features. The period therefore identifies a floor on the cost of leaving, of the order of half a year of annual spend for a five-year buyer of the flagship office suite, and no rent. The exit cost decomposes into transport, re-integration, downtime, retraining and contractual timing. An instrument lowers the price only through the component it touches: egress fees are below 1% of most customers' annual cloud spend, which is why the incumbents could waive them in 2024 without the switching rate moving. Pass-through of a collective exit-cost reduction into a posted price is, to first order, a share set by the slope of the inverse hazard of the exit-cost distribution, with the sign flipping where the hazard decreases. Under a posted price an individual buyer's investment in its own portability changes its price by nothing unless it crosses the margin, so portability is a public good among buyers. The destroyed rent that the companion screening model takes as a free parameter becomes a computable function of the exit-cost distribution.

Keywords: switching costs, exit costs, lock-in, holdup, cloud computing, software pricing, portability, Data Act, procurement, digital sovereignty.

JEL: D42, L13, L14, L51, L86, H57.

1. Introduction

Three facts about the European market for cloud and software services sit uneasily together. European organisations spend about EUR 400 billion a year on these services (Asterès 2026). Fewer than 1% of cloud customers switch provider in a year, while the two largest providers earn returns sustained above their cost of capital (CMA 2025). Alternatives exist at a fraction of the price. European infrastructure providers charged roughly a sixth of the hyperscalers' list price for a standard compute instance before the memory shock of 2026 (Fermigier 2026a). Open-source suites replace the workforce software estate at list prices well below the incumbent's (Fermigier 2026e). A buyer who faces a cheaper alternative and a low probability of moving is paying for something. This paper prices it.

The something is the cost of leaving. In the model of section 3, a buyer stays with its incumbent as long as the present value of the price gap to the alternative is below its exit cost. An incumbent that knows this prices up to it. Under a posted price the markup equals the marginal buyer's exit cost, which the incumbent's first-order condition sets at the inverse hazard of the exit-cost distribution net of the incumbent's margin at parity. Under negotiated prices, which is what an enterprise agreement approximates, the markup equals the buyer's own exit cost (Proposition 1). The rent is the exit cost. This is Klemperer's (1987a) holdup in its simplest form, on which the paper builds four results.

The first result is a bound (section 4). A buyer who stays through a price increase reveals that its exit cost exceeds the present value of the gap the increase opened. Combining a price path with a switching rate therefore bounds the exit cost from below for the share of the base that stayed, under buyer rationality and nothing about the supplier's equilibrium behaviour; the buyers that left reveal the mirror-image ceiling (Proposition 2). The bound is on the exit cost plus the value of staying, meaning the incumbent's capability premium and any inattention. It holds whatever moved the price, which is also its limit: a floor on the cost of leaving is not a measurement of rent. Over 2022 to 2026 every price path the paper can verify moved with currency, energy, memory or bundled features, so section 4 draws no conclusion about rent from prices, illustrates the method on one product, and says what would identify the rent.

The second is a decomposition (section 5). The exit cost is a sum of components: transport (moving the data), re-integration (rewriting what depends on the incumbent's interfaces), downtime, retraining and contractual timing. An instrument lowers the price through the component it acts on and through nothing else. The Data Act's removal of switching charges acts on transport. Transport is below 1% of most customers' annual spend (CMA 2024), which is why Google, AWS and Microsoft could waive exit egress in 2024 while the CMA still measured switching under 1% a year afterwards (Proposition 3, corollary). The binding component is re-integration, which only an interface a second supplier serves can reach.

The third is a pass-through rule (Proposition 3). When every buyer's exit cost falls by the same amount, a posted price falls by a share $\rho = |\lambda'|/(1+|\lambda'|)$ of it, where λ' is the slope of the inverse hazard of the exit-cost distribution at the margin. The remainder appears as switching. Concentrated exit costs pass through as price, dispersed ones as switching. Where the hazard decreases at the margin the sign flips and the price rises. Whether a market sits in that region cannot be read off an annual switching flow; under negotiated prices the question does not arise, so the paper reports the pass-through as conditional on the hazard at the margin.

The fourth is a public-good property (Proposition 4, section 6). Under a posted price a single buyer that lowers its own exit cost changes its price by nothing unless the reduction takes it across the margin; only a collective reduction moves the price. Portability is therefore a public good among the buyers of one incumbent, which explains why individual buyers under-invest in it and why the instruments that have moved anything are collective: statutory switching rules, sectoral exit-test duties, and pooled procurement.

The paper closes a gap in the lab's own work. The companion screening model (Fermigier 2026b) shows that the accuracy an ownership screen needs rises with the mimic's stake in winning. Fermigier (2026c) argued that an exit mandate lowers that stake by destroying lock-in rents and left the destroyed rent Δ_{lock} as a free parameter. Section 7 replaces the parameter by a function of the exit-cost distribution and the size of the reduction. The paper also gives the lab's buyer-side brief (Fermigier 2026e) and supplier-side index (Fermigier 2026d) the arithmetic behind the figure they import from Asterès, and the reason that figure is a cost figure and not a rent.

The bound has two limits. It is an inequality on the exit cost plus the value of staying: the incumbent's capability premium where the alternative is not equivalent, which Fermigier (2026a) documents at the differentiated layer of cloud, together with the inattention wedge where no decision is ever convened (Fermigier 2026f). The bound overstates the exit cost by both. Its inputs are proxies too: announced list prices where the paid price is negotiated and private, and a UK cloud switching rate applied to a European base. The results are read as orders of magnitude.

Roadmap. Section 2 positions the paper. Section 3 sets up the model and states the holdup result. Section 4 derives the bound, shows why the current record does not identify rent, and illustrates the method. Section 5 decomposes the exit cost, derives pass-through and reads the instruments through it. Section 6 states the public-good property. Section 7 links the results to the screening threshold. Section 8 lists what the record says and what would falsify the paper. Section 9 concludes. Proofs are in the appendix.

