Midterm Report: Re-employment, Earnings Scarring and the Public Cost of AI Displacement

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Supervised Program for Alignment Research — Fall 2026

Abstract

This paper links expanding AI adoption to unemployment and public costs in Germany over 2026–2035. A monthly industry model represents 34.84 million insured employees and incorporates observed adoption evidence and employers' employment expectations. Relative to fixed 2025 adoption and capability, the conditional projection yields EUR 5.75 billion in cumulative additional unemployment-related fiscal costs, with annual costs rising from EUR 0.17 billion to EUR 0.71 billion (constant 2024 euros). A complementary worker-history model examines benefit exhaustion and earnings scarring under fixed 2025 rules.

Keywords AI displacement · Re-employment · Earnings scarring · Public finance · Germany · Microsimulation

1 Introduction

How does expanding AI adoption affect public finances as workers lose jobs and return to employment? This paper connects industry employment, workplace adoption and monthly labour-market transitions to benefit spending and lost receipts. German displacement evidence motivates a complementary worker-history account of earnings after re-employment. The framework separates the timing of job loss, unemployment duration and benefit eligibility. [5]

The national experiment directly represents 34,840,671 insured employees in 14 industry groups. Germany's broader national-accounts benchmark is 42.311 million employees in the retained 2025 annual-average vintage. Annual context also includes EUR 262.688 billion in cash wage-tax receipts and provisional statutory employer and employee contributions of EUR 631.280 billion. Their distinct populations and accounting definitions are preserved. [10, 11, 3, 12]

2 Methodology

BA industry employment counts form the population cells. IAB's 2025 survey reports industry shares of establishments using generative AI and finds that approximately 40% of insured employees work in AI-using establishments. A common log-odds adjustment allocates that employee anchor across industries using the establishment shares. This is an explicit proxy allocation: sector employee exposure is not directly observed, and workplace adoption is distinct from task automation. [10, 7]

The reference holds 2025 adoption and capability fixed. The shock closes 10.56% of the remaining adoption gap annually, extending the historical rise in establishment use from approximately 5% in 2023 to 24% in 2025. A separate capability index grows by an assumed 5% annually. Increases in adoption times capability generate first-separation risk among workers not previously displaced. Half move directly to another job; others enter unemployment and face a monthly job-finding probability of 5.65%, using the BA aggregate outflow ratio as a proxy. [7, 9]

The starting separation conversion is fitted once to a 0.06% employment shortfall after three years, matching the rounded January 2026 German employer expectation. With fixed labour supply, this calibration assigns the shortfall to unemployment. The fitted conversion remains fixed when other dashboard assumptions change. Reference unemployment is zero for these new AI-associated transitions; ordinary national unemployment is outside the comparison. [4]

Monthly unemployment person-years are priced using IAB's 2024 account: EUR 16,864 in spending plus EUR 10,621 in net receipt losses per person-year. Annual flows sum to the ten-year total. Amounts are undiscounted 2024 euros, with the historical claimant mix and fiscal relationship held fixed. Benefit-financed insurance transfers are already reflected in the source's net receipt losses. [6]

The separate worker-history experiment applies fixed 2025 rules to 10,000 synthetic profiles. Insured histories determine ALG I entitlement; monthly resource tests determine subsequent support; unemployment without a modelled payment remains visible. Employment, wages and hours generate receipts and earnings scarring. These profiles are not expanded to Germany or added to the national unemployment account. [2, 1]

3 Preliminary Results

The starting national projection produces 209,381 additional unemployed person-years over 2026–2035. The corresponding cumulative covered cost is EUR 5.75 billion: EUR 3.53 billion in benefit-budget spending and EUR 2.22 billion in net lost receipts. Annual cost rises from EUR 0.17 billion in 2026 to EUR 0.71 billion in 2035 (Table 1). These are conditional model outputs under the stated diffusion, calibration and re-employment assumptions.

Workplace adoption reaches approximately 80% by 2035, while the capability index rises from 1 to 1.63. The resulting monthly separations and continuing unemployment generate changing annual costs; cumulative cost adds those annual flows (Figure 1). The model therefore follows both new displacement and the consequences of earlier displacement throughout the decade.

Table 1: Conditional national unemployment cost: shock minus reference

Period	Spending (EUR bn)	Net receipts lost (EUR bn)	Covered cost (EUR bn)
2026 annual	0.104	0.065	0.169
2030 annual	0.387	0.244	0.632
2035 annual	0.436	0.275	0.711
2026–2035 cumulative	3.531	2.224	5.755

Model outputs in constant 2024 euros, undiscounted; cells are rounded independently. The reference freezes 2025 adoption and capability, producing zero new AI-transition unemployment in this incremental account. The shock uses the stated industry, diffusion and transition assumptions.

