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Reputation Portability and Endogenous Recognition in Platform Competition

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Abstract

Digital labor platforms make reputation valuable but platform-specific. Portability rights allow workers to export ratings, yet a destination platform may recognize imported reputation only imperfectly. This paper models an entrant that invests in recognizing imported reputation and an incumbent that chooses costly source-side recognition friction before the two platforms compete in fees for workers with heterogeneous switching costs. Effective recognition shifts workers and operating profit toward the entrant and compresses the fee gap; these effects extend to log-concave switching-cost distributions when the equilibrium switching threshold is interior. Under stated concavity and monotonicity conditions, the recognition stage has a unique equilibrium in which recognition and friction are strategically linked. Raising the cost of friction crowds in recognition, whereas stronger formal portability raises incumbent friction in the interior region, so equilibrium

effective recognition can rise less than proportionally or even fall. Purely strategic friction is socially excessive in a first-best benchmark and, under a stated condition, at the market allocation. Formal portability and effective recognition are therefore distinct policy objects.

Keywords: digital labor markets; interoperability; platform competition; reputation portability; reputation recognition; switching costs

JEL Classification: D43; D83; J24; L13; L40; L86

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Plain Language Summary

Giving workers the right to export their ratings does not guarantee that another platform will actually use them. This paper models that gap. A new platform can invest in verifying and interpreting imported reputation, while an established platform may retain technical or organizational frictions that make recognition harder. Better recognition strengthens entry and narrows fee differences. But a stronger legal right to export ratings can also provoke more resistance from the incumbent, so the share of a worker's history that a rival actually recognizes may rise by less than the legal change suggests, and can even fall. Policies that make source-side friction more costly work in the opposite direction: they reduce friction directly and encourage entrants to invest more in recognition.

1. Introduction

Reputation is an economic asset in digital labor markets. Ratings, completed tasks, client feedback, and verified histories reduce uncertainty about worker quality and shape hiring, prices, visibility, and access to future transactions (Pallais, 2014; Tadelis, 2016). When that reputation is platform-specific, however, leaving a platform can mean abandoning part of an accumulated market position. Ciotti, Hornuf, and Stenzhorn (2025) show theoretically and experimentally that such reputation lock-in creates switching costs and allows an incumbent platform to capitalize on them through fees.

This paper asks what happens after a portability right exists. A record can be legally or technically transferable without becoming an economic substitute for native reputation on a destination platform. Imported ratings may be discounted because provenance is difficult to verify, rating taxonomies differ, prior tasks are only partially comparable, or older performance is less informative. Experimental evidence is consistent with this recognition gap: imported ratings can increase demand while receiving less weight than ratings generated on the destination platform (Tran Nhat, Thäter, and Teubner, 2024; see also Hesse and Teubner, 2020).

The distinction matters for policy because portability rules increasingly reach platform-work data. Beyond the general right to data portability in Article 20 of the General Data Protection Regulation, Article 9(6) of Directive (EU) 2024/2831 gives persons performing platform work a right to the portability of personal data generated through their work in the context of automated monitoring or decision-making systems, including ratings and reviews. Yet the right to move a record does not determine how a competing platform will authenticate, map, calibrate, and use it. Effective recognition can therefore remain strategic even when formal transferability is high.

The model has an incumbent platform, an entrant, and workers who have accumulated a reputation stock on the incumbent and differ in switching costs. Before fee competition, the entrant chooses recognition investment q, which makes imported reputation verifiable and economically usable, while the incumbent simultaneously chooses source-side recognition friction s, which reduces that usability. Effective recognition is the product of formal transferability, contextual and temporal relevance, entrant recognition, and incumbent-side friction. Platforms then compete in fees and workers choose where to participate.

The first set of results concerns competition once recognition is fixed. In the uniform switching-cost benchmark, stronger effective recognition shifts workers and operating profit toward the entrant, lowers the incumbent fee, raises the entrant fee, and compresses the fee gap. With an interior switching threshold, the market-share and fee-gap results extend to log-concave switching-cost densities, while the individual fee responses hold weakly. With fixed incomplete recognition, a larger reputation stock strengthens incumbent advantage; this effect reverses only if recognition responds sufficiently elastically to reputation value, a condition the paper states explicitly and shows is not met by the endogenous recognition response in its quadratic-cost benchmark.

The second set of results concerns recognition architecture. Under the maintained concavity and monotonicity assumptions, the recognition stage has a unique equilibrium, interior or corner: the entrant's recognition best response is decreasing in incumbent friction, while the incumbent's friction best response is increasing in entrant recognition. Raising the marginal cost of source-side friction therefore reduces friction and crowds in entrant recognition. At an interior equilibrium, stronger formal portability strictly raises incumbent friction, so legal or technical transferability need not pass through one-for-one into equilibrium recognition: the pass-through

elasticity can lie below one, be negative, or exceed one, and all three cases arise in the numerical benchmark. A limited welfare analysis adds two signed results. When friction only destroys useful recognition, it is socially excessive at the first-best allocation; at the market allocation, the same conclusion holds whenever the entrant's reputation-adjusted advantage exceeds a stated threshold, because fee-induced excess switching otherwise gives friction an offsetting second-best role.

The contribution is not the general claim that portability reduces switching costs or that compatibility can be strategic. Those mechanisms are established in the switching-cost and interoperability literatures (Klemperer, 1987; Farrell and Klemperer, 2007), including the result that a dominant network may degrade interconnection quality with a rival (Crémer, Rey, and Tirole, 2000). The contribution is to separate formal transferability from economic recognition for an installed stock of professional reputation and to make the recognition wedge an equilibrium outcome of asymmetric, two-sided platform investment before fee competition. Unlike interconnection-quality models, in which one firm controls a single compatibility parameter, recognition here is jointly produced: the destination platform must invest to read the record, and the source platform can make it harder to read. This structure generates an endogenous effective-recognition rate, an asymmetric fee response, a reduced-form threshold at which reputation changes from an incumbent advantage into an entrant-attraction force, and non-proportional strategic pass-through from formal portability to market recognition.

The closest benchmark is Ciotti et al. (2025), who analyze reputation lock-in and a portability regime in which transferred ratings are available after switching. The present paper moves one stage downstream and asks how much transferred reputation is actually recognized once firms can invest on opposite sides of the recognition process. The remainder of the paper is organized as follows. Section 2 reviews related work. Section 3 sets out the environment. Section 4

characterizes fee competition, and Section 5 the recognition stage. Section 6 maps the equilibrium regions numerically, Section 7 discusses welfare and policy, Section 8 discusses limitations, and Section 9 concludes.

2. Related Literature and Contribution

2.1 Reputation as market capital

Online-feedback systems reduce information asymmetry by aggregating transaction histories into market signals. Dellarocas (2003) emphasizes that the architecture of online feedback affects incentives and trust, and Tadelis (2016) surveys reputation and feedback systems in online platform markets. Resnick et al. (2006) show experimentally that established seller reputation commands a willingness-to-pay premium. Cabral and Hortaçsu (2010) and Saeedi (2019) document how feedback and reputation affect seller dynamics, prices, and market composition. Bar-Isaac and Tadelis (2008) and Board and Meyer-ter-Vehn (2013) provide theoretical foundations for reputation under hidden information and learning.

In online labor markets, reputation is tied directly to access to work and future earnings. Pallais (2014) shows that information about workers' past performance has substantial value for entry-level workers in an online labor market. Kokkodis and Ipeirotis (2016) show that reputation transferability depends on task context and that worker quality can evolve over time. Lin, Liu, and Viswanathan (2018) show that reputation affects client contracting decisions in customized production. These findings motivate the paper's treatment of R as an economically valuable stock without requiring the stronger legal claim that reputation is conventional property.

2.2 Reputation lock-in and worker switching

Ciotti et al. (2025) provide the most direct benchmark. Their model and lab-in-the-field experiment show that platform-specific reputation creates switching costs, allows a platform to capitalize on lock-in through fees, and makes highly rated workers less willing to switch. Under their reputation-portability regime, transferred ratings are available after switching, switching rises, and lock-in capitalization is reduced. The present paper accepts this lock-in mechanism but relaxes the implicit full-recognition step: a record may be portable while the destination platform recognizes only part of its economic value.

This distinction matters because portability can be technologically or legally complete while economic substitutability remains incomplete. The entrant must decide how much to invest in interpreting external reputation; the incumbent may have incentives to preserve incompatibility. The competitive margin is therefore not only the worker's switching decision but also the firms' prior investment in market legibility.