2. Related literature

Switching costs and market power. Klemperer (1987a, 1987b) and Farrell and Shapiro (1988) are the founding models: an incumbent prices above the competitive level on its locked base and firms compete for new customers, so prices follow a bargain-then-ripoff path. Beggs and Klemperer (1992) give the infinite-horizon steady state in which nobody switches and prices sit above the no-switching-cost level. Klemperer (1995) is the survey that fixed the vocabulary. Farrell and Klemperer (2007) is the handbook treatment. Cabral (2016) shows in a dynamic model that prices rise with the seller's share of locked customers, which is the observed shape of the price path. Our section 3 is the one-incumbent, one-alternative case of this literature and claims nothing new in it.

Measuring switching costs. Shy (2002) maps observed prices and market shares onto switching costs under an undercut-proof condition: each firm sets the highest price at which no rival could profitably subsidise its customers' switching cost and take them all. With zero production costs a brand's switching cost is then its price minus the rival's price weighted by the rival's share. Kim, Kliger and Vale (2003) recover switching costs and transition probabilities from aggregated bank data through the firms' first-order conditions. The micro literature estimates switching costs from choice data with structural demand models: Dubé, Hitsch and Rossi (2009) in packaged goods, Handel (2013) in health insurance, Honka (2014) in auto insurance, Shcherbakov (2016) in pay television. Hortaçsu, Madanizadeh and Puller (2017) decompose retail inertia into inattention and an incumbent advantage, which are the two confounds the bound of section 4 absorbs. Our bound sits at the cheap end of this ladder. It needs a price path and a switching rate, assumes only that a buyer who stays prefers staying, and returns an inequality. Shy's condition does not describe a market where the alternative is a fringe at near-cost prices and the incumbent's customers are individually locked; Kim et al.'s route through the supplier's first-order condition needs the supplier's marginal cost, which we do not observe. We use the first-order condition for comparative statics and the bound for magnitude.

Lock-in in business IT. Zhu, Kraemer, Gurbaxani and Xu (2006) study the migration from proprietary to open-standard interorganisational systems on survey data, with network effects, switching costs and path dependency as the determinants. Opara-Martins, Sahandi and Tian (2016) report a practitioner survey of cloud lock-in. Schnurr (2022) reads the Data Act's switching chapter. Chen and Sacks (2026) model a dynamic duopoly in which each firm reimburses part or all of the switching cost of the customers it takes from its rival, charging switchers less and its own locked-in customers more, so that the reimbursement is financed by the base. The larger installed base reimburses more, with a reimbursement that is non-monotone in the base. Their customers attend to the choice only when their product dies, which is the decision-event device of Fermigier (2026f). None of these prices the lock-in or decomposes it into the components an instrument can act on.

The regulatory record. Ofcom (2023) and the CMA (2024, 2025, 2025b) measured the UK cloud market: switching under 1% a year, egress fees below 1% of most customers' spend, returns above the cost of capital for the two largest providers, technical barriers that "lock customers into their initial choice of provider". Asterès (2025, 2026) for Cigref measured the reported cost path on the European cloud-and-software base.

The lab's own work. Fermigier (2026a) explains the share loss of cheaper European cloud on the differentiated layer by an assembly gap; the present paper explains why the installed base does not move where the price edge exists. Fermigier (2026f) models why the decision to leave is never convened when a component arrives inside a bundle; that paper supplies the event, this one the exit cost the event would compare. Fermigier (2026g) classifies cloud services by whether a second supplier serves the same interface, which is the component map of section 5 per service. Fermigier (2026b, 2026c) are the screening papers section 7 feeds.

3. The model

Buyers form a continuum of mass one, each running a workload with an incumbent supplier. Buyer i has an exit cost $X_i \geq 0$, the one-off cost of moving the workload to the alternative, drawn from a distribution F with density f on $[0, \infty)$. The alternative charges p_c per period; the incumbent posts p. The buyer's decision horizon is H periods at discount rate r, with annuity factor $A = \sum_{t=0}^{H-1}(1+r)^{-t}$. Write $m = p - p_c$ for the gap and $y = A\,m$ for its present value over the horizon. The buyer stays if and only if $y \leq X_i$: paying the gap for H periods costs less than paying the exit cost once. The incumbent's unit cost is c, so its margin at parity with the alternative is $g = p_c - c \geq 0$.

The inverse hazard of F is $\lambda(x) = (1 - F(x))/f(x)$. We say F has an increasing hazard at x (IFR at x) when λ is decreasing there. Weibull distributions with shape above one are IFR everywhere and the exponential has a constant hazard, while the lognormal's hazard rises over the bulk of its mass and turns down in the far tail. The propositions below say where the condition is needed.

Proposition 1 (the rent is the exit cost). *(a) Under a posted price, if $\lambda(0) > Ag$ the incumbent's optimal present-value gap y^* is the interior solution of*

$$y^* + A\,g = \lambda(y^*),$$

which is unique where F is IFR, and otherwise $y^* = 0$. The buyers with $X_i < y^*$ leave; the marginal buyer's exit cost equals the present value of the markup; the present value of the incumbent's margin over its own cost, $y^* + Ag$, equals the inverse hazard of the exit-cost distribution at the margin. (b) Under buyer-specific pricing the incumbent sets $y_i = X_i$ for every buyer, who stays when indifferent, so nobody switches and each buyer's markup is its own exit cost.

Two readings. Under a posted price the incumbent gives up the low-exit-cost buyers to charge the rest, with the markup set by how thin the distribution is at the margin. Under negotiated prices, which is what an enterprise agreement with individually set discounts approximates, the incumbent extracts each buyer's exit cost exactly. The observed switching rate is then zero by construction.

