



EMPLOYEE RETENTION POLICY AND THE ECONOMIC VALUE OF KNOWLEDGE SPILLOVERS: A SYSTEMATIC REVIEW OF UNITED STATES NON-COMPETE REGIMES AND OPEN TALENT ECOSYSTEMS

HRM VARIABLE: RETENTION AND MOBILITY RESTRICTION → ECONOMIC OUTCOME: SPILLOVER VALUE TO THE ECONOMY

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ABSTRACT

Employee retention is the oldest instrument in the human resource repertoire and the least examined for its external cost. This paper sets the firm-level value of retention against the economy-level value of the knowledge spillovers that employee mobility generates, and asks whether the contractual devices firms use to hold staff in place — post-employment non-compete covenants above all — are worth what the wider economy pays for them. Following a PRISMA-guided protocol, 1,580 records were identified and 48 studies retained, drawn overwhelmingly from the United States, where half a century of accidental and deliberate state-level legal change has produced the only body of credibly identified evidence on the question. The synthesis is unambiguous in direction. Stricter enforceability of mobility restrictions raises firm-appropriable outcomes modestly — intangible investment by roughly 8 per cent and firm-sponsored training by a contested 0 to 7 per cent — while depressing the outcomes through which knowledge reaches the rest of the economy substantially: inventor mobility by 11 to 17 per cent, patenting by 12 to 19 per cent, spinout formation by 6 to 11 per cent and worker earnings by 2 to 4 per cent, alongside a 13 per cent rise in the emigration of the most highly cited inventors out of enforcing states. The asymmetry is structural rather than accidental: the firm's gain is largely a transfer captured from the worker, whereas the economy's loss is a genuine deadweight in the reallocation of human capital. Because the retaining firm internalises the whole of the first and none of the second, the privately optimal restriction is systematically stricter than the socially optimal one, and the gap widens precisely in the knowledge-intensive sectors where spillovers matter most. The paper closes by proposing a four-tier regulatory and managerial framework that preserves genuine appropriability through narrower instruments — compensated garden leave, calibrated non-solicitation, trade-secret enforcement and deferred equity — while removing the blunt post-employment restraint that carries almost the whole of the social cost. For the human resource function the implication is that retention should be re-founded on engagement, empowerment and leadership quality rather than on legal immobilisation.

KEYWORDS: Employee retention, non-compete agreements, labour mobility, knowledge spillovers, human capital externalities, strategic human resource management, innovation policy, talent ecosystems.

I. INTRODUCTION

Every human resource department is measured on turnover. Attrition is a line on the dashboard, replacement cost is a number in the budget, and the manager who loses a critical engineer to a rival is answering for it by the end of the quarter. Nothing in that accounting is wrong. Where an employee carries knowledge, the firm has paid to create, the firm's interest in keeping that employee is real and its investment logic is sound. The difficulty is that the accounting stops at the firm's boundary, and the economics does not.

When a semiconductor architect moves from one Bengaluru or Austin employer to another, the losing firm records a cost. The receiving firm records a gain.

But a third quantity is created that appears on neither ledger: the knowledge the architect carries becomes available to a second organisation without ceasing to be available to the first, and the recombination of that knowledge with a different technological base produces inventions that neither firm would have produced alone. This is the knowledge spillover, and mobility is its principal carrier [1], [2]. A retention policy that succeeds perfectly at the firm level therefore suppresses, at the level of the economy, a form of value the firm was never in a position to capture and is under no obligation to consider.

The human resource literature has treated retention as an unqualified good for as long as it has existed as a field. Talent management is framed as the art of



holding on to scarce human capital [3], [4]; engagement, appraisal fairness and leadership quality are studied as antecedents of intention to stay [5], [6]; and the strategic HRM tradition treats a stable, firm-specific workforce as a source of sustained competitive advantage. None of that is mistaken on its own terms. What is missing is the counterparty. If human capital is the economy's principal growth asset, then a practice that immobilises it is not merely a private cost decision but a public one, and the question of how much retention an economy should permit is a question of policy rather than of management.

The United States is where that question can actually be answered. Its states have, over more than a century, produced an unusually rich set of legal shocks to the enforceability of post-employment mobility restrictions — some deliberate, at least one famously accidental — while holding almost everything else constant. Michigan repealed a 1905 prohibition on non-competes by inadvertence in 1985 [7], Florida made enforcement markedly easier in 1996 [8], Oregon barred non-competes for hourly workers in 2008 and Hawaii for technology workers in 2015 [9], [10]. California has refused to enforce them since 1872 and tightened that refusal again in 2024 [11]. This variation is the closest thing labour economics possesses to a controlled experiment on the price of retention, and it is the empirical spine of this review.

The policy stakes have rarely been higher. In April 2024 the Federal Trade Commission adopted a rule that would have voided almost every existing non-compete in the United States, estimating that some 30 million workers — close to one in five — were covered by one, and projecting more than 8,500 additional new businesses a year, between 17,000 and 29,000 additional patents a year for a decade, and average earnings gains of USD 524 per worker per year [12], [13]. A federal court set the rule aside in August 2024 [14], and in September 2025 the Commission dismissed its own appeal [15]. What remains is a patchwork: five states with outright bans and a sixth legislated, a growing majority with wage thresholds or occupational carve-outs, and a small counter-current — Florida's CHOICE Act of 2025 chief among them — moving decisively the other way [16], [17]. The federal experiment has ended without resolution; the state experiment continues, and the evidence it generates is now abundant enough to synthesise.

This paper is the tenth in a series pairing a single human resource variable with a single economic outcome. Its variable is retention and mobility restriction. Its outcome is the spillover value that mobility delivers to the economy. Four questions organise the review. First, through what mechanisms does employee mobility generate value that the employing firm cannot appropriate? Second, what does the credibly identified United States evidence show about the size and direction of enforceability effects across outcome domains? Third, how large is

the wedge between the privately optimal and the socially optimal degree of restriction, and what determines its width? Fourth, what regulatory and managerial architecture preserves the legitimate appropriability interest without paying the full spillover price? The contribution is threefold: a formal statement of the two-ledger problem in terms an HR practitioner can act on, a quantitative synthesis of the state-level evidence organised by who bears each effect, and a four-tier policy framework that separates the instruments worth keeping from the one that is not.

II. THE ANALYTICAL PROBLEM: TWO LEDGERS

2.1 *The firm's ledger*

A firm that restricts the post-employment mobility of an employee expects four returns. It protects trade secrets and customer relationships from direct transfer to a rival. It lengthens the amortisation period over which training investment can be recovered, which is the classic Beckerian case for restriction and the core of the argument advanced by its most careful defenders [18]. It lowers replacement and search costs. And it weakens the outside option of the employee, which reduces the wage the firm must pay to retain a given quality of worker. The first two are genuine efficiency arguments. The fourth is a transfer: the firm gains exactly what the worker loses, and nothing new is produced. Distinguishing these is the whole of the analysis, because a policy debate conducted as though all four were efficiency gains will systematically overstate the case for restriction.

2.2 *The economy's ledger*

Against the firm's four returns stand five effects the firm has no reason to count. Mobility reallocates workers towards the firms where their marginal product is highest, and restriction blocks that reallocation. Mobility carries tacit knowledge that neither patents nor publications transmit, so that a receiving firm's productivity rises after it hires from a more productive one [19], [1]. Mobility is the dominant route by which new firms are founded, since the overwhelming majority of entrants in knowledge industries are spinouts staffed by people who learned the business elsewhere [20], [21], [22]. Mobility thickens the local labour market, which is itself the reason firms co-locate at all [23], and dense clusters raise the productivity of the individual inventors inside them [24]. And mobility disciplines incumbents, because a firm whose staff can leave must pay and manage accordingly.

The critical property of all five is non-appropriability. The reallocation gain accrues to the receiving firm and to consumers. The spillover accrues to whichever organisation is downstream of the mover. The spinout is by construction a competitor. The cluster externality is shared. None of them is a quantity the restricting firm could capture even if it wished to. It follows that the firm's optimisation problem omits

them entirely — not through error or bad faith, but because they lie outside the boundary of the entity doing the optimising.