2.3 Imported reputation and contextual recognition

Tran Nhat et al. (2024) show experimentally that imported rating volume has a positive demand effect but is discounted relative to onsite rating volume, and Hesse and Teubner (2020) review the technical and institutional obstacles to cross-platform reputation portability. These results suggest that transferred reputation need not retain its source-market value. Kokkodis and Ipeirotis (2016) provide a complementary mechanism: reputation should be conditioned on task similarity, and historical observations can lose predictive value as worker quality changes.

The present model does not claim that contextual discounting or task-specific transferability is new. Instead, it turns the empirically observed recognition wedge into a strategic platform choice and embeds it before fee competition. The distinctive question is therefore not

whether imported reputation matters, but who determines how much it matters, how that choice interacts with incumbent-side friction, and how the resulting effective-recognition rate changes fees, market shares, and entry incentives.

2.4 Data portability, interoperability, and platform competition

The broader platform-competition literature shows that portability and compatibility affect both user switching and firm strategy. Klemperer (1987) and Farrell and Klemperer (2007) provide the standard switching-cost foundations. Crémer et al. (2000) show that a larger network can gain from degrading the quality of its interconnection with a smaller rival, and the raising-rivals'-costs logic of Salop and Scheffman (1983) applies directly to incumbent-side friction that increases the cost of using an exported record. Jeon, Menicucci, and Nasr (2023) show that compatibility or incompatibility can be chosen strategically and that data portability changes those incentives. Kim (2026) analyzes regulation that jointly imposes data portability and interoperability in a duopoly platform model, where the policy removes switching costs, enlarges network benefits, and can increase data-breach risk. OECD (2021) reviews the policy design of portability and interoperability measures. These contributions establish that interoperability design has strategic and welfare consequences, but they do not endogenize the degree to which a transferred professional reputation stock is recognized by a destination platform, nor do they model recognition as the joint outcome of destination-side investment and source-side friction.

Lam and Liu (2020) show that portability need not mechanically facilitate entry because it can change ex ante incentives. Li and Zhang (2026) similarly show that portability can reshape firms' incentives to collect personal data before switching occurs. These results reinforce the broader point that portability changes strategic investment as well as ex post mobility.

These studies caution against treating portability as a frictionless policy switch. The present paper isolates a different implementation margin: formal transfer can be complete while economic recognition remains partial. By assigning destination-side recognition to the entrant and source-side recognition friction to the incumbent, the model makes the effectiveness of portability itself an equilibrium object rather than an exogenous regime label.

2.5 Contribution

The paper's contribution is a reputation-specific strategic-recognition game over an installed stock of professional reputation. The novelty is the separation of formal transferability from economic recognition and the asymmetric investment game that determines the wedge between them before fee competition. This structure yields four results that the closest literatures do not jointly characterize: (i) an endogenous effective-recognition rate, with a unique equilibrium, rather than a binary portability regime; (ii) a fee-gap response to recognition that need not imply a uniform fee decline; (iii) a recognition-elasticity condition under which accumulated reputation can shift from an incumbent lock-in force to an entrant-attraction force; and (iv) non-proportional strategic pass-through, because stronger formal portability raises the incumbent's incentive to preserve source-side recognition friction. The model therefore shifts the policy question from whether reputation can be exported to whether exported reputation becomes competitively usable, and by whom that usability is determined.

A broader normative account of portable, purpose-limited professional standing appears in Kwag (2026, ch. 11). The present paper develops a distinct economic mechanism: destination-side recognition and source-side friction are modeled as strategic platform choices that jointly determine the competitive value of an inherited reputation stock.

The model also nests the closest benchmark cases. If $q = 1$ and $s = 0$, transferred reputation is fully recognized up to the exogenous context and age terms, reproducing the logic of a portability regime with no strategic recognition wedge. If q is fixed, the model becomes a partial-recognition switching-cost model without endogenous destination investment. If $s = 0$, only entrant recognition is strategic. The distinctive predictions on crowd-in and non-proportional pass-through require both q and s to be endogenous.

3. Environment and Recognition Technology

There are two platforms, an incumbent I and an entrant E, and a unit mass of workers initially associated with I. Every worker has accumulated the same reputation stock $R > 0$ on I; heterogeneity in R is discussed in Section 8. The model is a one-way entry problem: the incumbent controls the source environment in which the installed reputation was produced, while the entrant decides how intensively to recognize imported evidence. This asymmetry follows from the timing of the economic object rather than from an assumption that platforms are intrinsically different: at the start of the game, the legacy reputation stock exists only on I, so only I can affect the source-side usability of that inherited record, while E controls its destination-side recognition. A symmetric two-way game would require reputation stocks on both platforms and reciprocal migration, which is a distinct extension. The model begins after reputation has been created; endogenous reputation formation is left for later analysis.

Timing. In Stage 1, the entrant chooses recognition $q \in [0,1]$ and the incumbent chooses source-side friction $s \in [0,1]$, simultaneously and noncooperatively. In Stage 2, having observed (q, s), the platforms simultaneously set per-worker fees f_I and f_E. In Stage 3, each worker chooses a platform. The solution concept is subgame-perfect equilibrium.

Let $a > 0$ denote the market return to recognized reputation and define $h \equiv aR$. A worker receives baseline opportunity y_I on I and y_E on E. Worker i has idiosyncratic switching cost c_i, distributed uniformly on [0, C] in the benchmark; Section 4.5 relaxes this assumption.

3.1 Aggregate recognition technology

Effective recognition is the fraction of the incumbent reputation stock that becomes economically usable on the entrant:

$$T = \bar{\varphi}\,(1 - s)\,q\,\chi\,e^{-\delta\tau} \in [0, 1]. \tag{1}$$

The terms have distinct interpretations. $\bar{\varphi} \in (0, 1]$ is maximum legal or technical transferability. The incumbent chooses source-side recognition friction $s \in [0, 1]$, and the entrant chooses recognition investment $q \in [0, 1]$. Contextual compatibility is $\chi \in (0, 1]$, and $e^{-\delta\tau}$ captures the temporal relevance of transferred evidence of age $\tau \geq 0$ that decays at rate $\delta \geq 0$.

3.2 Credential-level microfoundation and empirical interpretation

The scalar choices q and s summarize a more granular credential-processing problem. Suppose the transferred reputation record contains many fine-grained professional-history components (for example, completed tasks, ratings, review text, timestamps, task categories, and provenance fields) whose weighted contribution aggregates to the installed reputation stock R. Formal or technical portability determines the share of that record that can be exported. Conditional on export, source-side design determines how much of the record remains verifiable and semantically mappable, while the destination platform determines how intensively it verifies provenance, maps source taxonomies into its own task ontology, calibrates external scores, and incorporates the resulting signal into ranking or contracting decisions. When component-level usability is multiplicative and independent across the export, source, destination, context, and age

stages, and the record is sufficiently fine-grained for a law of large numbers to apply, the expected usable share aggregates to $\bar{\varphi}(1 - s)q\chi e^{-\delta\tau}$, yielding equation (1). Thus q and s are reduced-form sufficient statistics for a credential-processing pipeline rather than literal one-dimensional engineering controls.

This microfoundation also clarifies the asymmetry of the strategic choices. The entrant can raise q through verification infrastructure, schema crosswalks, fraud screening, task-similarity models, and calibration of imported evidence. The incumbent can raise s through proprietary or weakly documented taxonomies, incomplete provenance metadata, access limits, delayed compatibility investment, or other design choices that increase the cost of making exported reputation economically legible. Neither platform controls χ or the temporal discount $e^{-\delta\tau}$: those terms capture genuine limits on comparability that arise from task context and aging rather than strategic incompatibility.

The same decomposition provides an empirical mapping. Destination-side recognition q can be proxied by the fraction of imported fields successfully verified and mapped, the acceptance rate of external credentials, or the weight placed on imported relative to native reputation in ranking and contracting. Source-side friction s can be proxied by metadata completeness, schema divergence, access latency or limits, and the manual remediation required before an exported record becomes usable. These observables need not identify q and s separately in every setting, but they generate testable predictions about which side of the recognition pipeline responds to changes in portability mandates, technical standards, or enforcement costs.