Holding separation conversion and other assumptions fixed, 0% annual capability growth gives a cumulative EUR 2.75 billion, while 10% gives EUR 10.11 billion. These sensitivity cases describe alternative assumptions, not confidence bounds. Common adoption-gap closure also makes low-adoption industries catch up; sector results therefore do not rank technical task vulnerability.

Validation checks zero differences for identical paths, population conservation, changing adoption and capability, re-employment, and agreement between sector, monthly, annual and cumulative accounts. Separate worker-history checks cover benefit exhaustion, subsequent means-tested support and unemployed people receiving no modelled benefit.

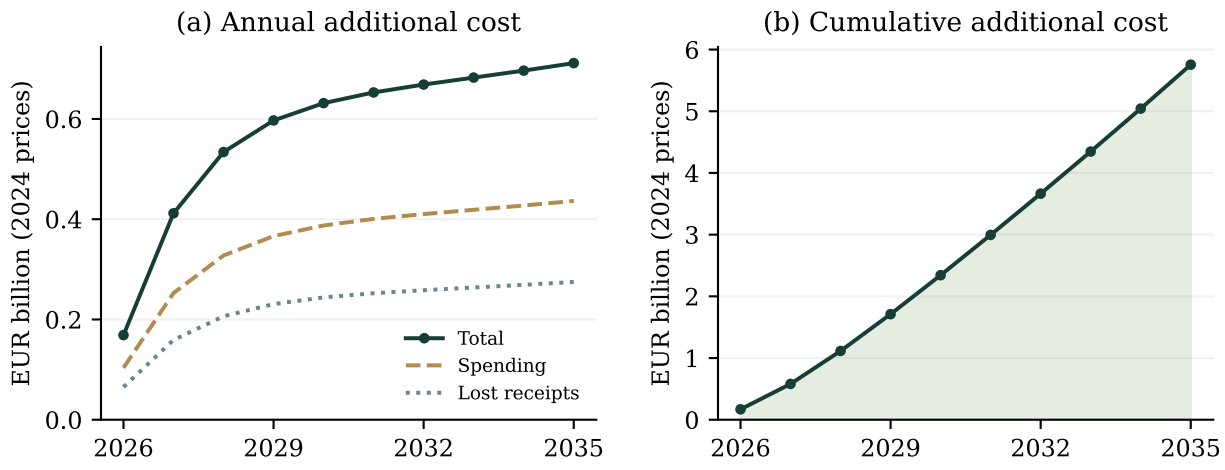


Figure 1: Annual and cumulative additional unemployment costs, 2026–2035

Conditional projection for 34.84 million insured employees. Annual fiscal differences change with adoption, capability and re-employment; cumulative values add the annual flows. Constant 2024 euros; same assumptions as Table 1.

4 Challenges & Open Questions

The employment anchor records expectations from 2,289 existing German firms, summarized using response-category midpoints. Net employment changes may arise through hiring, retirement or new firms as well as dismissals. Assigning the target to unemployment under fixed labour supply is a model closure, not a measured causal mechanism. Capability growth, direct job-to-job moves and future diffusion remain assumptions; the result is a conditional projection, not an identified national AI forecast. [4]

The covered cells exclude 42,496 private-household employees and 2,321 employees without industry classification; civil servants, self-employed people and exclusively marginal jobs lie outside the insured population. Public administration and extraterritorial organisations share one BA cell, requiring an adoption proxy. Sector workplace exposure is calibrated, while individual task exposure and sector earnings distributions remain unobserved. [10]

The historical unemployment coefficient may differ for AI-displaced workers with different earnings, durations or benefit eligibility. The national cost excludes active labour-market measures, post-re-employment scarring, productivity and new-job gains, and business-tax effects. Combining these channels requires compatible populations and accounting; adding the synthetic worker account for the same unemployed months would double count.

5 Next Steps

Estimate duration-specific employment and inactivity transitions and post-displacement earnings from German administrative histories, separating hourly pay from hours. Add representative household resources and insurance histories to the worker model, then reconcile weighted earnings and receipts to compatible national benchmarks. [8]

Test alternative adoption, capability and labour-adjustment assumptions against new German evidence. Extend the national account to earnings scarring and other fiscal channels only after their employment overlap and government boundaries are reconciled. Report uncertainty from behavioral assumptions separately from numerical validation.

Supporting material. The technical supplement provides the full equations, worker-history mechanisms, validation and replication results. The interactive dashboard, editable SPAR source and reproduction bundle are available online.

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