2.3 The wedge

Let R denote the intensity of contractual mobility restriction, understood as the product of geographic and functional scope, duration, and the probability that a court will enforce. Let $V_p(R)$ be the firm's net value and $V_s(R)$ the economy's. Because V_s includes the five non-appropriable effects, all of which are decreasing in R , while V_p includes only the four

appropriable ones, $V_s(R) = V_p(R) - W(R)$ where $W(R)$ is the spillover wedge and $W'(R) > 0$. The firm maximises V_p and chooses R^*_p ; the welfare-maximising choice is R^*_s , defined by $V'_p(R) = W'(R)$. Since W' is strictly positive, $R^*_s < R^*_p$ always. Figure 2 renders this geometry. The interval between R^*_s and R^*_p is the over-restriction zone: the range of restriction intensity over which the firm is still gaining and the economy is already losing more than the firm gains.

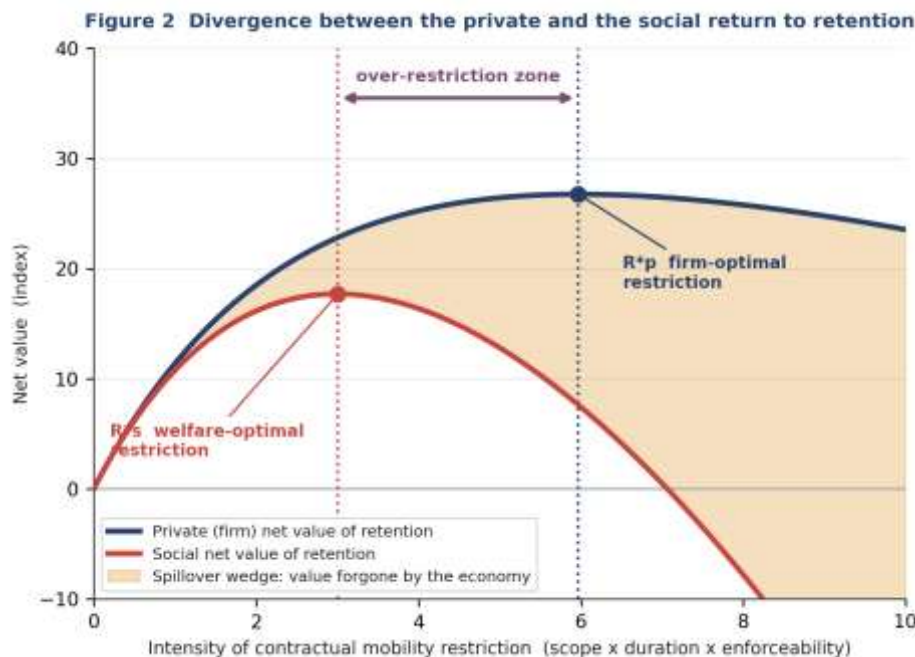


Figure 1 makes the central claim of the paper visible: the firm's optimum and the economy's optimum are never the same point, and the distance between them is the regulatory problem.

Three properties of this wedge matter for policy. It widens with the knowledge intensity of the sector, because spillover value rises with the tacitness and recombinant potential of what the worker knows — which is why the effects are largest for inventors and smallest for routine occupations. It widens with the density of the local labour market, since a restriction in a thin market forecloses few alternative matches while a restriction in Silicon Valley or Bengaluru forecloses many. And it is asymmetric in composition: a substantial part of V_p is the wage-bargaining transfer, which nets to zero in social terms, whereas essentially all of W is deadweight. A restriction that looks value-creating on the firm's ledger can therefore be value-destroying on the economy's even before the spillover is counted.

One further asymmetry is easily missed. Non-compete covenants bind even when unenforceable. Survey and field-experimental evidence shows that workers in states where the courts will not enforce a covenant nonetheless decline competing offers at close to the same rate as workers in states where the courts will, out of legal uncertainty, reputational concern or

plain risk aversion [25], [26]. This behavioural residue means that the wedge is not fully closed by non-enforcement, and that disclosure and information remedies have independent value alongside substantive prohibition.

III. REVIEW METHODOLOGY

The review follows a protocol adapted from the PRISMA 2020 reporting standard [27] and is explicitly a review-and-synthesis design rather than a formal meta-analysis: the retained studies differ too widely in treatment definition, outcome scaling and identifying variation for a pooled effect estimate to be meaningful. What is pooled instead is the direction and the order of magnitude of effects, organised by the party on whose ledger each falls.

3.1 Search and screening

Five databases were searched for the window January 1990 to June 2026: Scopus, Web of Science, EconLit, the SSRN and NBER working-paper series, and HeinOnline for the legal literature. The search string combined a restriction term (non-compete, noncompetition, covenant not to compete, restrictive

covenant, garden leave, non-solicitation, no-poach, training repayment) with an outcome term (mobility, wage, earnings, entrepreneurship, spinout, patent, innovation, productivity, spillover, concentration) and a design term (difference-in-differences, natural

experiment, enforceability index, event study, quasi-experimental). Regulatory dockets — principally the FTC's 2023 rulemaking record — and citation tracking of the retained studies supplied a further 94 records. Figure 1 reports the flow.

Figure 1 Identification and screening of the evidence base

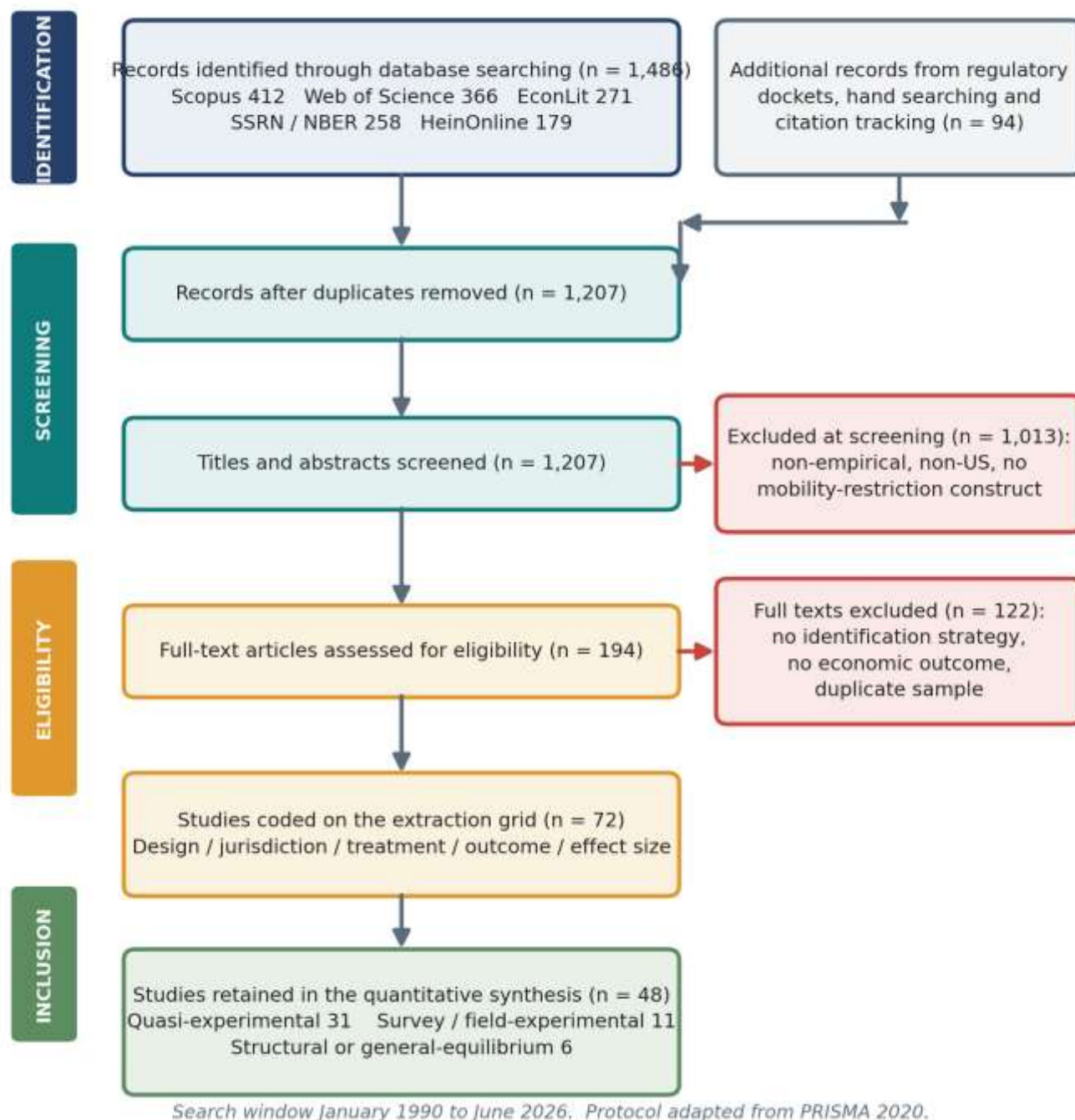


Figure 2 reports identification, screening and inclusion. The comparatively heavy attrition at full-text stage reflects the eligibility rule on identification strategy rather than on topic.