For compactness, define

$$B \equiv \bar{\varphi}\,\chi\,e^{-\delta\tau} \in (0, 1], \quad G \equiv hB, \quad \text{so that } T = B(1 - s)q. \tag{2}$$

Worker utility is

$$U_I(i) = y_I + h - f_I, \tag{3}$$

$$U_E(i) = y_E + hT - f_E - c_i. \tag{4}$$

Define the entrant's reputation-adjusted baseline advantage

$$A \equiv (y_E - y_I) - h(1 - T) = A_0 + G(1 - s)q, \tag{5}$$

$$A_0 \equiv (y_E - y_I) - h. \tag{6}$$

Worker i switches when

$$c_i \leq A + f_I - f_E. \tag{7}$$

When $0 < A + f_I - f_E < C$, entrant and incumbent shares are

$$D_E = (A + f_I - f_E)/C, \quad D_I = 1 - D_E. \tag{8}$$

Maintained assumptions. (A1) Fee interiority: $-C < A_0$ and $A_0 + G < 2C$, so the Stage-2 fee game is interior for every $(q, s) \in [0,1]^2$. (A2) Own-strategy concavity: $\kappa_E > 2G^2/(9C)$ and $\kappa_I > 2G^2/(9C)$, where κ_E and κ_I are the curvature parameters of the Stage-1 cost functions defined in Section 5. (A3) Monotone incumbent incentive: $2C - A_0 > 2G$. Assumption (A3) implies the second inequality in (A1). The piecewise monopoly corners of the fee game remain part of the model but lie outside the region in which the main results are stated.

4. Fee Competition

Stage-1 recognition and source-side-friction costs are sunk when fees are chosen. Platform marginal cost per worker is normalized to zero, so Stage-2 operating profits are

$$\pi_I^F = f_I D_I, \quad \pi_E^F = f_E D_E. \tag{9}$$

Inside the competitive region, simultaneous fee choice gives

$$f_I^* = (2C - A)/3, \quad f_E^* = (C + A)/3, \tag{10}$$

$$D_I^* = (2C - A)/(3C), \quad D_E^* = (C + A)/(3C), \tag{11}$$

$$\pi_I^{F*} = (2C - A)^2/(9C), \quad \pi_E^{F*} = (C + A)^2/(9C). \tag{12}$$

The equilibrium fee gap is $f_I^* - f_E^* = (C - 2A)/3$. The complete nonnegative-fee equilibrium is piecewise: if $A \le -C$, the entrant attracts no workers; if $-C < A < 2C$, the market is interior; if $A \ge 2C$, the entrant attracts the entire market. Under (A1), the propositions below refer to the interior region.

4.1 Recognition reallocates market share and compresses the fee gap

Because $\partial A/\partial T = h$,

$$\partial D_E^*/\partial T = h/(3C) > 0, \quad \partial D_I^*/\partial T = -h/(3C) < 0, \tag{13}$$

$$\partial f_E^*/\partial T = h/3 > 0, \quad \partial f_I^*/\partial T = -h/3 < 0, \tag{14}$$

$$\partial(f_I^* - f_E^*)/\partial T = -2h/3 < 0. \tag{15}$$

Proposition 1. *In the interior fee equilibrium, greater effective recognition shifts workers toward the entrant, raises the entrant's equilibrium fee, lowers the incumbent's equilibrium fee, and compresses the fee gap.*

The pricing result is intentionally asymmetric. Better recognition strengthens the entrant rather than mechanically reducing every platform fee: the entrant's improved quality allows it to charge more, while competition compresses the incumbent's installed-base premium.

4.2 Recognition reallocates platform profit

$$\partial \pi_E^{F*}/\partial T = 2h(C + A)/(9C) > 0, \tag{16}$$

$$\partial \pi_I^{F*}/\partial T = -2h(2C - A)/(9C) < 0. \tag{17}$$

Proposition 2. *In the interior fee equilibrium, effective recognition increases entrant operating profit and reduces incumbent operating profit.*

Propositions 1 and 2 are the familiar comparative statics of an asymmetric Hotelling-type duopoly; their role here is to supply the Stage-1 incentives analyzed in Section 5.

4.3 Reputation strengthens incumbency under fixed incomplete recognition

If T is fixed and incomplete,

$$\partial A/\partial R = -a(1 - T) < 0, \tag{18}$$

$$\partial D_E^*/\partial R = -a(1 - T)/(3C) < 0. \tag{19}$$

Proposition 3. *When effective recognition is incomplete and exogenous, a larger incumbent reputation stock strengthens the incumbent's installed-base advantage.*

4.4 A recognition-elasticity threshold

Suppose instead that recognition follows a schedule T = T(R) that responds to the value of external reputation. Then

$$dA/dR = a[R\,T'(R) - (1 - T(R))], \tag{20}$$

$$dD_E^*/dR \gtrless 0 \Leftrightarrow R\,T'(R) \gtrless 1 - T(R). \tag{21}$$

Proposition 4. *Under a recognition schedule T(R), a larger common reputation stock changes from a lock-in force into an entrant-attraction force if and only if the elasticity of recognition with respect to reputation exceeds the unrecognized share, R T'(R)/T(R) > [1 − T(R)]/T(R).*

Because R is common to all workers, Proposition 4 is a statement about markets with more valuable reputation stocks, not about which individual worker is most captive. A cross-worker version would require heterogeneity in R.

Remark 1 (endogenous recognition and the threshold). In the full model, $T^* = B(1 - s^*)q^*$ responds to R through G = aRB and $A_0 = (y_E - y_I) - aR$, and the relevant elasticity is that of the

Stage-1 equilibrium. In the benchmark parameterization of Section 6 (with $y_E - y_I = 0.6C$ and $B = 0.8$), the entrant's equilibrium share falls monotonically as h rises over the entire range in which (A1)–(A3) hold, for each of the three interior cost configurations in Table 1. The quadratic-cost recognition response therefore attenuates, but does not reverse, reputation lock-in. The reversal in Proposition 4 requires a recognition technology whose productivity rises with reputation value faster than in the benchmark, for example fixed per-record verification costs or scale economies in validating long histories.

4.5 Robustness to general switching-cost distributions

The uniform distribution makes the fee equilibrium transparent but is not essential. Let switching costs have a continuously differentiable CDF Ψ with density $\psi > 0$ on $[0, \bar{c}]$, and define the switching threshold $z = A + f_I - f_E$, so that $D_E = \Psi(z)$ and $D_I = 1 - \Psi(z)$. The fee first-order conditions imply $f_I = [1 - \Psi(z)]/\psi(z)$ and $f_E = \Psi(z)/\psi(z)$. Define the equilibrium fee gap $m(z) \equiv [1 - 2\Psi(z)]/\psi(z)$. The equilibrium threshold solves

$$H(z) \equiv z - m(z) = A. \tag{22}$$

Whenever $H'(z) = 1 - m'(z) > 0$,

$$dz/dA = 1/[1 - m'(z)] > 0, \quad d(f_I - f_E)/dA = m'(z)/[1 - m'(z)]. \tag{23}$$

Proposition 1′ (general distributions). *Suppose ψ is log-concave and the equilibrium threshold lies in the interior of the support. Then the fee subgame has a unique equilibrium, and greater effective recognition raises the entrant's market share, strictly compresses the fee gap, weakly raises the entrant fee, and weakly lowers the incumbent fee.*

The proof (Appendix B) uses the fact that a log-concave density has log-concave CDF and survival function (Bagnoli and Bergstrom, 2005). Conditional on an interior switching threshold,

log-concavity makes each platform's profit quasi-concave in its own fee, makes Ψ/ψ nondecreasing and $(1 - \Psi)/\psi$ nonincreasing, and hence implies $m'(z) < 0$ and $H'(z) > 1$. The uniform, truncated normal, exponential, and many other common distributions satisfy the condition. For distributions that are not log-concave, the market-share result requires only $H' > 0$, while fee-gap compression requires $m' < 0$ at the equilibrium threshold.

5. Endogenous Recognition and Source-Side Friction

Recognition and source-side friction are chosen before fees. The variable q is a reduced-form measure of destination-side investment in making imported reputation verifiable and economically usable. The variable s is a reduced-form measure of source-side recognition friction under incumbent control, including proprietary taxonomies, metadata design, access limits, or withheld compatibility investment. A positive s need not be unlawful or socially inefficient. Stage-1 costs are

$$K_E(q) = \rho_E\, q + \kappa_E\, q^2/2, \quad \rho_E \geq 0,\ \kappa_E > 0, \tag{24}$$

$$K_I(s) = \rho_I\, s + \kappa_I\, s^2/2, \quad \rho_I \geq 0,\ \kappa_I > 0. \tag{25}$$

The linear terms can represent setup, governance, compliance, expected-penalty, or engineering costs that make a small recognition or friction action costly at the margin. The purely quadratic specification is the special case $\rho_E = \rho_I = 0$.