Remark 1 (what a low switching rate says about pricing). For a Weibull exit-cost distribution with shape a and $g = 0$, the share of the base the incumbent lets go at its posted-price optimum is $F(y^*) = 1 - e^{-1/a}$ in closed form: 39% at $a = 2$, 9.5% at $a = 10$, 3% at $a = 33$ and 2% at $a = 50$, where the last two correspond to coefficients of variation of 3.8% and 2.5%. An exclusion share of a few percent is therefore consistent with a posted-price optimum only if exit costs are nearly identical across buyers, which they are not. The CMA's figure is an annual flow while $F(y^*)$ is the stock shed when the price is posted, so the observed combination of a rising price path and a flow under 1% a year says one of three things. Prices are negotiated buyer by buyer, in which case (b) applies and the rent is each buyer's own exit cost. Or the posted price is still climbing toward y^*, Cabral's (2016) dynamics, which a forecast of 12% a year after three years at 8.7% describes. Or the base was shed before the measurement window and the flow is what remains. All three are consistent with the record.

None is needed for the bound of the next section, which uses only the buyer's side of the decision.

4. The bound

Consider a window of T periods over which the incumbent's price goes from p_0 to p_T and the alternative's from $p_{c,0}$ to $p_{c,T}$. Let s be the share of the buyers present at the start who left during the window.

Proposition 2 (the revealed-preference bounds). *(a) Every buyer who stays at the end of the window has $X_i \geq A\, m_T$ with $m_T = p_T - p_{c,T}$, so the share of the initial base with an exit cost below $A\, m_T$ is at most s. If (i) the incumbent was no cheaper than the alternative at the start of the window and (ii) the alternative's price did not rise over it, then $m_T \geq \Delta_T := p_0\,[(1+\gamma)^T - 1]$, where γ is the incumbent's average annual increase, so that*

$$X_i \geq A\,\Delta_T \quad \text{for at least a share } 1 - s \text{ of the base.}$$

(b) Every buyer that left during the window left at a gap no larger than m_T, so for each leaver $X_i + A\, q_i \leq A\, m_T$, where q_i is its per-period value of staying, and the share of the base with $X_i + A\, q_i \leq A\, m_T$ is at least s. (c) If every buyer is attentive, the two inequalities meet: the share of the base whose exit cost plus value of staying lies below the present value of the gap equals the switching share, so the switching rate identifies the distribution of that sum at the gap.

Part (a) is the stayers' bound and part (b) its mirror for the leavers. A buyer that migrates reveals a ceiling on its own exit cost plus value of staying: the present value of the gap it faced when it decided. The public migration accounts of section 5 are leavers, so each of them gives two numbers, the cost it booked and the ceiling its decision reveals. Part (c) says what the wedge does: with attentive buyers the switching share reads off the distribution at the gap, and inattention opens the gap between (a) and (b).

The bound needs nothing about the supplier, its optimum, its pricing rule or the shape of F. It needs only that a buyer who stays prefers staying, so it bounds the exit cost plus whatever else makes staying worth it. Two extensions make that explicit. If the incumbent is worth q per period more to the buyer than the alternative, through capabilities the alternative lacks or features the increase bought, the buyer's condition is $A(m_T - q) \leq X_i$ and the bound holds on $X_i + Aq$. If some buyers stay through inattention, the bound holds on $X_i + w_i$ with $w_i \geq 0$ the attention wedge of Fermigier (2026f). The number the calibration produces is therefore a lower bound on the exit cost plus the present value of the capability premium plus the wedge, and the three terms travel together. The exit cost alone is identified only where the alternative is functionally equivalent, which is arguable for the workforce estate and the commodity layer of cloud and is not the case at the differentiated layer, where Fermigier (2026a) documents a capability premium the European fringe does not close.

Scope of the bound. The floor holds whatever moved the incumbent's price. A buyer that stays through an increase caused by a currency alignment or by the supplier's own costs reveals its cost of leaving as surely as one that stays through a margin increase: the gap opened either way. The cause changes only the reading of the incumbent's price as rent. Proposition 1 says the rent is the exit cost; computing a floor does not test that, because a price that rose with costs is not a rent. Identifying rent from a price path needs an increase that is neither cost nor currency, which means knowing the supplier's input costs and currency exposure over the same window; the paper does not have them.

Why the 2022 to 2026 record does not identify rent. Table 1 assembles the list-price changes the vendors announced, verified from the announcements, beside the sector's reported cost figure. Every one of them moved for a stated reason other than lock-in. Microsoft's euro step of April 2023 was a currency alignment after the euro's fall against the dollar (Microsoft 2023). Its dollar steps of 2022 and 2026 and Google's of 2023 and 2025 came with features added to the bundle (Microsoft 2021, 2026; 9to5Google 2023, 2025). The European fringe's increases followed energy in 2023 and memory in 2026: OVHcloud's b2-7 instance rose 3%

over the window (OVHcloud 2026, archived price pages). Hetzner's plans rose 31% to 169% on 15 June 2026, for new orders and rescales, after conventional DRAM contract prices had risen 93% to 98% in a single quarter (Hetzner 2026a, 2026b, 2026c; TrendForce 2026; Gajdosik 2026). A fringe pricing near cost passes such shocks through; nothing in its doing so says anything about rent. The sector's reported cost growth of 8.7% a year comes from 54 chief information officers in three countries, weighted by sector, with a self-selection bias the report states (Asterès 2026, section 3.1); it is spend per organisation, which mixes price with seats, tiers and bundles. The respondents rank face price first among its drivers without quantifying the split (section 3.2). On this record the paper draws no conclusion about rent from price paths. At the commodity layer of cloud, where both sides moved with costs and the fringe by more, the gap did not clearly open and there is no floor at all.