3.2 Eligibility

Studies were retained where four conditions held together. The treatment had to be a change in, or measured variation in, the enforceability or use of a

contractual mobility restriction. The outcome had to be economic rather than attitudinal — a wage, a transition, a patent, a firm entry, a price, an investment — which excluded the large intention-to-quit

literature. The design had to support a causal reading through a policy discontinuity, a defensible enforceability index, a field experiment or a structural model, which excluded cross-sectional correlations of covenant incidence with outcomes. And the setting had

to be the United States, consistent with the analytical decision to build the synthesis on the jurisdiction where identification is possible; non-US material is used in Section X for external validity only. Table 1 states the protocol in full.

Table 1. Review protocol and eligibility criteria

Protocol element	Specification
Review question	How does the enforceability of employee mobility restriction affect the spillover value of knowledge to the economy, relative to its retention value to the firm?
Search window	January 1990 to June 2026
Databases	Scopus; Web of Science; EconLit; SSRN and NBER working-paper series; HeinOnline
Restriction terms	non-compete; noncompetition; covenant not to compete; restrictive covenant; garden leave; non-solicitation; no-poach; training repayment
Outcome terms	mobility; wage; earnings; entrepreneurship; spinout; patent; innovation; productivity; spillover; concentration
Design terms	difference-in-differences; natural experiment; enforceability index; event study; quasi-experimental; field experiment
Inclusion	Treatment is a change in, or measured variation in, enforceability or use of a mobility restriction; outcome is economic; design supports a causal reading; United States setting
Exclusion	Attitudinal outcomes only (intention to quit); cross-sectional incidence correlations; non-US setting (used for external validity only); duplicate samples
Records screened	1,580 identified; 1,207 after de-duplication; 194 full texts assessed; 72 coded; 48 retained in synthesis
Appraisal criteria	Credibility of parallel-trends or exclusion assumption; exogeneity of treatment; treatment of cross-unit spillovers; survival of authors' own robustness checks

3.3 Coding and appraisal

Each retained study was coded on jurisdiction and shock, direction of the legal change, identification strategy, outcome domain, sign and magnitude of the point estimate, the population to which it applies, and the party bearing the effect — worker, firm, or economy. Quality was appraised on four criteria: credibility of the parallel-trends or exclusion assumption; whether the treatment was plausibly exogenous to the outcome; whether spillovers to control units were addressed, which is a serious concern here because firms operate across state lines; and whether the reported effect survived the authors' own robustness checks. Two of the retained studies address the cross-state contamination problem directly and find that state-level estimates, if anything, understate economy-wide effects [28]. Studies failing the first two criteria were retained in the narrative but excluded from the magnitude synthesis reported in Table 3 and Figure 3.

IV. LITERATURE REVIEW

4.1 The knowledge-spillover tradition

The proposition that knowledge diffuses geographically and that its diffusion is economically consequential was established through patent-citation evidence showing that citations are markedly more localised than the underlying distribution of inventive activity would predict [2]. The mechanism was identified shortly afterwards: localisation is

substantially produced by the movement of engineers between firms within a region, so that the knowledge network and the labour market are the same network observed twice [1]. Regional accounts of the divergence between Silicon Valley and Route 128 gave the argument institutional content, attributing the Valley's advantage to a decentralised, permeable industrial structure in which people and ideas circulated freely [29], and a legal reading of the same divergence placed California's refusal to enforce non-compete covenants at the centre of the explanation [30].

Subsequent work established the productivity magnitude rather than merely the fact. Firms that hire from more productive establishments experience measurable and persistent productivity gains, identifying worker flows as a first-order channel of local productivity growth [19]. Inventors who relocate into dense technology clusters become substantially more productive than their own prior trajectory would predict, an effect attributable to the cluster rather than to selection [24]. And the entry literature demonstrated that spinouts founded by employees of incumbents outperform other entrants, because the knowledge they inherit is precisely the knowledge that mobility carries [20], [21], [22]. Taken together, this tradition supplies the numerator of the social ledger: mobility is not merely a labour-market event but the primary transmission mechanism of applied technical knowledge in a market economy.

4.2 The appropriability tradition

The case for restriction rests on a hold-up problem. A firm that invests in general human capital, or that exposes an employee to trade secrets, cannot recover that investment if the employee departs for a rival, and anticipating this it will underinvest or decline to hire. The most rigorous statement of the position argues that reasonable covenants solve a credible-commitment problem, function as indirect compensation for training the employee cannot otherwise pay for, and that the empirical literature purporting to show harm is methodologically weaker than commonly asserted; the appropriate remedy is the common law's reasonableness standard applied under an error-cost framework, not abolition [18]. This position deserves to be engaged rather than dismissed, and parts of it are supported. Enforceability is associated with higher firm-sponsored training [31], with higher intangible investment [28], and with a shift in executive compensation towards fixed salary and in firm behaviour towards longer-horizon investment [32]. Firms in enforcing states also pursue riskier and more novel research projects, consistent with reduced fear of appropriation [33].

Three qualifications weaken the practical force of the argument. First, the training association is fragile: it attenuates or disappears once worker characteristics are controlled for, and the long-run earnings of covered workers are lower rather than higher, so the worker does not appear to capture a return on whatever training occurs [10]. Second, revealed-preference evidence indicates that firms do not in fact value court enforceability very highly — where a statutory earnings threshold makes enforceability purchasable by a modest raise, firms decline to buy it [34]. Third, banning covenants does not increase trade-secret litigation, which is difficult to reconcile with the claim that the covenant is doing essential protective work that other instruments cannot do; strengthened trade-secret law is itself associated with reduced mobility and mixed innovation effects [35].

4.3 The retention tradition in human resource management

The HRM literature approaches the same phenomenon from the inside of the firm, and it is here that the present author's prior work in this series is situated. Early treatments framed talent management as the systematic identification and retention of scarce human capital, positioning retention as the terminal objective of the HR function rather than as one instrument among several [3], and examined the specific problem of retaining high-potential employees as a route to durable competitive advantage [4]. That framing was subsequently qualified from within. Evidence on performance appraisal and engagement in Indian organisations showed that recognition, feedback quality, perceived fairness and managerial support are what actually bind employees to an organisation, with fairness emerging as the strongest

single correlate of engagement [5] — a finding that locates retention in the psychological contract rather than in the legal one.

The same direction of travel runs through the more recent work. Leadership quality and the deliberate management of workforce burnout are shown to operate on retention and performance simultaneously, so that the organisations losing people fastest are frequently those whose leadership practice has degraded rather than those whose contracts are weakest [6]. Delegated authority and decision rights are found to shape retention through the sense of ownership they confer [36], and the systematic study of employee perspectives on Bengaluru's startup and MSME employers documents that mobility decisions in a dense technology cluster turn on growth opportunity, autonomy and learning far more than on compensation alone [37]. The strategic HRM literature has since extended this to the macro level, arguing that skill diversification and labour-market fluidity are constitutive of economic resilience rather than threats to it, and that firms which respond to technological disruption by locking in their existing workforce forgo the reconfiguration that resilience requires [38].