Substituting the fee equilibrium, Stage-1 profits are

$$\Pi_E = [C + A_0 + G(1 - s)q]^2/(9C) - \rho_E\, q - \kappa_E\, q^2/2, \tag{26}$$

$$\Pi_I = [2C - A_0 - G(1 - s)q]^2/(9C) - \rho_I\, s - \kappa_I\, s^2/2. \tag{27}$$

The marginal-profit functions are

$$F_E(q, s) \equiv \partial\Pi_E/\partial q = 2G(1 - s)(C + A)/(9C) - \rho_E - \kappa_E\, q, \tag{28}$$

$$F_I(q, s) \equiv \partial \Pi_I/\partial s = 2Gq(2C - A)/(9C) - \rho_I - \kappa_I\, s. \tag{29}$$

Their own-derivatives are $F_{E,q} = -\kappa_E + 2G^2(1 - s)^2/(9C)$ and $F_{I,s} = -\kappa_I + 2G^2q^2/(9C)$, both strictly negative on $[0,1]^2$ under (A2).

5.1 Existence and uniqueness of the recognition-stage equilibrium

Theorem 1. *Under (A1)–(A3), the recognition stage has exactly one Nash equilibrium* $(q^*, s^*) \in [0,1]^2$*, interior or corner, and the game has a unique subgame-perfect equilibrium. In this equilibrium* $s^* < 1$*;* $q^* = 0$ *implies* $s^* = 0$*; and if* $q^* > 0$*, then* $s^* > 0$ *if and only if* $\rho_I < 2Gq^*(2C - A_0 - Gq^*)/(9C)$*.*

The intuition is monotonic. Under (A2), each best response is single-valued and continuous. The entrant's best response is nonincreasing in incumbent friction, because a higher s lowers the return to making imported reputation legible. Under (A3), the incumbent's best response is nondecreasing in entrant recognition, because a larger q increases the reputation value that friction can insulate. Because these sign properties hold on the whole strategy square rather than only at interior points, the composite map $q \mapsto q_{BR}(s_{BR}(q))$ is continuous and nonincreasing, so it has exactly one fixed point. Maximal friction can never be an equilibrium: if s = 1, imported reputation is worthless, the entrant sets q = 0, and the incumbent then has no reason to incur any friction cost. A formal proof is in Appendix A.1.

5.2 Recognition and source-side friction interact strategically

The cross derivatives of the marginal-profit functions are

$$F_{E,s} = -2G[C + A + Gq(1 - s)]/(9C) < 0, \tag{30}$$

$$F_{I,q} = 2G[2C - A - Gq(1 - s)]/(9C) = 2G[2C - A_0 - 2Gq(1 - s)]/(9C). \tag{31}$$

Under (A3), $F_{I,q} > 0$ throughout the strategy square.

Proposition 5. *Under (A1)–(A3), recognition and friction are strategic substitutes for the entrant and strategic complements for the incumbent: the entrant's best response is nonincreasing in s (strictly decreasing where interior), and the incumbent's best response is nondecreasing in q (strictly increasing where interior).*

5.3 Raising the cost of source-side friction crowds in recognition

Let $|J| \equiv F_{E,q}F_{I,s} - F_{E,s}F_{I,q}$ denote the Jacobian determinant of (F_E, F_I); under (A2)–(A3) both products are positive, so $|J| > 0$. At an interior equilibrium,

$$dq^*/d\rho_I = -F_{E,s}/|J| > 0, \quad ds^*/d\rho_I = F_{E,q}/|J| < 0, \tag{32}$$

$$dq^*/d\kappa_I = -F_{E,s}s^*/|J| > 0, \quad ds^*/d\kappa_I = F_{E,q}s^*/|J| < 0. \tag{33}$$

Proposition 6. *At an interior equilibrium, raising the marginal cost of source-side friction reduces that friction and increases entrant recognition. At corner equilibria the same comparative statics hold weakly.*

The result has a direct policy interpretation. Enforcement directed at incompatibility or strategic source-side friction need not merely suppress incumbent behavior; it can increase the entrant's private return to building recognition infrastructure.

5.4 Recognition cost reduces both strategic efforts

$$dq^*/d\rho_E = F_{I,s}/|J| < 0, \quad ds^*/d\rho_E = -F_{I,q}/|J| < 0, \tag{34}$$

$$dq^*/d\kappa_E = F_{I,s}q^*/|J| < 0, \quad ds^*/d\kappa_E = -F_{I,q}q^*/|J| < 0. \tag{35}$$

Proposition 7. *At an interior equilibrium, higher recognition cost lowers entrant recognition and, because recognition and friction are strategically linked, also lowers incumbent source-side friction.*

5.5 Formal portability and strategic pass-through

Holding h, χ, δ, and τ fixed, an increase in formal portability $\bar{\varphi}$ raises recognition leverage $G = h\bar{\varphi}\chi e^{-\delta\tau}$ proportionally, $d \ln G / d \ln \bar{\varphi} = 1$, and leaves A_0 unchanged. Absent strategic responses, effective recognition T would rise one-for-one in proportional terms. Define the pass-through elasticity

$$\varepsilon_T \equiv d \ln T^* / d \ln \bar{\varphi} = 1 + (G/q^*)\, dq^*/dG - [G/(1 - s^*)]\, ds^*/dG. \tag{36}$$

Proposition 8. *At an interior equilibrium under (A1)–(A3): (i) greater formal portability strictly increases source-side friction, $ds^*/d\bar{\varphi} > 0$; (ii) its effect on entrant recognition is ambiguous; and (iii) the pass-through elasticity ε_T is strictly less than one if and only if the strategic responses reduce $(1 - s^*)q^*$. Pass-through can be incomplete ($0 < \varepsilon_T < 1$), negative ($\varepsilon_T < 0$), or amplified ($\varepsilon_T > 1$).*

Part (i) holds because a larger G raises the incumbent's marginal gain from friction both directly and through its complementarity with recognition (Appendix A.3). Part (ii) reflects the entrant's larger direct gain from recognition, offset by the incumbent's stronger friction response. Section 6 shows that each of the three cases in part (iii) arises in the benchmark parameterization. This proposition is the central distinction between formal portability and effective recognition as an equilibrium object: a stronger legal right to export reputation can, through the incumbent's response, leave the economically usable share of that reputation lower than before.

5.6 Corner equilibria

Strict own-strategy concavity permits a complete endpoint classification of each platform's best response. The entrant chooses no recognition when

$$2G(1 - s)(C + A_0)/(9C) \leq \rho_E, \tag{37}$$

and full recognition when

$$2G(1 - s)[C + A_0 + G(1 - s)]/(9C) \geq \rho_E + \kappa_E. \tag{38}$$

The incumbent chooses zero source-side friction when

$$2Gq[2C - A_0 - Gq]/(9C) \leq \rho_I, \tag{39}$$

and would choose maximal friction only if $2Gq(2C - A_0)/(9C) \geq \rho_I + \kappa_I$; by Theorem 1, this last best-response corner is never part of an equilibrium. Because $q^* = 0$ implies $s^* = 0$, the no-recognition equilibrium obtains exactly when $\rho_E \geq 2G(C + A_0)/(9C)$.

The linear marginal-cost terms are important. With a purely quadratic friction cost ($\rho_I = 0$), condition (39) fails whenever $q > 0$, so any equilibrium with positive recognition has strictly positive friction. A positive ρ_I creates an economically plausible zero-friction region.

6. Numerical Equilibrium Regions

The numerical analysis illustrates the analytical regions rather than calibrating the model to a particular platform. Parameters are normalized by $C = 1$. The benchmark sets $h = C$, $B = 0.8$, and $y_E - y_I = 0.6C$, so that $A_0/C = -0.4$ and $G/C = 0.8$, together with $\kappa_E/C = \kappa_I/C = 0.18$. These values satisfy (A2), since $0.18 > 2(0.8)^2/9 \approx 0.142$, and (A3), since $2.4 > 1.6$; hence A remains in the interior fee region for all $(q, s) \in [0,1]^2$. Because Theorem 1 guarantees a unique equilibrium, each point is computed as the unique fixed point of the composite best-response map (Appendix C).

Figure 1 maps the recognition-stage regimes over $\rho_E/C \in [0, 0.20]$ and $\rho_I/C \in [0, 0.32]$. Four regimes appear: interior recognition with interior friction (I); interior recognition with zero friction (II); no recognition and no friction (III), which obtains exactly when $\rho_E/C \geq 2(0.8)(0.6)/9 \approx 0.107$; and full recognition with zero friction (IV), which obtains when friction is very costly (ρ_I/C above roughly 0.28) and recognition is cheap (ρ_E/C below roughly 0.07). Maximal friction never occurs, consistent with Theorem 1.