Product and window	Change	Source
Microsoft 365 E3, USD, March 2022 to July 2026 ($32 to $36 to $39)	+22%	Microsoft 2021, 2026
Microsoft 365 E3, EUR, April 2023 to July 2026 (+11% harmonisation, +8%)	+20%	Microsoft 2023, 2026
Microsoft 365 E3, EUR, March 2022 to July 2026	+35%	Microsoft 2021, 2023, 2026
Office 365 E3, USD, March 2022 to July 2026 ($20 to $23 to $26)	+30%	Microsoft 2021, 2026
Google Workspace Business Standard, flexible plan, March 2023 to March 2025 ($12 to $14.40 to $16.80)	+40%	9to5Google 2023, 2025
Google Workspace Business Standard, annual plan, January 2025 ($12 to $14, Gemini bundled)	+17%	9to5Google 2025
Salesforce Enterprise Edition, August 2023 and August 2025 (+10%, +6% average)	+17%	Salesforce Ben 2023; Salesforce 2025
SAP on-premise support fees, 2023 and 2024 (+3.3%, +5%)	+8%	Forrester 2023
Azure and the Microsoft cloud in EUR, April 2023 harmonisation	+11%	Microsoft 2023
OVHcloud, all services, December 2022, before the window	+10%	OVHcloud 2022
OVHcloud b2-7 instance, hourly list price, January 2023 to September 2026 ($0.0813 to $0.0837)	+3%	OVHcloud 2026, archived pages
Hetzner, 1 April 2026 round, existing products and new orders, no figures announced (press reports: up to 37%)	not measured	Hetzner 2026c
Hetzner CX33 (4 vCPU, 8 GB), 15 June 2026, new orders and rescales (EUR 6.49 to 8.49); CPX22 regular-performance plan (EUR 7.99 to 19.49); the January 2023 energy step not measured	+31%; +144%	Hetzner 2026b
Sector reported cost, cloud and software, three years to 2026 (8.7% a year)	+28%	Asterès 2026

Table 1. Announced list-price changes, verified from the vendors' announcements, beside the sector's reported cost figure. Two cases are not in the table because they are not price paths. Oracle's January 2023 move of Java to a per-employee metric was put by Gartner at two to five times the previous cost for most organisations (Oracle 2023; InfoWorld 2023). CISPE members

reported increases of 800% to 1,500% after Broadcom's acquisition of VMware (The Register 2025).

An illustration of the method. For a European buyer of Microsoft 365 E3 who stayed through the July 2026 increase, the dollar list price rose 8% inside the three-year window while the open-source alternative's run cost, a list price the brief quotes at one date, did not (Microsoft 2026; Fermigier 2026e). At a five-year horizon and 4% the annuity factor is 4.63, so the floor is 0.39 years of annual spend; at three years it is 0.24. Counting the currency step as part of the gap, since the euro alternative did not move, gives 0.94 and 0.58. These are floors on the exit cost plus the value of staying, held by at least 97% of the base at the CMA's switching rate. They are not measurements of rent; a buyer computes its own from the prices it paid.

Orders of magnitude from other directions. Three figures, none a measurement, sit in the same range. In the February 2022 survey by Asterès and Vanson Bourne, chief information officers put the cost of leaving their cloud at 15% of their IT budget (Asterès 2026, section 2.1), which is a third to half a year of cloud-and-software spend if those services are a third to a half of the budget. Shy's (2002) method gives the switching cost from prices and shares under the undercut-proof condition, with zero production costs, as the incumbent's price minus the fringe's price weighted by the fringe's market share. With the fringe at a sixth of the incumbent's compute price before the 2026 shock (Fermigier 2026a) and about 15% of the market, that is 0.98 of a year's spend, from the supplier's side and under an equilibrium condition the bound does not need. The engineering estimates of section 5 are of the order of one to two years of spend. The agreement is between orders of magnitude; that is all the record supports.

Where the rent evidence is. Two observations bear on Proposition 1′s reading of the price as rent; neither comes from a 2022 to 2026 price path. The UK competition authority found the two largest cloud providers earning returns sustained above their cost of capital while fewer than 1% of customers switched in a year (CMA 2025), which is the coexistence the model predicts. The February 2022 survey found face-value increases of 3% to 6% a year at renewal for nine in ten French companies over the preceding years, a period of low inflation and stable currency (Asterès 2026, section 2.2, on the 2022 survey). Both are consistent with the model; neither identifies the rent per buyer. That identification needs a buyer's paid prices, the alternative's price at the same dates, and an index of the supplier's costs, which is a panel the paper does not have.

Assumptions (i) and (ii) in the data. For the commodity layer of cloud, (i) holds with room, since the alternative's list prices are a fraction of the incumbent's (Fermigier 2026a); a buyer's own bill shows the same gap: Aarhus moved sixty systems from Azure to Hetzner at a third of the price (HK 2025). Assumption (ii) fails there in this window, which is why the layer gives no floor. For the workforce software estate the alternative's paid price is the run cost of the replacement stack, which a migrating buyer knows from its own accounts and which the brief quotes from list prices at one date (Fermigier 2026e, break-even annex). The illustration takes it as flat, so (ii) is an assumption there.

Mismatches. The switching rate is a regulatory measurement for UK cloud that counts full provider switches, so partial migration and multi-homing leave the base looking more locked than it is. No regulator has measured switching in business software; the illustration uses the cloud rate for a software estate because the software rate is, on every practitioner account, lower. The 97% is a share of customers while the spend figures are money. Announced list prices are the vendor's intended path for its base, since Microsoft's announcements move existing customers to the new price at renewal (Microsoft 2026); they are still not a measured paid path.

The decomposition. The exit cost is a sum:

$$X = x_{\text{transport}} + x_{\text{reint}} + x_{\text{down}} + x_{\text{train}} + x_{\text{timing}}.$$

Transport is the cost of moving the data, including egress charges. Re-integration is the cost of rewriting what depends on the incumbent's interfaces and features, the CMA's "technical barriers". Downtime is the cost of the cut-over. Retraining is the cost of the people learning the alternative. Contractual timing is the cost of the calendar: an enterprise agreement under which reducing seats mid-term saves nothing puts the savings at the renewal date whatever the technical plan says (Fermigier 2026e). Table 2 maps the instruments in force or proposed to the component each acts on.