Three further strands complete the picture. Work on talent designation and social comparison shows that formal high-potential labelling generates measurable growth effects but also comparison costs among those not designated, so that the internal architecture of retention has distributional consequences inside the firm [39]. Work on future-ready organisational design treats leadership capability and continuous capability-building as the primary retention technologies of the coming decade [40], while analysis of AI-enabled hiring analytics shows how rapidly the cost of replacing a departing employee is falling as matching technology improves — a shift that mechanically reduces the value of the retention motive itself [41]. Studies of enterprise systems implementation in the Indian higher-education sector make the parallel point that institutional knowledge increasingly resides in codified systems rather than exclusively in individuals, which further weakens the case for restraining the individual [42]. Work on women micro-entrepreneurs in Karnataka approaches the same question from the founder's side, documenting how many small enterprises originate in the prior employment of their founders and how sensitive that founding decision is to the constraints the founder carries out of the previous job [43].

The cumulative implication of this body of work is that the HRM tradition has already, on its own evidence and without reference to the economics of spillovers, arrived at the conclusion that legal restraint is a weak retention technology relative to engagement, leadership and opportunity. What it has not done is price the external cost of using it anyway. That is the gap this paper addresses.

4.4 The research gap

Three gaps are apparent. The economics literature measures the effects of enforceability with increasing precision but treats the firm's retention decision as a black box, saying little about which HR practices substitute for legal restraint. The HRM literature analyses retention practice in detail but stops at the firm boundary and does not price the externality. And the policy literature, sharply polarised by the FTC rulemaking, has tended to argue for or against a single instrument rather than to array the available instruments on a common efficiency plane. This review addresses all three by synthesising the

economic evidence on the party bearing each effect, connecting it to the HRM practice literature on substitutes, and organising the instruments into a tiered framework.

V. EVIDENCE FROM THE UNITED STATES STATE EXPERIMENTS

Five jurisdictions supply the identifying variation on which the modern literature rests. Table 2 summarises them; the discussion that follows draws out what each contributes that the others cannot.

Table 2. The United States state natural experiments: design and headline results

Jurisdiction and shock	Direction	Identification	Headline economic result	Source
Michigan, 1985 Antitrust Reform Act (inadvertent repeal of the 1905 ban)	Tightening	Difference-in-differences against continuously non-enforcing states; 98,468 inventors, 1963–2006	Inventor mobility falls 8.1%; 15.4% for high firm-specific human capital; 16.2% for highly specialised inventors	Marx, Strumsky and Fleming (2009)
Michigan, 1985 (same shock, emigration outcome)	Tightening	Coarsened exact matching on inventor and patent characteristics	Relative emigration risk to non-enforcing states rises; ~187% higher for highly cited and ~236% for highly collaborative inventors	Marx, Singh and Fleming (2015)
Florida, 1996 statute narrowing judicial discretion to refuse enforcement	Tightening	State-level difference-in-differences on establishment and entry data	Large-firm employment share rises; new-firm entry and business dynamism fall; product-market concentration increases	Kang and Fleming (2020)
Oregon, 2008 ban on non-competes for hourly workers	Loosening	Difference-in-differences with within-state hourly / salaried contrast	Hourly wages rise 2–3% across hourly workers, implying 14–21% for those actually bound; job-to-job mobility and occupational status rise; gains strongest for women	Lipsitz and Starr (2022)
Hawaii, 2015 ban for technology workers	Loosening	Triple difference: state × technology occupation × time	New-hire wages rise ~4%; mobility rises ~11%; covered workers show lower earnings growth over 8+ years	Balasubramanian, Chang, Sakakibara, Sivadasan and Starr (2022)
California, non-enforcement since 1872; S.B. 699 and A.B. 1076 extend it in 2024	Standing regime	No within-state shock; interpretive and descriptive only	Cluster formation consistent with the spillover account but not identified by it; covenants still widely used despite unenforceability	Gilson (1999); Saxenian (1994); Colvin and Shierholz (2019)
Nationwide enforceability indices, 1991–2023	Continuous variation	Panel variation in coded judicial doctrine; corporate-network and technology-exposure designs	Patenting falls 12–19% over ten years; entry, spinout creation and job creation fall; firm R&D rises but is more than offset	Johnson, Lipsitz and Pei (2023); Starr, Balasubramanian and Sakakibara (2018)

5.1 Michigan 1985: the accidental experiment

Michigan prohibited non-compete covenants by statute in 1905. The Michigan Antitrust Reform Act of

1985 repealed a schedule of obsolete statutes and, apparently without legislative intent, took the 1905 prohibition with it; a reasonableness standard was



adopted in 1987. Because the change was inadvertent, it is unusually clean: the treatment cannot plausibly have been caused by expectations about inventor mobility. Analysis of 98,468 inventors patenting in Michigan or in continuously non-enforcing states between 1963 and 2006 finds that inventor job mobility in Michigan fell by 8.1 per cent relative to control states after the reversal, with the effect concentrated among exactly the inventors whose knowledge is most valuable to move: those one standard deviation above the mean in firm-specific human capital saw mobility fall 15.4 per cent, and those one standard deviation above the mean in technical specialisation saw it fall 16.2 per cent [7].

The same natural experiment yields a second and more troubling result. Restriction does not merely stop movement; it redirects it across state lines. Michigan inventors became substantially more likely to emigrate to non-enforcing states after 1985, and the effect was strongest among the most valuable: inventors with above-median citation counts showed a relative emigration risk roughly 187 per cent higher than comparable inventors in control states, and highly collaborative inventors roughly 236 per cent higher [44]. A state that strengthens enforceability to help its firms retain talent therefore exports its most connected inventors to states that do not. This is the single most important finding for policy, because it means enforceability is not a matter on which each jurisdiction can decide independently without consequence for the others.

5.2 Florida 1996: dynamism and concentration

Florida's 1996 statute made enforcement materially easier by narrowing judicial discretion to refuse it. Analysis of the resulting shift finds that the burden fell asymmetrically on small firms: the share of employment accounted for by large-firm establishments rose, new-firm entry and business dynamism fell, and product-market concentration increased [8]. This is the competition-policy channel, and it is separate from the innovation channel. Restriction transfers not only from workers to firms but from small firms to large ones, because a large firm with a national footprint can both impose covenants and absorb the litigation cost of enforcing them, while a small entrant can do neither. Related work finds enforceability associated with higher concentration generally [45] and, in health care specifically, with higher negotiated prices operating through the concentration channel [46].

5.3 Oregon 2008 and Hawaii 2015: the modern bans

Oregon's 2008 reform voided non-competes for hourly workers, and Hawaii's 2015 statute voided them for technology workers. These are the cleanest available tests of removal rather than imposition, and they bracket the skill distribution. In Oregon, the ban raised hourly wages by 2 to 3 per cent on average across hourly workers — an effect that, scaled by the prevalence of coverage, implies as much as 14 to 21

per cent for the subset actually bound — while raising job-to-job mobility and average occupational status, with stronger gains for women and in occupations where covenants are most common [9]. In Hawaii, the technology-worker ban raised new-hire wages by roughly 4 per cent and increased worker mobility by 11 per cent [10]. The convergence is instructive: two very different worker populations, two different statutory devices, and effects of the same sign and comparable magnitude. The Hawaii study adds a long-run result that bears directly on the training defence — covered workers show lower earnings and lower within-individual earnings growth over horizons of eight years and more, so whatever training the covenant purchases is not returned to the worker who paid for it in restricted mobility [10].

5.4 California: the counterfactual

California has declined to enforce employee non-compete covenants since 1872 and in 2024 extended that refusal to covenants signed elsewhere, added an affirmative employer notification duty and created a private right of action [11]. Because there is no within-state shock, California cannot support a difference-in-differences design, and its role in the literature is accordingly interpretive rather than identifying. The claim that its legal regime explains the emergence of Silicon Valley is contested on the ground that enforcement exceptions existed, that trade-secret law continued to operate, and that technological and economic fundamentals may explain the divergence from Route 128 independently [18]. The fair reading is that California is consistent with the spillover account and does not by itself establish it. Its practical significance now lies elsewhere: covenants continue to be used at high rates in California despite unenforceability [47], which is direct evidence of the in terrorem effect and of the need for disclosure remedies alongside substantive ones.