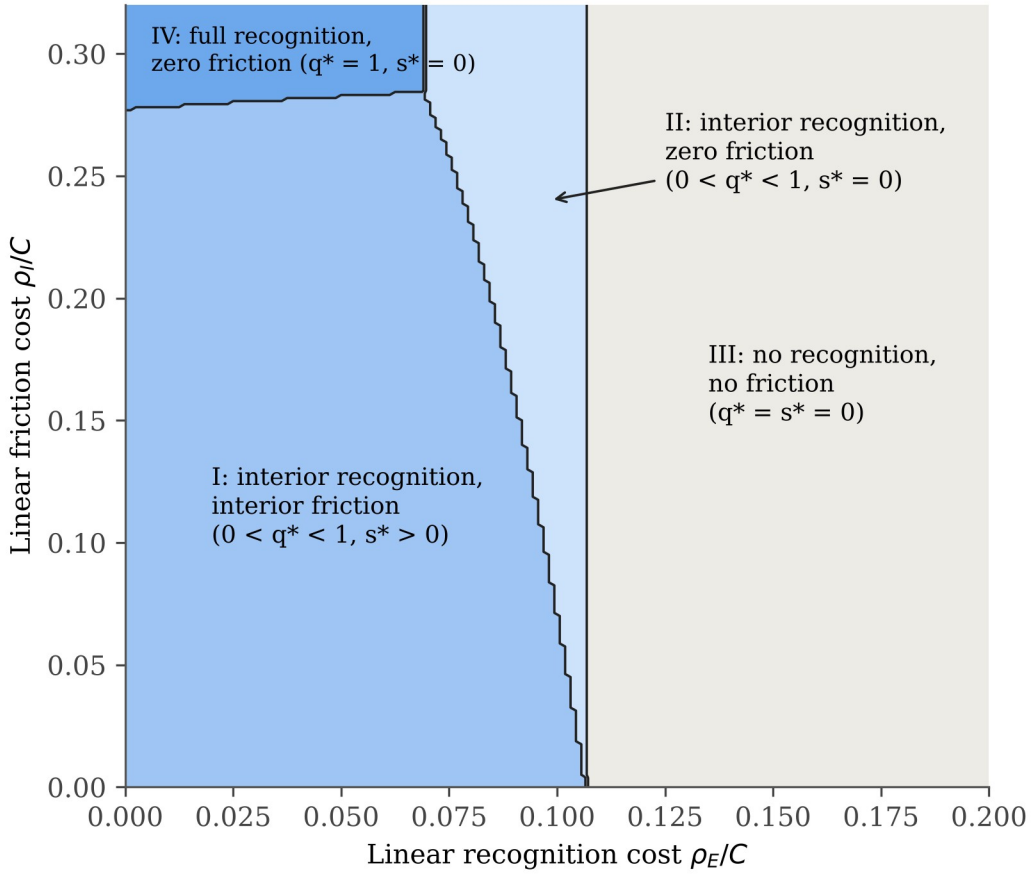

Figure 1. Recognition-stage equilibrium regimes. Benchmark: $A_0/C = -0.4$, $G/C = 0.8$, $\kappa_E/C = \kappa_I/C = 0.18$.

6.1 Source-side-friction enforcement and recognition

Figure 2 holds ρE/C = 0.05 fixed and increases the marginal cost or expected penalty associated with source-side friction. As Proposition 6 predicts, s* falls and q* rises; both strategic responses therefore raise effective recognition T*. At ρI/C ≈ 0.29 the equilibrium reaches full recognition with zero friction.

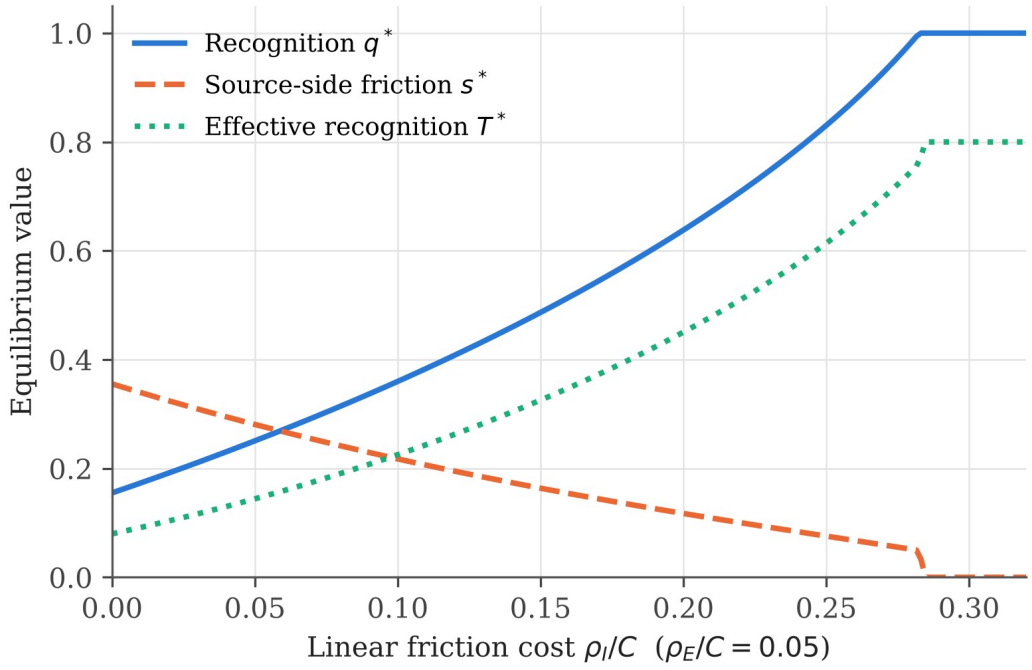

Figure 2. Higher source-side-friction cost reduces s^* and crowds in q^* ($\rho_E/C = 0.05$).

6.2 Recognition cost and strategic withdrawal

When ρ_E rises, recognition becomes less attractive. The entrant reduces q^*, and the incumbent correspondingly reduces s^*. Once recognition shuts down, source-side friction also disappears because there is no portable reputation flow left to block.

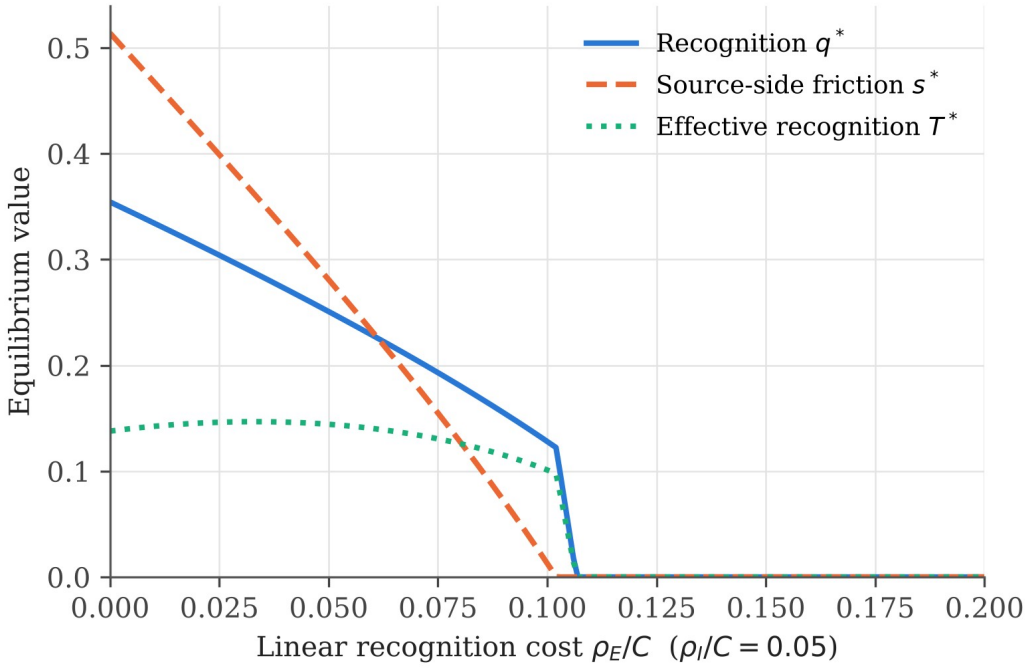

Figure 3. Higher recognition cost lowers both q^* and s^* ($\rho_I/C = 0.05$).