Instrument	Acts on	Reach
Egress waivers for departing customers (Google, AWS, Microsoft, 2024)	transport	the whole component, exit only
Data Act, switching charges removed (January 2027)	transport	the whole component
Data Act, functional equivalence	re-integration	part: equivalence of the service, not of the integrations built on it
DORA Article 28, tested exit strategies	downtime and knowledge of X	the test prices the component; it does not lower it
SecNumCloud reversibility clauses, Cloud Sovereignty Framework exit objectives	transport, downtime	contractual
Open interfaces a second supplier serves	re-integration	the whole component, where the second supplier exists
Renewal-date discipline, yearly exit-cost disclosure	timing and knowledge of X	contractual

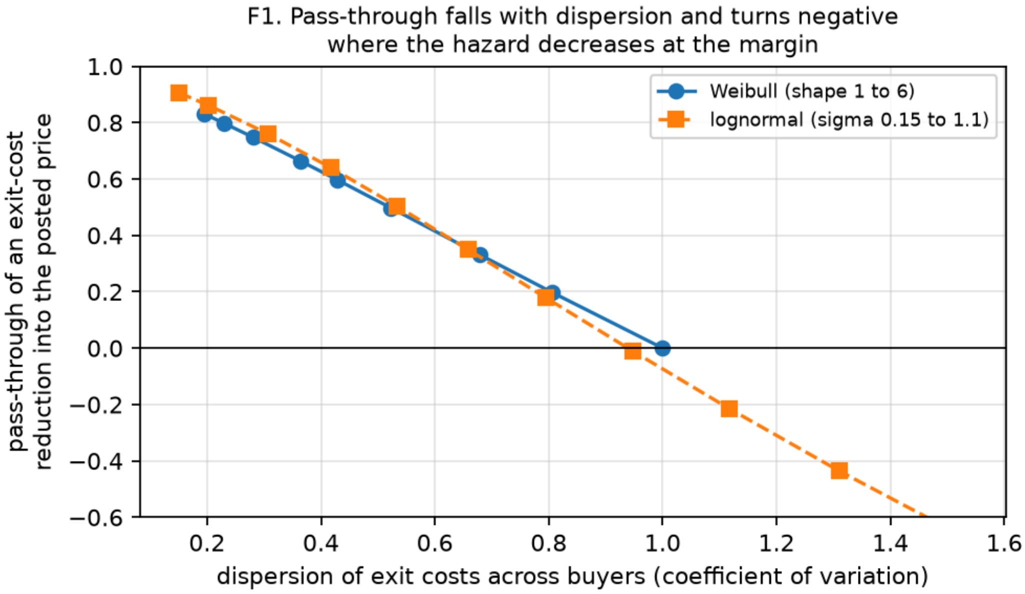
Table 2. Instruments and the component of the exit cost each acts on.

Proposition 3 (pass-through of an exit-cost reduction). *Let every buyer's exit cost fall by $\delta > 0$, and assume $x \mapsto x - \lambda(x)$ is increasing on the support, so that the incumbent's first-order condition has a unique root for every reduction in $[0, \delta]$. (a) Under buyer-specific pricing every retained buyer's markup falls by δ/A: pass-through is one. (b) Under a posted price, if λ is decreasing on $[y^*, y^* + \delta]$, the present-value gap falls by an amount strictly between zero and δ. To first order the fall is $\rho\,\delta$ with*

$$\rho = -\frac{dy}{d\delta} = \frac{|\,\lambda'(z)|}{1 + |\,\lambda'(z)|} \in [0, 1),$$

evaluated at $z = y' + \delta$, while the share of the base that leaves rises from $F(y^*)$ to $F(z)$. (c) If instead λ is increasing on $[y^*, y^* + \delta]$, with $\lambda' < 1$ there by the standing assumption, the gap rises and the leaving share rises.

The exponential is the boundary: with a constant hazard the price does not move and the whole reduction shows up as switching. A degenerate distribution, every buyer at the same exit cost, gives $\rho \to 1$. Between them, Figure 1 traces ρ against the dispersion of exit costs for Weibull and lognormal families: concentrated exit costs pass through as price, dispersed ones as switching. Part (c) is the sign flip in the lognormal's upper tail, where the incumbent facing a very dispersed base responds to lower exit costs by letting the marginal buyers go and charging the core more. The standing assumption is the second-order condition made global: $\lambda' < 1$ at a root makes it a local maximum, and $\lambda' < 1$ everywhere makes the maximum unique for every δ. Every Weibull and every lognormal in the Monte-Carlo satisfies it. A well-separated bimodal mixture violates it between its modes, where the profit function has two peaks and a finite δ can move the global optimum from one to the other. The finite response then has no sign restriction: three of the 144 bimodal draws jumped, with the gap moving by up to 68 times δ, all in violation of the assumption. Under the assumption the Monte-Carlo bears the proposition out. The price fell by between zero and δ on every draw with a decreasing hazard on the interval, in all three families. It rose on 60 of the 62 lognormal draws with an increasing inverse hazard there, the other two having both signs on the interval. On every draw where the sign flipped the incumbent was letting go more than 40% of its base at its optimum. Whether a market sits in that region cannot be read off the annual switching flow, for the reason of Remark 1: a base shed before the window shows up as a small flow. Under negotiated pricing the question does not arise. Under a posted price the paper reports ρ as conditional on the hazard at the margin, and notes that a unimodal exit-cost distribution whose margin sits in its lower tail, which is what a small stock of departures implies, has an increasing hazard there.



Corollary (components already at zero). *An instrument that acts on a component of size zero for the buyers in question sets $\delta = 0$ and moves neither the price nor the switching share. An instrument that acts on a component of size δ small relative to the spread of X near the margin moves the switching share by at most $F(y^* + \delta) - F(y^*)$, the mass within δ of the margin.*

The CMA sequence. Egress fees are below 1% of most customers' annual cloud spend; over a contract a customer might pay between 0% and 5% of annual spend in them (CMA 2024). Against the reported-cost bound of 0.8 years of spend at the shortest horizon, transport is about 6% of the sum the bound covers, about 4% at a five-year horizon and about 2% at ten; against the list-price bound the shares are about 8%, 5% and 3%. Google, AWS and Microsoft waived egress for departing customers in 2024, exit-only and under conditions (CMA 2025b). Chen and Sacks (2026) model a different move, the firm that wins the customer paying its switching cost to take it. A waiver is the incumbent setting to zero, on exit, a component of the switching cost it had itself imposed, and the smallest one. The Data Act removes switching charges outright from January 2027. The CMA measured switching under 1% a year after the waivers were in place (CMA 2025). The corollary says this is what removing a component of at most a few percent of the exit cost does. The binding component is re-integration, which the waivers did not touch and which functional equivalence reaches only in part, since equivalence of the service does not rebuild the integrations a buyer wrote against the incumbent's interfaces.