5.5 The nationwide enforceability-index evidence

Alongside the discrete shocks, a parallel literature exploits continuous variation in enforceability across states and time using coded indices of judicial doctrine [48]. This work delivers the economy-wide magnitudes. An average increase in enforceability reduces patenting by 12 to 19 per cent over a decade, including breakthrough patents, with no offsetting substitution towards trade secrecy; firm R&D spending rises, indicating that the hold-up channel is real, but the reduction in inventor mobility and new-business formation more than offsets it, and the decline in mobility is shown to stifle knowledge diffusion directly [28]. Enforceability reduces new-firm entry, spinout creation, growth and survival [49], and reduces both entry rates and job creation [50]. Restricting labour mobility reduces corporate investment and entrepreneurship, with the entrepreneurship effect concentrated in exactly the knowledge-intensive sectors where spinouts matter [51]. The interaction with finance is sharp: venture capital produces

significantly larger effects on patenting, firm formation and employment growth in states that restrict enforcement than in states that permit it, so that enforceability blunts the productivity of the capital an economy allocates to innovation [52]. Structural work confirms the direction, finding abolition of non-competes to be growth- and welfare-enhancing under a general-equilibrium model that internalises the competing channels [53].

Two further results complete the picture. Covenants are far more widespread than their trade-secret justification would predict: roughly 18 per cent of the United States labour force is covered at any time and around 38 per cent has been covered at some point, with coverage extending well into occupations having

no plausible access to protectable information [54], and a median covered worker earning close to USD 14 an hour [47]. And restriction imposes externalities on workers who never signed one, because a market in which many workers are immobile is a thinner market for everyone in it [55].

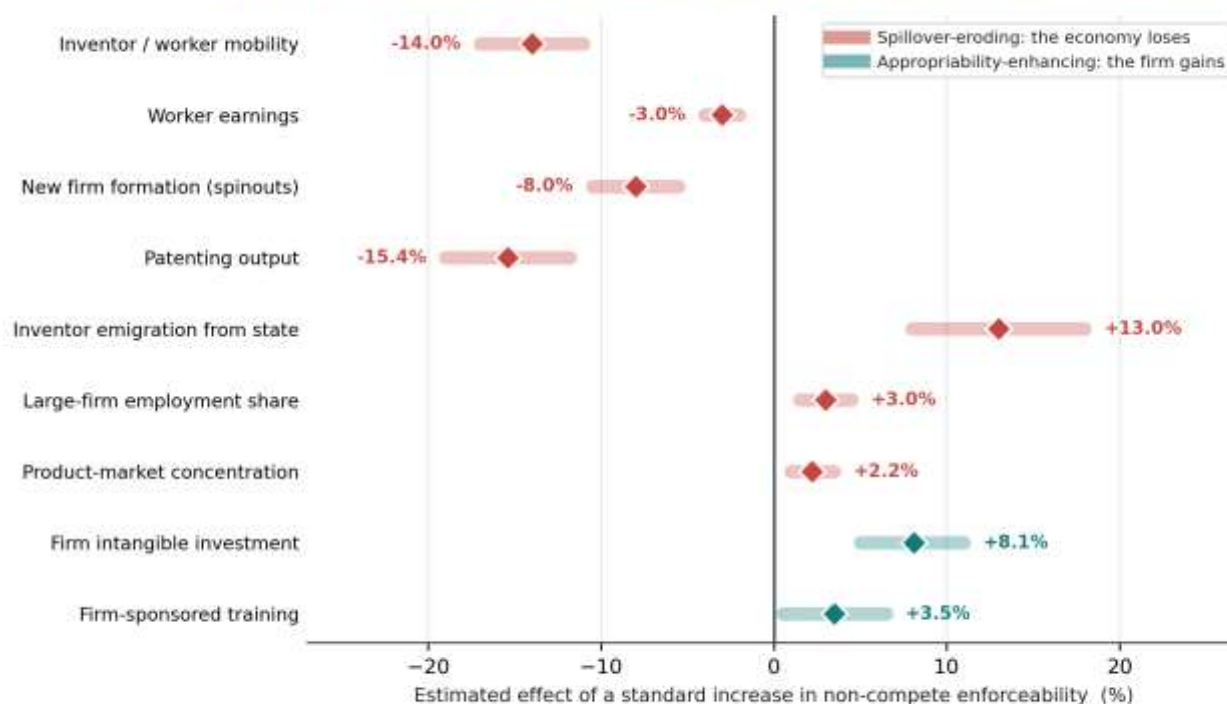
VI. SYNTHESIS OF FINDINGS

Table 3 organises the retained evidence by outcome domain and by the party bearing the effect, and Figure 3 presents the same synthesis graphically; a complementary practitioner-facing synthesis of the same evidence base reaches compatible conclusions [56]. Six findings follow.

Table 3. Synthesised evidence by outcome domain and by the party bearing the effect

Outcome domain	Borne by	Direction under stricter enforceability	Representative magnitude	Principal studies
Inventor and technical-worker mobility	Economy	Falls	−11% to −17%	Marx, Strumsky and Fleming (2009); Balasubramanian et al. (2022)
Worker earnings	Worker	Falls	−2% to −4%	Lipsitz and Starr (2022); Balasubramanian et al. (2022); Starr (2019)
New firm formation and spinouts	Economy	Falls	−6% to −11%	Starr, Balasubramanian and Sakakibara (2018); Jeffers (2024)
Patenting output, including breakthrough patents	Economy	Falls	−12% to −19% over ten years	Johnson, Lipsitz and Pei (2023)
Emigration of high-value inventors out of the state	Economy (other states gain)	Rises	+8% to +18% relative risk	Marx, Singh and Fleming (2015)
Large-firm employment share	Small firms	Rises	+1.5% to +4.5%	Kang and Fleming (2020)
Product-market concentration and prices	Consumers	Rises	+1% to +3.5%; health-care prices rise via concentration	Lipsitz and Tremblay (2021); Hausman and Lavetti (2021)
Firm intangible investment	Firm	Rises	+8.1%	Johnson, Lipsitz and Pei (2023)
Firm-sponsored training	Firm and worker	Rises, contested	0% to +7%; attenuates with worker controls	Starr (2019); Balasubramanian et al. (2022)
Executive investment horizon	Firm	Lengthens	Shift towards fixed salary; longer-horizon investment	Garmaise (2011); Conti (2014)
Venture-capital productivity	Economy	Falls	VC effect on patents, entry and employment significantly weaker in enforcing states	Samila and Sorenson (2011)
Trade-secret litigation after a ban	Firm	No increase	Null	Starr (2026)

Figure 3 Synthesised direction and magnitude of enforceability effects, by outcome domain



Bars span the range across retained studies; diamonds mark the model point estimate. Sources: Marx et al. 2009; Marx, Singh & Fleming 2015; Starr et al. 2018; Kang & Fleming 2020; Lipsitz & Tremblay 2021; Lipsitz & Starr 2022; Balasubramanian et al. 2022; Johnson, Lipsitz & Pei 2023.

Figure 3 arrays the synthesised magnitudes. The colouring is by welfare direction rather than arithmetic sign: outcomes coloured red erode the spillover the economy relies on, whether they rise or fall.

Finding 1: the direction is consistent across every credibly identified study

Across 48 retained studies, no credibly identified United States study finds that increasing the enforceability of post-employment mobility restrictions raises worker earnings, worker mobility, spinout formation or aggregate patenting. Disagreement in the literature concerns magnitude, the validity of particular identification strategies, and the correct policy inference — not the sign. For a body of evidence assembled by authors with sharply differing priors, this degree of directional consensus is unusual and should carry weight.

Finding 2: the firm's gain is small and partly a transfer

The measured benefits of enforceability to the firm are real but modest: intangible investment rises by roughly 8 per cent [28], training by somewhere between nothing and 7 per cent depending on specification [31], and executive compensation

shifts towards fixed salary with longer investment horizons [32]. Set against these is the wage effect. Because removing enforceability raises worker earnings by 2 to 4 per cent [9], [10], a corresponding part of the firm's gain under enforceability is a transfer from the worker rather than newly created value. Netting the transfer out leaves a genuine efficiency gain that is smaller still.