6.3 Formal portability and strategic pass-through

Figure 4 increases recognition leverage G through $\bar{\varphi}$, holding h = C fixed, within the range that preserves (A2), G/C < 0.9. Incumbent source-side friction rises with formal portability in both panels, as Proposition 8(i) predicts. In panel (a), with no linear costs, recognition is nearly flat and effective recognition declines once G/C exceeds about 0.65: at the benchmark G/C = 0.8, $\varepsilon_T \approx -0.44$, so a one-percent increase in formal portability lowers effective recognition by roughly 0.44 percent. In panel (b), with moderate linear costs, $\varepsilon_T \approx 0.29$ at the benchmark, while ε_T exceeds one (about 1.27 at G/C = 0.6) near the boundary at which friction becomes active. Formal portability therefore has non-monotone, and potentially negative, pass-through into equilibrium recognition.

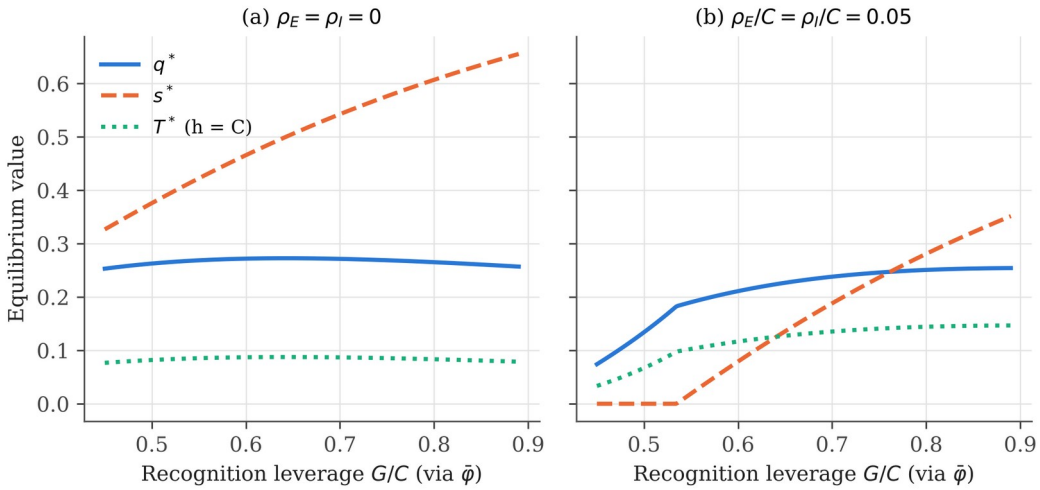

Figure 4. Formal portability raises incumbent friction; effective recognition can rise less than proportionally or fall. Panel (a): $\rho_E = \rho_I = 0$; panel (b): $\rho_E/C = \rho_I/C = 0.05$.

6.4 Benchmark outcomes

Table 1 reports equilibrium outcomes for five cost configurations. Comparing the second and third rows illustrates crowd-in: raising ρ_I/C from 0.05 to 0.12 cuts friction from 0.281 to 0.195 and raises recognition from 0.251 to 0.408, nearly doubling effective recognition. The last column reports the pass-through elasticity of equation (36).

Case	ρ_E/C	ρ_I/C	q^*	s^*	T^*	Fee gap	Entrant share	ε_T
Low marginal costs	0.00	0.00	0.265	0.607	0.083	0.544	0.228	−0.44
Balanced moderate costs	0.05	0.05	0.251	0.281	0.144	0.504	0.248	0.29
High friction penalty	0.05	0.12	0.408	0.195	0.263	0.425	0.288	−0.08
High recognition cost	0.12	0.05	0.000	0.000	0.000	0.600	0.200	—
High costs / no investment	0.15	0.15	0.000	0.000	0.000	0.600	0.200	—

Table 1. Illustrative normalized equilibrium outcomes (C = 1, h = 1, B = 0.8, $A_0 = -0.4$, G = 0.8, $\kappa_E = \kappa_I = 0.18$). $T^* = B(1 - s^*)q^*$; fee gap = $f_I^* - f_E^*$; ε_T is the pass-through elasticity in equation (36), undefined when $q^* = 0$. These are stress-test benchmarks, not empirical calibrations.

7. Welfare and Policy

7.1 Minimal welfare benchmark

Platform fees are transfers between workers and platforms, so they cannot by themselves identify welfare. The private Stage-1 cost $K_I(s)$ may include expected penalties or other transfers,

which should not automatically be counted as social resource costs. For welfare, therefore, the analysis distinguishes the incumbent's private friction cost from the real-resource cost of friction.

Let $x \in [0, 1]$ denote the mass of workers allocated to the entrant, with the lowest-switching-cost workers moving first. Let w_0 denote the real surplus generated by entrant-side allocation absent imported reputation, let $v > 0$ denote the real social return to one unit of effectively recognized reputation, and let B be the non-strategic portability term in equation (2). Under the uniform distribution, the aggregate switching cost of moving mass x is $Cx^2/2$, so welfare is

$$W(x, q, s) = x[w_0 + vB(1 - s)q] - Cx^2/2 - K_E^W(q) - K_I^W(s). \tag{40}$$

Here $K_E^W(q)$ is the real resource cost of recognition and $K_I^W(s) = \omega_I s + \xi_I s^2/2$, with $\omega_I, \xi_I \geq 0$, is the real resource cost of friction. Neither need equal the corresponding private cost in equations (24)–(25). Pure fines, taxes, or damages paid to other domestic agents are transfers and are excluded from K_I^W unless they proxy real enforcement or compliance resources. When private and social valuations coincide, $w_0 = A_0$ and $v = h$, so the bracket in (40) equals A; this case links the welfare benchmark to the positive model.

The planner's allocation is

$$x^W = \min\{1, \max\{0, [w_0 + vB(1 - s)q]/C\}\}. \tag{41}$$

7.2 Purely strategic friction at the first-best allocation

If source-side friction has no direct productive, privacy, security, fraud-prevention, or credential-quality benefit, and its real-resource cost is nonnegative, then for $x > 0$ and $q > 0$,

$$\partial W/\partial s = -xvBq - \omega_I - \xi_I s < 0. \tag{42}$$

Proposition 9. *In the benchmark without a countervailing real benefit from friction, and whenever the planner allocates a positive mass of workers to the entrant, the social*

optimum sets $s^W = 0$. Any private equilibrium with $s^* > 0$ therefore contains excessive friction relative to this benchmark, regardless of whether part of the incumbent's private cost consists of transfer payments such as fines.

The qualification is important. Proposition 9 is a first-best benchmark, not a claim that every interoperability restriction is harmful at the decentralized market allocation. If some restrictions increase security, privacy, fraud prevention, or credential reliability, those benefits must enter the welfare function explicitly.

7.3 Friction at the market allocation

Proposition 9 is a first-best statement: it holds the allocation x at a level a planner would choose. In the market, however, the allocation is D_E^*, which differs from x^W because the fee gap $(C - 2A)/3$ is positive whenever $A < C/2$. With $w_0 = A_0$ and $v = h$, the first-best allocation is $x^W = \max\{0, A/C\}$, whereas $D_E^* = (C + A)/(3C)$; the market therefore allocates too many workers to the entrant whenever $A < C/2$. Friction that reduces switching then has an offsetting second-best effect.

Proposition 10. *Let $w_0 = A_0$ and $v = h$, and let $W^m(q, s)$ denote welfare evaluated at the market allocation D_E^*. Holding q fixed,*

$$\partial W^m/\partial s = -Gq(2C + 5A)/(9C) - \omega_I - \xi_I s. \tag{43}$$

Hence, for $q > 0$, purely strategic friction strictly reduces welfare at the market allocation whenever $A > -2C/5$. When $A < -2C/5$, excess switching induced by the fee gap is large enough that friction can raise welfare.

In the benchmark of Section 6, $A_0 = -0.4C$, so every equilibrium with positive recognition satisfies $A > -2C/5$ and Proposition 10 confirms that friction is welfare-reducing, although only modestly so near A_0. At the same time, $A < 0$ in every benchmark case, so $x^W = 0$: in that

parameterization the first-best allocation keeps all workers on the incumbent, and the welfare value of recognition operates entirely through the switching that the market generates anyway.

7.4 Recognition investment and welfare

With $s^W = 0$, the planner's recognition choice can be characterized directly. For the quadratic real-resource benchmark $K_E^W(q) = \rho_E^W q + \kappa_E^W q^2/2$ and an interior allocation x, substituting (41) into (40) yields

$$q^W = [vBw_0/C - \rho_E^W]/[\kappa_E^W - v^2B^2/C], \quad \text{provided } \kappa_E^W > v^2B^2/C, \tag{44}$$

with truncation to [0, 1]. The sign of $q^* - q^W$ is not generally determined. The entrant maximizes fee profit rather than total matching surplus, while recognition also redistributes market power. In the benchmark, $w_0 = A_0 < 0$ implies $q^W = 0 < q^*$ whenever the allocation stays at the corner $x^W = 0$, so private recognition can exceed the first-best level; the model therefore does not claim that private recognition is too low.