The engineering estimate. As an order of magnitude and nothing more, the lab's buyer-side brief prices the migration of a workforce estate from the incumbent suite to an open-source stack (Fermigier 2026e, break-even annex, on Standtke and Tiede 2024). The one-off effort is 144, 364 and 953 person-days for estates of 250, 2,500 and 25,000 seats at a blended day rate of EUR 1,200. The productivity loss is one user-day per user at EUR 300. The exit cost per seat is then EUR 991, 475 and 346, of which the engineering share is 70%, 37% and 13% and the rest is the productivity loss, the downtime and retraining components. Against the incumbent's list price of $36 per user per month over the window, $432 a year, the estimate is 2.3, 1.1 and 0.8 years of spend for the three estates (2.1, 1.0 and 0.7 at the $39 in force from July 2026). Treating the euro and dollar figures at par understates the ratio by the exchange rate, and enterprise agreements are discounted from list, which understates it further. The brief labels its effort and day-rate inputs illustrative, so the comparison is between orders of magnitude.

Public migration accounts. Three public accounts sit beside the estimate. Schleswig-Holstein migrated 25,000 workstations and 44,000 accounts in 2025, after individual migrations of fewer than 50 workstations in 2024 and with none in 2026. It reports licence savings above EUR 15 million a year, against EUR 9 million of one-off investment in 2026 for the migration's remainder and the further development of the open-source stack (Schleswig-Holstein 2025, 2026). The migration year's own cost sits inside the state's contracts with its operations provider and its framework agreements with the vendors, unitemised and unpublished, so the state's per-seat migration cost is not identified. The EUR 9 million of 2026 is post-migration investment, EUR 360 per seat, and bounds nothing. Two facts from the state's answer bear on the components instead. It cancelled the software-assurance part of its Microsoft Office contracts when the parliament decided, on the finding that most workstations would no longer need the update right from October 2025, which is the contractual-timing component managed to the renewal calendar. It also does not record training time per user, for employee data-protection reasons, so the retraining component is unobserved in this account by design. Munich's LiMux desktop cost EUR 11.7 million for about 12,600 desktops in 2012, EUR 930 per seat (h-online 2012, on the city's council bulletin). The city's return to Windows in 2017 was budgeted at EUR 49.3 million (The Register 2017), about EUR 3,300 per seat with wider IT work inside it. The brief's per-seat figures, EUR 346 to 991, sit inside the range the two German accounts span. Proposition 2(b) adds the ceiling each decision reveals. Schleswig-Holstein saves EUR 600 per seat a year in licences. With the replacement stack's run cost at a sixth to a third of that, the brief's range, the gap it faced was EUR 400 to 500 per seat a year. Its exit cost plus value of staying is therefore at most 1.9 to 2.4 years of licence spend for a three-year decision horizon and 3.1 to 3.9 for a five-year one. The whole of the brief's engineering range and Munich's published cost sit inside that ceiling. The direction of Munich's two figures agrees with the decomposition: the cost of leaving a proprietary estate and the cost of returning to one are both mostly re-integration and retraining, with transport a small part of either.

What the estimate does and does not say. The estimate and the illustration of section 4 are of the same order, one to two years of spend against a floor of a third to a year. The paper stops there: an illustrative estimate compared with a floor computed from a contaminated price path identifies nothing, neither a residual nor its absence. The estimate omits components the brief itself lists among the costs a model must not hide: parallel running of both stacks, data migration tooling, security capability with its staff, recruitment and retention, the incumbent's exit terms. None of these sits in the 144, 364 and 953 person-days.

Two features of the estimate are consistent with the model. The exit cost per seat falls with estate size because the engineering component is close to fixed, which is why the smallest buyers face the hardest arithmetic and why pooling is the buyer's instrument (section 6). The component most of the estimate is made of, at every size, is one no instrument in Table 2 removes: the productivity loss and the re-integration effort. The transport component, which the same brief lists among the costs a model must not hide, is the one the CMA measures at a few percent.

Cloud. The corpus holds no engineering estimate of the re-integration cost of a cloud workload, and the price record of this window gives no floor for it. The service-level map of Fermigier (2026g) says where the cost sits. Of the 35 hyperscaler services it scores, 23 have an exit-friction score above one half, and in 20 of those the proprietary-interface term, this paper's re-integration component, is the largest contributor. Every one of the 35 has an open-source substitute and all but identity management a European one, so the cost is not a shortage of alternatives. The count is of services; the matrix does not weight them by spend.

6. Portability as a public good

Proposition 4 (the public-good property). *Under a posted price, a single buyer that reduces its own exit cost by δ_i leaves the incumbent's problem and hence the posted price unchanged. Its private return, gross of the cost of the reduction, is zero if it remains above the margin and $y^* - (X_i - \delta_i)$ if the reduction takes it across, in which case it leaves. The price effect $\rho\,\delta$ of Proposition 3 exists only for a reduction common to the base. Under buyer-specific pricing the private return to reducing one's own exit cost is one-for-one, as is the incumbent's return to raising it.*

The proposition explains a pattern in the record. Individual buyers under-invest in their own portability under a posted price. A buyer that abstracts its integrations, keeps a second source warm or runs an exit test gets nothing for it unless it means to leave. The buyers that mean to leave are the low-exit-cost ones the incumbent has already let go. The instruments that have moved anything are collective: the Data Act's switching rules, which change every buyer's transport cost at once; DORA's exit-test duty, which prices the component for a whole sector; pooled procurement, which lets a group of buyers commit demand to a second supplier on an interface it then serves for all of them (Fermigier 2026h). Under negotiated pricing the private return is there. By the same arithmetic so is the incumbent's return to raising the buyer's exit cost through proprietary features, bundling and data gravity. Exit cost is then contested one-for-one on both sides, which is the investment in lock-in of the switching-cost literature (Farrell and Klemperer 2007). The instruments that matter are then the ones that put a component out of the incumbent's reach, an interface a second supplier serves being the clearest case. A yearly exit-cost disclosure, which the lab's brief recommends, lowers no component. It tells the buyer which components it has and shows the incumbent's investment in raising them.