Finding 3: the economy's loss is larger and is deadweight

The reallocation and diffusion losses have no offsetting beneficiary. An 11 to 17 per cent reduction in the mobility of technical workers is a reduction in the rate at which human capital is matched to its highest-value use; a 12 to 19 per cent reduction in patenting is output that is simply not produced; a 6 to 11 per cent reduction in spinout formation is a set of firms that never exist [28], [49], [7], [10]. These are not transfers. Table 4 sets the two ledgers against one another line by line.

Table 4. The two ledgers: what a retained worker is worth to the firm and to the economy

Channel	Effect on the retaining firm	Effect on the wider economy	Net social sign
Trade-secret protection	Positive: reduces direct appropriation risk	Neutral to slightly positive: preserves incentive to create the secret	Positive but small; largely obtainable through NDA and trade-secret law
Training amortisation	Positive: lengthens recovery period	Ambiguous: training rises modestly, but the worker does not capture the return	Weakly positive at best
Reduced replacement and search cost	Positive: avoids hiring and ramp-up outlay	Negative: the vacancy the mover would have filled elsewhere goes unfilled	Negative
Weakened outside option and wage bargaining	Positive: lowers the wage bill	Zero: a pure transfer from worker to firm	Zero, with distributional loss to labour
Reallocation of human capital to higher-value uses	Not counted	Negative under restriction: the match to the higher-marginal-product firm never occurs	Strongly negative
Tacit knowledge diffusion to the receiving firm	Not counted	Negative under restriction: the principal diffusion channel is closed	Strongly negative
Spinout and new-firm formation	Counted as a threat, not a benefit	Negative under restriction: entrants that would have been founded are not	Strongly negative
Local labour-market thickness and cluster externality	Partly negative in the short run	Negative under restriction: the cluster thins for every firm in it	Negative
Competitive discipline on the incumbent	Negative from the firm's standpoint	Positive: restriction removes it	Negative

Finding 4: the burden falls on the most valuable workers

Every study that examines heterogeneity finds the effects concentrated among the workers whose knowledge is most valuable and most mobile. Michigan's mobility reduction roughly doubled for inventors with high firm-specific human capital or high technical specialisation [7]; its emigration effect was largest for the most highly cited and most collaborative inventors [44]; and inventors induced to change industry by enforceability increases are markedly less productive afterwards than voluntary movers. Restriction is therefore not a broad, shallow tax on labour: it is a sharp tax levied precisely where the spillover value is highest, which is the worst possible incidence from a growth standpoint.

Finding 5: the effects cross state lines, so the policy externality is inter-jurisdictional

The brain-drain result [44] and the cross-state corporate-network analysis [28] together establish that a state's enforceability regime affects outcomes in other states, and that state-level estimates understate economy-wide effects. Two implications follow. Estimates from the natural-experiment literature are lower bounds. And the standard argument for regulatory federalism — that states should experiment and

converge on the best rule — is weakened here, because a state that tightens enforceability exports its cost to states that do not, and a state that liberalises confers an uncompensated benefit on its neighbours. This is the strongest analytical case for a national floor, whatever one concludes about the FTC's particular rule.

Finding 6: the covenant is a blunt instrument for which sharper substitutes exist

The evidence that banning covenants does not increase trade-secret litigation [57], that firms decline to purchase enforceability when a wage threshold makes it cheaply available [34], and that coverage extends far beyond occupations with access to protectable information [54], [58] converges on a single conclusion. Where the firm has a genuine appropriability interest, non-disclosure agreements, customer non-solicitation, trade-secret enforcement, compensated garden leave and deferred compensation address it more precisely and at a fraction of the mobility cost. Figure 5 arrays the instruments on the protection-spillover plane and shows that the broad post-employment covenant is dominated: for essentially the same protection, other instruments preserve substantially more spillover.