This asymmetry is useful for policy. The welfare case against purely strategic source-side friction is sharper than the welfare case for subsidizing recognition. Regulation can be designed to discourage source-side friction without assuming that a regulator knows the socially optimal intensity of every recognition investment.

7.5 Institutional implications

First, portability rights should be evaluated by effective recognition rather than file transfer alone. A legal right to export ratings can coexist with low T if third parties cannot authenticate, interpret, or use the transferred record.

Second, interoperability enforcement has a two-sided effect: it directly raises the private cost of maintaining source-side recognition friction and indirectly crowds in entrant recognition.

This mechanism suggests that standards, schema compatibility, or rules against strategic incompatibility can affect competition even when they do not mandate equal weighting of imported and onsite ratings.

Third, formal portability can provoke strategic resistance. Proposition 8 shows that stronger legal or technical transferability raises the incumbent's incentive to preserve source-side friction, and Section 6 shows that this response can be strong enough to reduce effective recognition. Portability mandates are therefore most effective when paired with measures that raise the cost of source-side friction, such as metadata and schema standards or provenance requirements.

Fourth, recognition should remain purpose-limited. The model's contextual component χ allows imported reputation to receive less than full weight when prior performance is not relevant to the destination task. Effective portability is not equivalent to universal scoring.

8. Limitations and Extensions

First, the model begins with a sunk reputation stock. Portability can alter ex ante incentives to build reputation, choose effort, or manipulate rating systems. Endogenous reputation formation is an important extension, but incorporating it into the current game would bring the paper substantially closer to the dynamic structure already studied by Ciotti et al. (2025). The present contribution is deliberately located after reputation has been accumulated.

Second, workers differ only in switching costs and hold a common reputation stock, and the fee game models the worker side of the platform while holding client-side terms fixed. This keeps the recognition mechanism transparent but abstracts from two-sided feedback, client multihoming, and cross-side network effects. A fuller two-sided platform model could change fee levels while preserving the core recognition wedge. Workers may also differ in reputation stocks, outside options, occupational fit, and multihoming; heterogeneity in R would allow a cross-worker version

of Proposition 4. Multihoming is especially relevant because it can alter both the level and structure of platform fees (Teh, Liu, Wright, and Zhou, 2023). Section 4.5 shows that the fee-stage results extend to any log-concave switching-cost distribution.

Third, recognition and friction are chosen simultaneously. If source-side design is committed before the entrant invests, the incumbent becomes a Stackelberg leader and internalizes the entrant's recognition response. Because qBR(s) is decreasing and the incumbent's operating profit is decreasing in q, this commitment creates an additional positive marginal incentive to raise s relative to the direct effect, although the global equilibrium comparison depends on parameters. A formal sequential-move analysis is left for future work.

Fourth, recognition investment is summarized by q and source-side friction by s. Section 3.2 provides a credential-level microfoundation in which these variables aggregate verification, schema mapping, provenance, metadata, and access choices, but the model deliberately stops short of specifying a particular engineering standard or protocol. A natural extension would model a verifiable-credential or common-schema standard that changes the productivity of q, the feasible set for s, or both.

Fifth, the model treats the context and age of reputation as exogenous components of B. A richer model could allow platforms to choose context-specific recognition schedules or strategically redefine categories, creating an additional standard-setting game.

Sixth, the welfare analysis is intentionally narrower than the competition analysis. It isolates claims that can be signed without a full model of privacy, security, fraud, or credential quality. Once incompatibility has productive benefits, the optimal s can be positive and becomes application-specific. The paper therefore uses welfare to discipline the interpretation of strategic friction, not to rank portability regimes.

Finally, the equilibrium analysis is strongest under (A1)–(A3), where Theorem 1 guarantees a unique equilibrium. Outside this region, lower curvature can generate multiple recognition-stage equilibria, and the paper makes no uniqueness claim there. The current manuscript is a theory paper; a worker-side experiment or field evidence on recognition rates following portability mandates could test the crowd-in and pass-through predictions.

9. Conclusion

Reputation portability does not end with data export. A transferred record affects competition only when a destination platform can recognize it, and platforms have strategic incentives over that recognition process. This paper therefore treats recognition architecture as part of platform competition rather than as a passive technical detail.

The equilibrium results qualify the usual portability intuition in several ways. In the uniform benchmark, stronger effective recognition improves the entrant's competitive position, raises its fee, lowers the incumbent's fee, and narrows the fee gap. With an interior switching threshold, log-concavity preserves the direction of the market-share shift and fee-gap compression. Accumulated reputation strengthens incumbency when recognition is incomplete, and the recognition response must be strongly elastic for this effect to reverse. Under the maintained Stage-1 conditions, recognition and source-side friction interact in a unique equilibrium, so stronger enforcement against friction crowds in recognition. At an interior equilibrium, stronger formal portability raises the incentive to preserve recognition barriers and can reduce effective recognition.

The policy implication is narrower than a general mandate for interoperability. Formal portability and effective portability are different objects. A regime that gives workers access to their ratings and reviews can improve competition only to the extent that the destination market can

credibly and contextually recognize those records. Conversely, policy aimed at source-side friction can alter private investment incentives on both sides of the market.

The central competition question is therefore not simply whether reputation can cross a platform boundary, but how much of an earned professional history remains economically legible after it crosses, and which firms have incentives to make that boundary easier or harder to traverse.

AI Use Disclosure

The author used OpenAI's ChatGPT and Anthropic's Claude as assistive tools for research organization, literature discovery, language editing, formal-model development and verification, numerical verification, and computational assistance. AI outputs were not treated as authoritative sources or accepted without independent review. The author re-derived the analytical results, checked the numerical results, verified citations against original or publisher sources where available, and reviewed and edited all AI-assisted text. The author takes full responsibility for the accuracy, originality, and scholarly content of the manuscript.

Data Availability Statement

No empirical data were used. Replication code for the equilibria, Table 1, and Figures 1–4 is available from the author upon reasonable request.

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Appendix A. Proofs

A.1 Proof of Theorem 1

Under (A1), the fee subgame is interior for every (q, s), so Stage-1 payoffs are (26)–(27) on the whole square. Under (A2), $\partial^2\Pi_E/\partial q^2 = F_{E,q} \le -\kappa_E + 2G^2/(9C) < 0$ and $\partial^2\Pi_I/\partial s^2 = F_{I,s} \le -\kappa_I + 2G^2/(9C) < 0$, so each payoff is strictly concave in the player's own strategy on [0, 1]. Each best response is therefore single-valued and, by Berge's maximum theorem, continuous.

By (30), $F_{E,s} < 0$ on $[0,1]^2$ because $C + A > 0$ under (A1). By (31) and (A3), $F_{I,q} = 2G[2C - A_0 - 2Gq(1 - s)]/(9C) \ge 2G[2C - A_0 - 2G]/(9C) > 0$ on $[0,1]^2$. Hence Π_E has strictly decreasing differences in (q, s) and Π_I has strictly increasing differences in (s, q) on the whole square. By standard monotone comparative statics, $q_{BR}(s)$ is nonincreasing and $s_{BR}(q)$ is nondecreasing, including at corners; where a best response is interior, implicit differentiation gives $q_{BR}'(s) = -F_{E,s}/F_{E,q} < 0$ and $s_{BR}'(q) = -F_{I,q}/F_{I,s} > 0$.

Define $\varphi(q) \equiv q_{BR}(s_{BR}(q))$. It is continuous and nonincreasing on [0, 1], so $g(q) \equiv q - \varphi(q)$ is continuous and strictly increasing, with $g(0) \le 0 \le g(1)$. Hence g has exactly one zero q^*, and $(q^*, s_{BR}(q^*))$ is the unique Nash equilibrium of the recognition stage. Combined with the unique interior fee equilibrium in every subgame, the subgame-perfect equilibrium is unique.

For the remaining claims: if s = 1, then $F_E(q, 1) = -\rho_E - \kappa_E q < 0$ for $q > 0$, so $q_{BR}(1) = 0$; but $F_I(0, s) = -\rho_I - \kappa_I s < 0$ for $s > 0$, so $s_{BR}(0) = 0 \ne 1$. Hence $s^* < 1$, and $q^* = 0$ implies $s^* = 0$. Finally, for $q^* > 0$, $s^* > 0$ if and only if $F_I(q^*, 0) > 0$, which is the stated inequality. QED.