The bargain-then-ripoff print. Cabral (2016) and the earlier dynamic models describe an incumbent that prices low to acquire a customer and high once the customer is locked. The CMA's committed-spend agreements are the bargain and the renewal increase the ripoff; the discount is the visible print of the premium (Fermigier 2026c). The model of section 3 is the ripoff phase alone. In the acquisition phase the alternative's low price is decisive and the cheaper European supplier wins new workloads, which Fermigier (2026a) documents at the commodity layer, while the installed base does not move.

7. The link to the screening threshold

In the companion screening model (Fermigier 2026b, Theorem 3), the accuracy an audit of effective control must reach for a sovereignty tender to screen out a foreign-controlled mimic is increasing in the mimic's stake in winning, π_B. Fermigier (2026c) argued that an exit mandate lowers that stake by destroying the lock-in rents a winner would collect over the relationship. It wrote the destroyed rent as a free parameter Δ_{lock}, so that the mandate and the ownership screen are complements on an accuracy band whose width is Δ_{lock}.

The present paper computes it, with one translation. The screening model's π_B is the rent a prospective winner expects over the relationship the tender creates, so the object is the present value at the tender date of the rent on the base the winner will hold, which is the installed-base rent of section 3 discounted to that date. Per unit of base, the incumbent's present-value rent is $R(\delta) = y'(\delta)\,[1 - F(y'(\delta) + \delta)]$ under a posted price, with y' from Proposition 3, and $\int \max(X_i - \delta, 0)\,dF(X_i)$ under buyer-specific pricing. A mandate that removes a component of size δ destroys

$$\Delta_{lock}(\delta) = R(0) - R(\delta),$$

which under negotiated prices is δ for every buyer whose exit cost exceeds δ and, under a posted price, is to first order $\rho\,\delta\,[1 - F(y^*)]$ on the retained buyers plus $y'\,[F(z) - F(y^*)]$ on the buyers who leave. Two consequences follow for the screening result. The band is as wide as the component the mandate removes and no wider. The threshold moves with Δ_{lock} relative to the mimic's stake, so a mandate acting on transport alone lowers the stake by a few percent of a year of the buyer's spend per buyer, which moves the threshold little, while a mandate reaching re-integration lowers it by most of the exit cost. The observability principle of Fermigier (2026c), that exit-type instruments insure the harms that announce themselves and screen-type instruments cover the harms that do not, is unchanged. Nothing in this paper touches the compelled-access channel. The rent it prices is paid whether or not any authority ever asks for anything.

8. What the record says and what would falsify the paper

What the record already shows. Three observations the model predicts are in the record; none of them is a price path read as rent. Existing customers move to a new list price at renewal (Microsoft 2026), which is the contractual-timing component in the vendor's own words. The 2024 egress waivers, which removed the transport component for departing customers, left the switching rate where it was (CMA 2025). On 31 March 2026 the CMA declined for the time being to open strategic-market-status investigations into AWS's and Microsoft's cloud services and accepted voluntary commitments instead (CMA 2026, as reported in The Register 2026b). The commitments are free egress extended to Microsoft's private network, a switching window lengthened from 60 to 180 days, a switch defined to include exit from a single Azure service, an interoperability mechanism promised within six months, with a review of progress after six months. The CMA opened a separate investigation into Microsoft's business-software licensing the same day. Every commitment acts on transport or on timing and none on re-integration, so the corollary predicts that the review will find the switching rate where it was. Two further observations are consistent with the model; neither is evidence of rent on its own. The European fringe's prices followed its costs, OVHcloud's by 3% inside the window and Hetzner's by 31% to 169% by plan in June 2026 after memory contract prices had doubled in a quarter (TrendForce 2026), as a supplier pricing near cost must. The incumbents' dollar list prices for compute did not move through the same shock, which a margin-rich incumbent can absorb and a fringe cannot. The model says an incumbent priced on exit costs has that room; the observation is consistent with it without proving it, since a later pass-through by the incumbents would close the gap further.

The falsifiers. A switching rate that rose materially after the 2024 egress waivers or the 2026 commitments, in the CMA's six-month review or Ofcom's next measurement, would falsify the corollary's ranking of components. Paid-price histories showing no increase net of the supplier's costs and currency over a period of stable costs would falsify the reading of Proposition 1 on this market; the 2017 to 2021 renewal record is where that test can be run. Migration accounts pricing the five components far above any floor a buyer's own price path gives would mean prices are not near the holdup bound, for reasons of competition or restraint the model does not contain.

Confidence. The Asterès figures come from a 54-respondent survey in three countries with a self-selection bias the report states; they are spend growth, used here for the scale of the market and the 2022 renewal observation only. The CMA's 2024 and 2025 figures are regulatory findings; its March 2026 decision is taken from press reports of the decision rather than from the decision text. The vendor prices are the vendors' own announcements; the fringe's come from their own pages. The engineering inputs are labelled illustrative by their source; the paper treats them so.

9. Conclusion

A buyer that cannot leave pays for it, at a price equal to its own cost of leaving. The paper turned that sentence into a bound a buyer can compute from its renewal history and a decomposition that says which instrument reaches which part of the cost. It added a pass-through rule that says whether a collective reduction will show up as lower prices or as departures, plus a public-good property that says why the reductions that have happened were collective. It did not measure the rent. Over 2022 to 2026 every verifiable price moved with currency, costs or bundled features. The record therefore gives a floor on the cost of leaving, of the order of half a year of spend for a five-year buyer of the flagship suite, and no reading of rent from prices. The evidence of rent is the regulator's finding of returns above the cost of capital beside a switching rate under 1%, together with the renewal increases of a low-inflation period. The component the Data Act removes is a few percent of the total. The component that binds is the one only a second supplier on the same interface can reach. The rent is the exit cost, the exit cost is mostly re-integration, and re-integration is the interface.