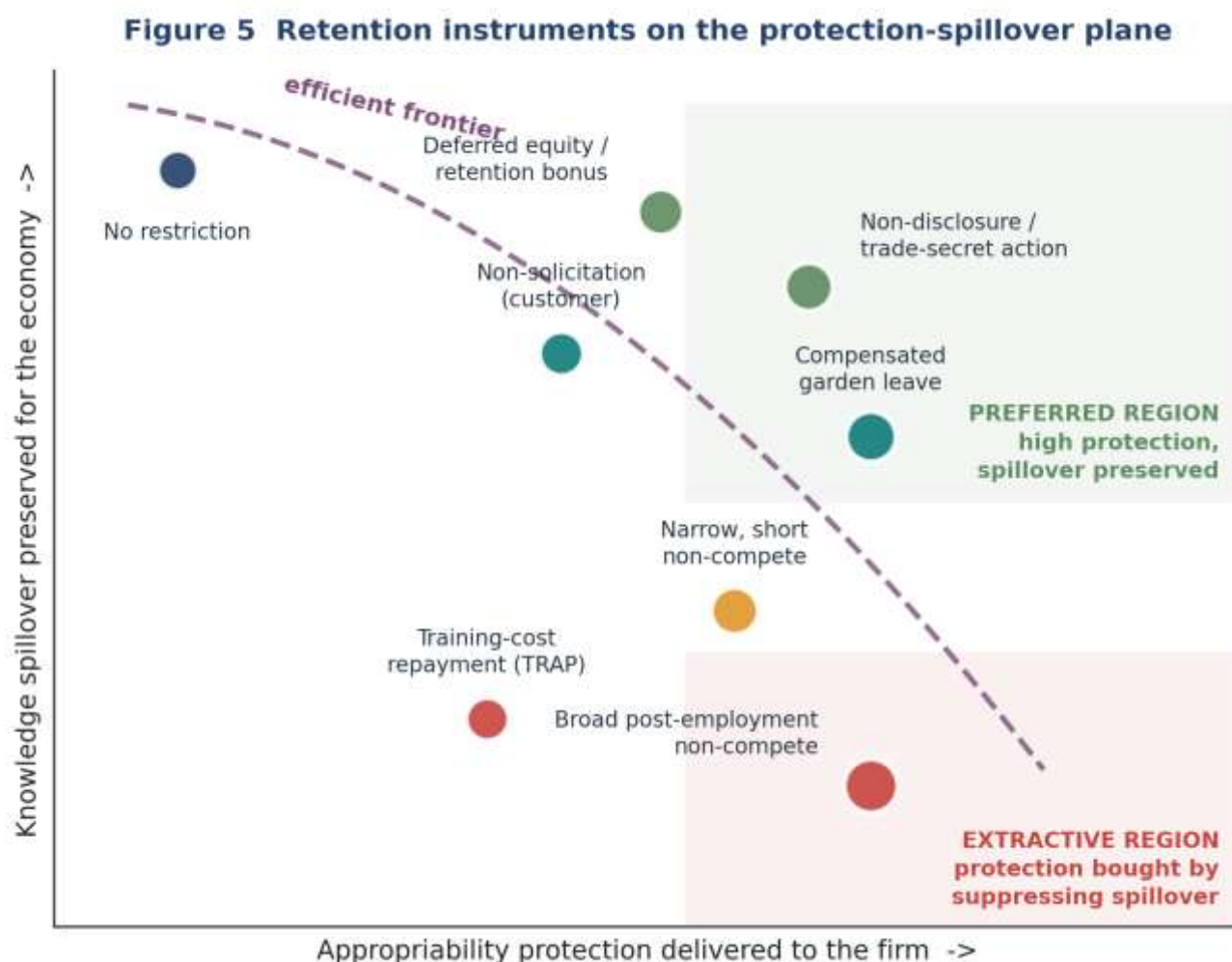


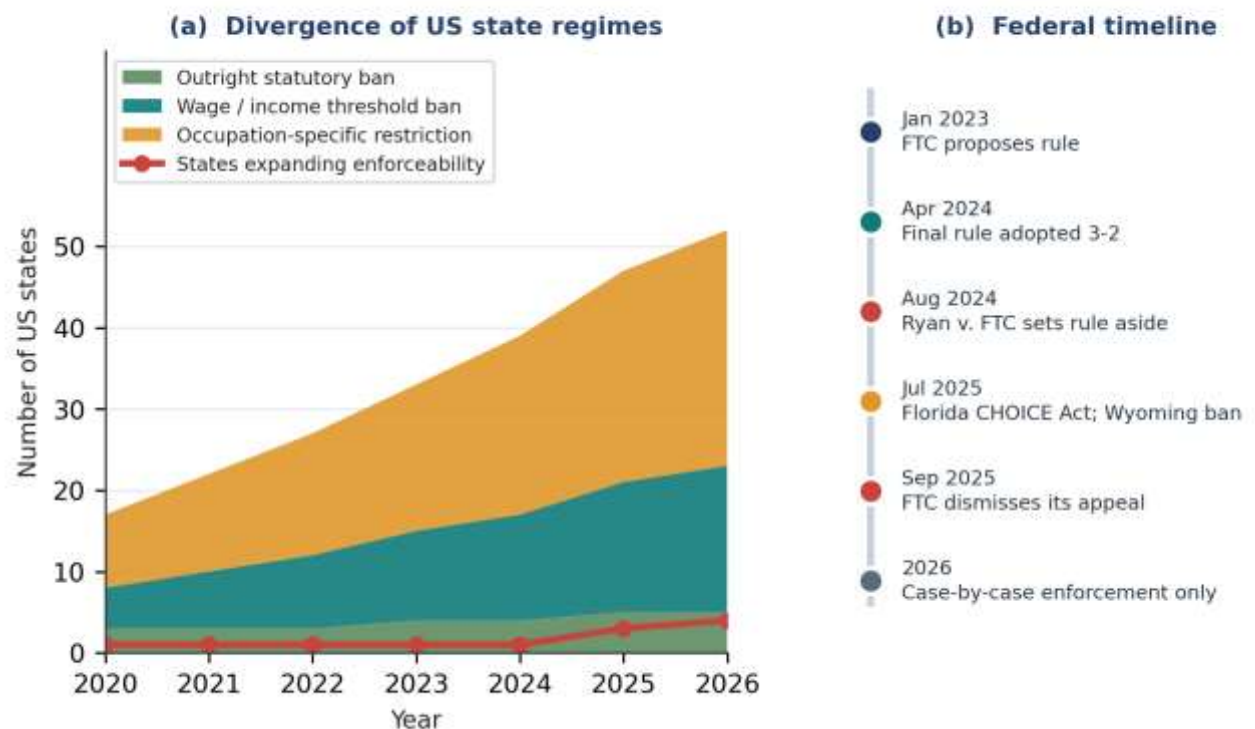
Figure 5 positions each retention instrument by the protection it delivers to the firm and the spillover it leaves intact. The broad covenant sits in the extractive region; its protective work can be done above the frontier

VII. THE POLICY LANDSCAPE, 2024–2026

The federal attempt to resolve the question has failed, and the state landscape has become more rather than less divergent. The Commission's rule, adopted 3–2 in April 2024, would have voided existing non-competes for all workers other than senior executives and prohibited new ones for everyone [13]. It was set aside in its entirety by the Northern District of Texas in August 2024 on statutory-authority and arbitrariness grounds [14], and in September 2025 the Commission dismissed its appeal, leaving the rule permanently unenforceable and enforcement reverting to case-by-case action under the general competition statutes [15], [16]. Legislative alternatives remain stalled.

State law has moved in both directions simultaneously. Five states now impose outright statutory bans — California, North Dakota and Oklahoma of long standing, joined by

Minnesota in 2023 [59] and Wyoming in 2025 — and Washington legislated a near-total ban in March 2026 that takes effect on 30 June 2027 [60]. A large and growing group operates wage or income thresholds — Oregon at approximately USD 116,000 and indexed annually, Illinois at USD 75,000 rising to USD 80,000, Colorado, Washington, Maryland at 150 per cent of the state minimum wage — and a still larger group restricts covenants by occupation, health care being the most common [61], [16]. Against this, Florida's CHOICE Act, effective July 2025, moved decisively the other way, creating a presumption of enforceability for high-earning employees, permitting covenants of up to four years and shifting the burden of proving unenforceability onto the employee [17]. Figure 4 traces both the federal sequence and the widening state divergence, and Table 5 sets out the resulting taxonomy.

Figure 4 The United States policy landscape, 2020-2026


Panel (a) shows the widening of state-level restriction alongside a small but real counter-movement; panel (b) traces the federal sequence from proposal to abandonment. State counts are indicative, compiled from published state-law surveys.

Table 5. Taxonomy of United States state regimes as at mid-2026

Regime tier	Representative states	Statutory device	Consequence for spillover
Outright statutory ban	California; North Dakota; Oklahoma; Minnesota (2023); Wyoming (2025); Washington (enacted 2026, effective 30 June 2027)	Post-employment restraint void by statute; California adds extraterritorial reach, notice duty and private right of action	Spillover fully preserved in law; residual in terrorem effect persists in practice
Wage or income threshold ban	Oregon (~USD 116,000, indexed); Illinois (USD 75,000 rising to 80,000); Colorado; Washington; Maryland (150% of state minimum wage); District of Columbia	Covenants void below a statutory earnings floor, indexed annually in most states	Spillover preserved where the protectable interest is weakest; contested high-skill cases left to common law
Occupation-specific restriction	A large majority of states; health care most common, with veterinary, broadcasting and legal carve-outs	Sectoral prohibitions, often with damages and fee-shifting provisions	Targeted preservation; effective where the sector is well defined, weak where roles are fluid
General reasonableness standard	The residual majority of states	Judicial review of scope, duration and legitimate business interest, with blue-pencil or reformation powers	Spillover loss depends on judicial temperament; uncertainty itself deters mobility
Expanded enforceability	Florida (CHOICE Act, 2025); a small number of states following	Presumption of enforceability for high earners; covenants up to four years; burden of proving unenforceability shifted to the employee	Maximum spillover loss; creates a designated natural experiment for future evaluation

Two features of this landscape deserve emphasis. First, the modal regulatory instrument is now the wage threshold, which is a defensible second best: it removes covenants where the protectable-information rationale is weakest and the worker's bargaining position is worst, while leaving the contested high-skill cases to the common law. Second, the divergence itself is costly. Firms operating nationally face materially different rules across their footprint; workers cannot easily know their own position; and the brain-drain result implies that the divergence redistributes inventive capacity between states for reasons unrelated to any state's underlying advantages.

VIII. A FOUR-TIER POLICY AND PRACTICE FRAMEWORK

The evidence does not support the proposition that firms have no appropriability interest, and a framework built on that proposition would fail. What it supports is that the interest is narrower than current practice assumes and that better-targeted instruments exist. Table 6 sets out a four-tier framework ordered from the least contestable intervention to the most.

Table 6. A four-tier framework for regulation and practice

Tier	Instrument	Firm protection	Spillover preserved	Recommended scope and rationale
1	Prohibition of post-employment restraint	None required	Full	Below a wage threshold at or near the state median, and in occupations with no access to trade secrets or exclusive customer relationships. No protectable interest can exist, so the restriction is pure deadweight.
2	Non-disclosure; customer non-solicitation; employee non-solicitation; trade-secret enforcement	High and targeted	High	Above the threshold, as the default. Each instrument constrains a specific act of appropriation rather than the employee's capacity to work. Evidence shows bans do not increase trade-secret litigation, indicating adequacy.
3	Compensated garden leave	High	Moderate to high	Narrow senior R&D and strategy roles only. Full salary for the restricted period internalises the cost to the firm, screens out low-value restraints far better than judicial reasonableness review, and removes the worker's income shock.
4	Transparency, timing and portability requirements	Neutral	Improves all tiers	Universal. Disclosure with the written offer, never after acceptance; written statement of intent to enforce at separation; training-repayment obligations capped at documented cost and amortised. Addresses the in terrorem effect that survives non-enforceability.

Tier 1: prohibit where no protectable interest can exist

Below a wage threshold set at or near the state median, and in occupations without access to trade secrets or exclusive customer relationships, post-employment restraint should be void without exception. This is the tier on which the evidence is strongest and the objection weakest: the Oregon result shows wage and mobility gains with no observed offsetting harm [9], coverage of low-wage workers is widespread and cannot be justified by the trade-secret rationale [54], [47], and the deadweight cost of restricting a worker with nothing to appropriate is unmitigated. Roughly half the states have now adopted some version of this tier.