A.2 Jacobian and comparative statics

$$J = [[F_{E,q}, F_{E,s}], [F_{I,q}, F_{I,s}]], \quad |J| = F_{E,q}F_{I,s} - F_{E,s}F_{I,q} > 0. \tag{A1}$$

Both products in $|J|$ are positive under (A2)–(A3). For a parameter θ, the implicit function theorem at an interior equilibrium gives $(dq^*/d\theta, ds^*/d\theta)' = -J^{-1}(F_{E,\theta}, F_{I,\theta})'$. For $\theta = \rho_I$, $(F_{E,\theta}, F_{I,\theta}) = (0, -1)$, which yields

$$dq^*/d\rho_I = -F_{E,s}/|J| > 0, \quad ds^*/d\rho_I = F_{E,q}/|J| < 0. \tag{A2}$$

For $\theta = \rho_E$, $(F_{E,\theta}, F_{I,\theta}) = (-1, 0)$, which yields

$$dq^*/d\rho_E = F_{I,s}/|J| < 0, \quad ds^*/d\rho_E = -F_{I,q}/|J| < 0. \tag{A3}$$

The κ comparative statics follow by replacing $(0, -1)$ with $(0, -s^*)$ and $(-1, 0)$ with $(-q^*, 0)$. At corner equilibria the weak versions follow from the monotone comparative statics of A.1, since ρ_I lowers the incumbent's marginal return uniformly and ρ_E lowers the entrant's.

A.3 Formal-portability pass-through

Holding A_0 fixed, the direct effects of G on the marginal-profit functions are

$$F_{E,G} = 2(1 - s)[C + A + G(1 - s)q]/(9C) > 0, \tag{A4}$$

$$F_{I,G} = 2q[2C - A - G(1 - s)q]/(9C) > 0, \tag{A5}$$

where the second inequality holds under (A3) for $q > 0$. Therefore

$$ds^*/dG = [F_{I,q}F_{E,G} - F_{E,q}F_{I,G}]/|J| > 0, \tag{A6}$$

$$dq^*/dG = [F_{E,s}F_{I,G} - F_{I,s}F_{E,G}]/|J|, \tag{A7}$$

where the first term in (A7) is negative and the second is positive, so the sign is ambiguous. Since $T^* = (G/h)(1 - s^*)q^*$ and $d \ln G/d \ln \bar{\varphi} = 1$, differentiating $\ln T^*$ gives equation (36). Because $ds^*/dG > 0$, $\varepsilon_T < 1$ if and only if $(G/q^*)dq^*/dG < [G/(1 - s^*)]ds^*/dG$. The numerical values reported in Section 6 and Table 1 establish that $\varepsilon_T < 0$, $0 < \varepsilon_T < 1$, and $\varepsilon_T > 1$ each occur within (A1)–(A3).

A.4 Proof of Proposition 9

For the welfare function (40), holding x and q fixed, $\partial W/\partial s = -xvBq - \omega_I - \xi_I s$, which is strictly negative whenever $x > 0$ and $q > 0$. Hence the constrained social optimum is $s^W = 0$ when friction has no countervailing productive benefit. The proof uses real-resource costs ω_I and ξ_I; expected fines or damages that are pure transfers do not enter this derivative. QED.

A.5 Proof of Proposition 10

With $w_0 = A_0$ and $v = h$, the bracket in (40) equals A, so $W^m = D_E^* A - C(D_E^*)^2/2 - K_E^W(q) - K_I^W(s)$ with $D_E^* = (C + A)/(3C)$. Then

$$dW^m/dA = D_E^* + (A - CD_E^*)\, dD_E^*/dA = (C + A)/(3C) + (2A - C)/(9C) = (2C + 5A)/(9C). \tag{A8}$$

Because $\partial A/\partial s = -Gq$, equation (43) follows. The first-best allocation $x^W = \max\{0, A/C\}$ is below D_E^* if and only if $A < C/2$. QED.

A.6 Recognition benchmark in the welfare model

With $s^W = 0$ and an interior allocation, (41) gives $x = (w_0 + vBq)/C$. Substituting into (40) and using $K_E^W(q) = \rho_E^W q + \kappa_E^W q^2/2$ gives the reduced objective $(w_0 + vBq)^2/(2C) - \rho_E^W q - \kappa_E^W q^2/2$. The first-order condition $vB(w_0 + vBq)/C - \rho_E^W - \kappa_E^W q = 0$ yields (44). The condition $\kappa_E^W > v^2B^2/C$ makes the reduced objective strictly concave on the interior-allocation region; boundary cases, including the kink at $x = 0$, are handled by comparing the interior candidate with the endpoints $q = 0$ and $q = 1$. This derivation does not sign $q^* - q^W$.

Appendix B. General Switching-Cost Distributions

Let $z = A + f_I - f_E$, $D_E = \Psi(z)$, and $D_I = 1 - \Psi(z)$, with density $\psi(z) > 0$. The fee first-order conditions are

$$1 - \Psi(z) - f_I\psi(z) = 0, \quad \Psi(z) - f_E\psi(z) = 0. \tag{B1}$$

Thus $f_I = [1 - \Psi(z)]/\psi(z)$, $f_E = \Psi(z)/\psi(z)$, and $m(z) \equiv f_I - f_E = [1 - 2\Psi(z)]/\psi(z)$. Because $z = A + m(z)$, define $H(z) = z - m(z)$. If $H'(z) = 1 - m'(z) > 0$, the implicit function theorem gives

$$dz/dA = 1/[1 - m'(z)] > 0, \quad d(f_I - f_E)/dA = m'(z)/[1 - m'(z)]. \tag{B2}$$

Proof of Proposition 1′. Suppose ψ is log-concave and the equilibrium switching threshold is interior. Then Ψ and $1 - \Psi$ are log-concave (Bagnoli and Bergstrom, 2005). Hence $\ln \pi I = \ln fI + \ln[1 - \Psi(A + fI - fE)]$ and $\ln \pi E = \ln fE + \ln \Psi(A + fI - fE)$ are concave in own fees where profits are positive, so (B1) characterizes the interior best responses. Log-concavity of Ψ is equivalent to $\psi'\Psi \le \psi^2$, which gives $(\Psi/\psi)' = (\psi^2 - \Psi\psi')/\psi^2 \ge 0$; log-concavity of $1 - \Psi$ gives $[(1 - \Psi)/\psi]' = -[\psi^2 + (1 - \Psi)\psi']/\psi^2 \le 0$. The two derivatives cannot vanish simultaneously, since that would require $\psi' = \psi^2/\Psi > 0$ and $\psi' = -\psi^2/(1 - \Psi) < 0$. Hence $m'(z) = [(1 - \Psi)/\psi]' - (\Psi/\psi)' < 0$ and $H'(z) > 1$ throughout the interior. Thus the interior equilibrium threshold is unique. By (B2), $dz/dA \in (0, 1)$, the entrant's share $\Psi(z)$ rises, and the fee gap strictly falls. Finally, $dfE/dA = (\Psi/\psi)'dz/dA \ge 0$ and $dfI/dA = [(1 - \Psi)/\psi]'dz/dA \le 0$. For the uniform distribution on $[0, C]$, $m(z) = C - 2z$, so $m' = -2$ and $dz/dA = 1/3$, reproducing Section 4. QED.

Appendix C. Numerical Procedure

The numerical exercises in Section 6 are equilibrium stress tests, not empirical calibrations. The benchmark parameters are $C = 1$, $h = 1$, $B = 0.8$ (so $G = 0.8$ at the benchmark), $y_E - y_I = 0.6$ (so $A_0 = -0.4$), and $\kappa_E = \kappa_I = 0.18$; these satisfy (A1)–(A3). For each cost configuration, the best responses $q_{BR}(s)$ and $s_{BR}(q)$ are computed by solving $F_E = 0$ and $F_I = 0$ on $[0, 1]$ with endpoint checks (37)–(39), and the equilibrium is the unique root of $g(q) = q - q_{BR}(s_{BR}(q))$ (Appendix A.1), located by bracketing with tolerance 10^{-13}. Figure 1 uses a 161×257 grid over $\rho_E \in [0, 0.20]$ and $\rho_I \in [0, 0.32]$. Figures 2 and 3 use 201-point sweeps. Figure 4 varies $G \in [0.45, 0.89]$ through $\bar{\varphi}$ with h

fixed, so that (A2) holds throughout. Pass-through elasticities are computed by symmetric finite differences in ln G with step 10^{-5}. Lower-curvature parameterizations that violate (A2) can generate multiple equilibria; those regimes are not used for any comparative-static claim.