Appendix A. Proofs

Proof of Proposition 1. (a) Per-period profit is $\pi(y) = (y/A + g)(1 - F(y))$. Differentiating, $\pi'(y) = \frac{1}{A}(1 - F(y)) - (y/A + g)f(y)$, which is zero iff $y + Ag = \lambda(y)$. The left side is increasing in y. Where F is IFR the right side is decreasing, so the equation has at most one root, with $\pi' > 0$ below it and $\pi' < 0$ above it; the root is the maximiser. A root exists iff $\lambda(0) > Ag$, since the left side starts at Ag and the right side at $\lambda(0)$ and the two cross once; otherwise $\pi' < 0$ on the whole range and $y^* = 0$. At the root the marginal buyer has $X_i = y^*$, and $y^* + Ag = A(p^* - c)$ is the present value of the incumbent's margin over its own cost. At $g = 0$ the condition is $y^* = \lambda(y^*)$. (b) With buyer-specific gaps the incumbent solves, for each i, $\max_{y_i}(y_i/A + g)\,\mathbf{1}\{y_i \le X_i\}$, whose solution is $y_i = X_i$ when a buyer indifferent between staying and leaving stays. □

Proof of Remark 1. For Weibull(a, k), $\lambda(y) = k^a y^{1-a}/a$, so $y^* = \lambda(y^*)$ gives $(y^*)^a = k^a/a$ and $F(y^*) = 1 - \exp(-(y^*/k)^a) = 1 - e^{-1/a}$. □

Proof of Proposition 2. A buyer present at the end of the window chose to stay at gap m_T, so $A\,m_T \le X_i$. Hence $\{i : X_i < A\,m_T\}$ is contained in the set of buyers who left, whose share is s. Under (i) $p_0 \ge p_{c,0}$ and under (ii) $p_{c,T} \le p_{c,0}$, so $m_T = p_T - p_{c,T} \ge p_0(1 + \gamma)^T - p_0 = \Delta_T$ and $\{X_i < A\,\Delta_T\} \subseteq \{X_i < A\,m_T\}$. With a feature value v per period the buyer's condition is $A(m_T - v) \le X_i$ and Δ_T is replaced by $\Delta_T - v$. With a wedge w_i the condition is $A\,m_T \le X_i + w_i$ and the bound holds for $X_i + w_i$. (b) A buyer that leaves at date $t \le T$ faces gap $m_t \le m_T$, since the incumbent's price rises and the alternative's does not, and prefers leaving, so $X_i + A\,q_i \le A\,m_t \le A\,m_T$. The leavers are a share s of the base, so at least s satisfies the inequality. (c) With $w_i = 0$ for all i, a buyer stays iff $X_i + A\,q_i \ge A\,m_T$ at the end of the window, so the set $\{X_i + A\,q_i < A\,m_T\}$ is exactly the set of leavers and its share is s. □

Proof of Proposition 3. (a) Immediate from Proposition 1(b): $y_{(i)'} = X_i - \delta$ for every buyer with $X_i \ge \delta$. (b) The retention condition is $y \le X_i - \delta$, so profit is $(y/A + g)(1 - F(y + \delta))$ and the first-order condition, with $z = y + \delta$, reads $z - \delta + Ag = \lambda(z)$. Compare with $y^* + Ag = \lambda(y^*)$. Under the standing assumption $x \mapsto x - \lambda(x)$ is increasing, so each equation has one root and $z > y^*$. Where λ is decreasing on $[y^*, y^* + \delta]$, $(y^* + \delta) - \lambda(y^* + \delta) \ge (y^* + \delta) - \lambda(y^*) = \delta - Ag$, so the increasing function reaches the value $\delta - Ag$ no later than $y^* + \delta$ and $z \le y^* + \delta$. Then $y^* - y' = \lambda(y^*) - \lambda(z) > 0$ because λ is decreasing on $[y^*, z] \subseteq$

$[y^*, y^* + \delta]$, and $y^* - y' < \delta$ because $z > y^*$. Differentiating $y' = \lambda(y' + \delta) - Ag$ in δ gives $dy'/d\delta\,(1 - \lambda'(z)) = \lambda'(z)$, so $dy'/d\delta = \lambda'(z)/(1 - \lambda'(z))$, where the denominator is positive by the standing assumption, which is the second-order condition at the root. With $\lambda' < 0$ this gives $\rho = -dy'/d\delta = |\lambda'|/(1 + |\lambda'|) \in [0, 1)$. The leaving share is $F(y' + \delta) = F(z) > F(y^*)$. (c) Where λ is increasing on $[y^*, y^* + \delta]$, $y^* - y' = \lambda(y^*) - \lambda(z) < 0$, so $y' > y^*$, while the derivative $\lambda'(z)/(1 - \lambda'(z))$ is positive because $0 < \lambda'(z) < 1$. The leaving share $F(z)$ rises with both terms. Without the standing assumption the first-order condition can have several roots, the global maximiser can move from one to another as δ varies, and none of the above constrains the finite change. The corollary follows from $\delta = 0$ in (b) and from $F(z) - F(y^*) \leq F(y^* + \delta) - F(y^*)$, since $z \leq y^* + \delta$. □

Proof of Proposition 4. A single buyer has measure zero in F, so the incumbent's posted-price problem and its solution y^* are unchanged by δ_i. Buyer i stays at the same markup if $X_i - \delta_i \geq y^*$, with a return of zero, and leaves if $X_i - \delta_i < y^*$, with a return of $y^* - (X_i - \delta_i)$, the gap it no longer pays net of the exit cost it now pays. A reduction common to the base changes F and hence y^* by Proposition 3. Under buyer-specific pricing $y_i = X_i$, so $dy_i/dX_i = 1$ for the buyer's reductions and for the incumbent's increases alike. □

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