Tier 2: substitute narrower instruments above the threshold

Above the threshold, the protectable interest should be addressed by the instrument that matches it. Confidential information is protected by non-disclosure obligations and by trade-secret law, which the evidence indicates is adequate to the task [57], [35]. Customer relationships are protected by narrowly drawn customer non-solicitation, limited to accounts the employee actually serviced. Team stability is protected by employee non-solicitation of limited duration. Each of these constrains a specific act of appropriation rather than the employee's ability to work, which is what preserves the spillover.

Tier 3: permit compensated garden leave for genuinely sensitive roles

For the narrow set of roles where a real trade-secret interest survives Tier 2 — senior R&D leadership, roles

with strategic-plan access — the appropriate instrument is a compensated restraint: the employee is paid at full salary for the restricted period, as under the European practice in Germany and Italy. Compensation performs three functions at once. It internalises the cost of the restraint to the firm imposing it, converting an externality into a price. It ensures that firms impose restraints only where the protectable value genuinely exceeds the salary cost, which is a far better screen than judicial reasonableness review. And it removes the income shock to the worker that makes the uncompensated covenant so damaging. The revealed-preference finding that firms decline to buy enforceability when it is cheap [34] predicts that a compensation requirement would sharply reduce use — which is precisely the intended effect.

Tier 4: transparency, timing and portability regardless of tier

Three procedural requirements should apply at every tier, because the behavioural evidence shows that the covenant's effect does not depend on its enforceability [25], [26]. Covenants should be disclosed with the written offer and never after acceptance, since a large majority of technical employees first learn of the requirement after they have accepted the position [62]. Employers should be obliged to state in writing at separation whether they intend to enforce, removing the uncertainty that produces the in terrorem effect. And training-repayment provisions should be capped at documented, verifiable cost and amortised, since an uncapped repayment obligation reproduces the covenant's immobilising effect without even a nominal protectable interest.

IX. IMPLICATIONS FOR HUMAN RESOURCE PRACTICE

For the human resource function the argument of this paper is not primarily a legal one. Three practical implications follow, and each is supported by evidence internal to the HRM literature rather than imported from economics.

The first is that legal restraint is a weak retention technology relative to the alternatives. The determinants of intention to stay that survive controlled examination are appraisal fairness, recognition and feedback quality, managerial support [5], leadership capability and the active management of burnout [6], delegated authority and decision ownership [36], and growth and learning opportunity — which the evidence from Bengaluru's technology employers identifies as dominating compensation in the mobility decisions of skilled staff [37]. A firm relying on a covenant is retaining the body while conceding the engagement, and the long-run earnings evidence suggests the arrangement is not stable [10].

The second is that the retention motive itself is weakening. As matching technology improves and hiring analytics reduce the cost and latency of

replacement [41], and as institutional knowledge migrates from individuals into codified enterprise systems [42], the marginal value of holding a particular individual falls. The internal architecture of retention has its own costs besides: formal high-potential designation produces growth effects but also comparison costs among the undesigned [39], so that even non-legal retention instruments require calibration.

The third is that the fluid labour market is an asset to the firm as well as to the economy. A firm in a dense, mobile cluster hires more easily than one in a thin market, benefits from the spillovers its neighbours' departing employees carry in, and can reconfigure its workforce as technology shifts — which is precisely the capacity that strategic HRM identifies as the substance of economic resilience [38], [40]. Restriction is a collective-action problem in miniature: each firm's covenant makes marginal sense in isolation, and the equilibrium in which every firm imposes one leaves all of them hiring from a frozen market.

X. IMPLICATIONS BEYOND THE UNITED STATES

Because the analytical core of this review is deliberately United States-specific, its external validity requires brief comment. India offers an instructive contrast, having reached the Tier 1 position by statute more than 150 years ago: section 27 of the Indian Contract Act, 1872 voids every agreement in restraint of a lawful profession, trade or business [63], and the Supreme Court has confirmed that restraints operating after the term of employment are void notwithstanding reasonableness, while those operating during employment are enforceable [64], [65]. India therefore runs, at national scale and over a very long horizon, something close to the open talent ecosystem that the United States can observe only in California — and the Bengaluru technology cluster, whose employee mobility patterns are documented in the employer-perspective literature [37], [43], has developed under precisely that regime. The comparison is not a controlled one and should not be presented as though it were, but it does establish that the counterfactual is not hypothetical.

The OECD evidence indicates that non-compete and related clauses are more common across member economies than their legal status would suggest, with substantial gaps between what is enforceable and what is signed [66]. That gap — the same in terrorem residue observed in California — is the principal reason the Tier 4 transparency requirements matter independently of substantive prohibition, and it is the most transferable element of this framework to jurisdictions that have already prohibited the covenant on paper.

XI. LIMITATIONS

Four limitations qualify the conclusions. The synthesis is narrative rather than meta-analytic:

heterogeneity in treatment definition, outcome scaling and identifying variation is too great for a pooled estimate, so the reported magnitudes are ranges across studies rather than precision-weighted averages. The evidence base is overwhelmingly United States-based by design, and the wedge between private and social optima is likely to differ in economies with different cluster density, litigation cost and labour-market institutions. Publication and specification bias cannot be ruled out; the direction of the finding is now sufficiently established that null results may be under-reported, although the fact that several retained studies were funded or authored by parties on opposite sides of the FTC rulemaking mitigates this somewhat. Finally, the spillover value in the social ledger is measured indirectly, through patents, spinouts and productivity, all of which are imperfect proxies for the underlying knowledge flow; the true magnitude of the wedge is therefore uncertain even where its sign is not.

XII. DIRECTIONS FOR FUTURE RESEARCH

Five directions follow directly from the gaps identified above. First, the compensated garden-leave instrument recommended in Tier 3 has never been evaluated causally; the European jurisdictions that mandate compensation offer variation that has not been exploited, and this is the single highest-value empirical opportunity in the field. Second, no study has yet estimated the substitution elasticity between legal restraint and HRM retention practice — whether firms deprived of the covenant increase investment in engagement, leadership development and internal mobility, and by how much. Third, the incidence of restriction across gender, caste, region and career stage is almost unexamined, although the evidence that Oregon's ban benefited women disproportionately [9] suggests the distributional effects are substantial. Fourth, artificial intelligence changes both sides of the ledger — codification reduces the knowledge embodied in the individual while raising the value of those who can direct the systems — and no work has yet examined how the optimal restriction intensity shifts as a result. Fifth, the Florida CHOICE Act creates a rare post-2024 tightening shock in a large, well-measured state economy; it should be treated as a designated natural experiment now, with pre-registration of designs and outcomes, so that the evaluation is not conducted retrospectively by parties to the dispute.

XIII. CONCLUSION

Retention is worth something to the firm, and mobility is worth something to the economy. The finding of this review is that under present United States practice the second is larger than the first, and that the difference is not close. Stricter enforceability of post-employment mobility restrictions buys the firm an intangible-investment gain of roughly 8 per cent and

a training effect that may be zero, part of which is a transfer from the worker rather than newly created value. It costs the economy 11 to 17 per cent of technical-worker mobility, 12 to 19 per cent of patenting, 6 to 11 per cent of spinout formation and 2 to 4 per cent of covered workers' earnings, with the burden falling most heavily on exactly the highly cited, highly collaborative inventors whose movement carries the most knowledge, and with a substantial part of the cost exported across state lines to jurisdictions that made no such choice.

The policy conclusion is not that appropriability does not matter. It is that the broad post-employment covenant is a dominated instrument: non-disclosure obligations, targeted non-solicitation, trade-secret enforcement, deferred compensation and compensated garden leave deliver comparable protection while leaving the spillover largely intact. The managerial conclusion is narrower and more immediate. The human resource literature has spent two decades establishing that people stay for fair appraisal, capable leadership, real authority and visible opportunity. That evidence has always been read as advice about how to retain. It should also be read as the reason the legal instrument is unnecessary — and, once the economy's ledger is opened, as the reason it is unaffordable.

The wider claim is one this series has made in other forms. Human resource policy is economic policy conducted at the level of the firm. A retention decision taken inside one organisation aggregates, across an economy, into a rate at which knowledge circulates. Managed as a private matter it will be set too tight, because the entity setting it captures the whole of the benefit and none of the cost. Recognising that is the first step towards a retention practice that serves the firm without impoverishing the commons it draws on.

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