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Experience rating the unemployment insurance tax: simulation results for Finland

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Abstract

I study the potential effects of introducing experience rating for the unemployment insurance tax in Finland. I simulate an array of potential rating systems using register data for all wages and unemployment from 2001 to 2021. Under the current tax regime, about half of all unemployment costs are attributable to employers who pay less than 10% of the UI tax. All the simulated systems would significantly reduce this discrepancy but also differ markedly from each other. The choices in designing the system are reflected in its administrative burden, how strongly it incentivises hirings and discourages dismissals, and how quickly it responds to employment changes.

Key words: unemployment insurance, experience rating

JEL classes: D22, H25, H71, J32, J38, J65

*University of Helsinki. Declarations of interest: none. Email: heikki.korpela@helsinki.fi. The online appendix is available at http://iki.fi/heikki.korpela/research/. I would like to thank Tuomas Hiilamo, Tomi Kyyrä, Tuomas Matikka, Michael Miller, Hanna Pesola, Jukka Pirttilä, Robert Pavosevich, Ossi Tahvonen, and Roope Uusitalo for their helpful comments and suggestions.

1 Introduction

When an employer considers layoffs in Europe, the expense of the worker's unemployment insurance (UI) is rarely their primary concern. Because employers' taxes do not reflect the unemployment they cause, they may resort to dismissals that could have been avoided at a low cost. In the US, the costs of unemployment are internalised through experience rating: layoffs increase employers' UI taxes. This may help curb excess unemployment.

This paper uses comprehensive administrative data for Finland over two decades to simulate the effects experience rating (ER) might have. The simulation addresses common concerns about the adverse impacts of ER and how they could be addressed in the system's design. Results from the simulations illustrate that the potential rating regimes differ significantly in terms of their administrative burden and incentives towards hirings and dismissals. A baseline calculation shows that about half of all UI costs are attributable to employers who currently pay 8.7% of the UI tax; the corresponding share for the simulated systems ranges from 18% to 29%.

Experience rating has two related main justifications. First, unemployment imposes costs on both the unemployed and the society, one of the most salient being the UI. If the taxes paid by employers incorporate some of these costs, firms are more likely to avoid layoffs if the net cost of keeping the worker is lower than the externality. Second, complete pooling of the costs distorts competition. Resources are taken from jobs with a low risk of unemployment and transferred to higher-risk ones that cannot employ the workers to the same extent. This is especially evident with temporary unemployment, where some employers repeatedly dismiss employees only to recall them later. The worker's livelihood during these periods is financed collectively, while the high-risk employers have a flexible work reserve.

Seminal papers by Topel (1984) and Feldstein (1976) showed that temporary unemployment is widespread and that incomplete experience rating will increase it. Since then, many empirical studies and reviews have proposed ER to curb excess unemployment. For example, Del Bono and Weber (2008), Boeri and Cahuc (2022), and Jost (2022) have argued for ER in the context of their research on part-time UI, unemployment wage premiums and temporary unemployment. However, few authors have considered the specifics and potential issues of introducing experience rating in countries currently lacking one.

Despite the potential benefits, the net effect of ER on employment is theoretically ambiguous. When the tax cost of a dismissal increases, this also raises the effective cost of a new hiring if there is a risk of a later layoff. In their reviews, Guo and Johnston (2021) and Duggan, Guo, and Johnston (2023) find that empirical results regarding the net effects of ER on aggregate employment are mixed. However, the balance of the evidence suggests that the magnitude of the impacts is probably minor.

Even if experience rating does not significantly change overall employment, it can

stabilise fluctuations. Empirical work by Card and Levine (1994), Duggan, Guo, and Johnston (2023), and Albertini, Fairise, and Terriau (2023) concludes that ER attenuates job losses over the business cycle. For example, Duggan, Guo, and Johnston estimate that ER saved nearly a million jobs during the Great Recession in the US.

The overall potential gains also need to be weighed against concerns about specific issues, many of them related to small employers. First, employers who resort to layoffs often have financial difficulties, and increased taxes can amplify the existing problems. Second, for small employers, the costs of a single long unemployment spell could cause large, unpredictable variation in their taxes. Third, ER might encourage employers to avoid hiring insured employees or workers deemed risky. Fourth, the system may come with a high administrative burden. Finally, the existing systems are asymmetrical: they assign penalties for dismissals but only minimal rewards for hiring.

This paper argues that many of the detailed questions can be addressed through the system's design. Experience rating is a principle that can be implemented in many ways. There are currently 52 rating mechanisms in the US. Some of their major differences include the choice of rating mechanism (such as the benefit or reserve ratios), maximum tax rate, past years used, attribution across several past employers, and which type of unemployment spells are covered.

Existing literature on these choices in designing ER is scarce. As an exception, Miller and Pavosevich (2019) discuss the weaknesses in the existing regimes and simulate a proposed replacement, which would account for both employment increases and decreases. While the marginal cost of layoffs in different systems has been discussed by many authors, such as Feldstein (1978), Duggan, Guo, and Johnston (2023), S. Woodbury (2004), Pavosevich (2020), and Vroman et al. (2017), these calculations are often quite coarse, only cover some systems or design choices, and are all specific to the US.

To illustrate the effects of the choices in ER, this study simulates different systems for each Finnish employer over the past two decades. Two alternatives proposed by Miller and Pavosevich and two major systems operating in the US are assessed. The simulation uses true employment records to recalculate UI tax rates for each employer and year. All systems are calibrated to provide the same revenue as the existing tax. Thus, the systems can be compared to each other and the current scheme. While the findings are based on the Finnish context, many of the lessons may also generalise to other settings.

The simulation provides three main contributions to the literature. First, it shows how introducing rating into an unrated system would change taxes overall. In many respects, the rating systems produce effects similar to each other. In all the simulations, more than half of all wages would be subject to slightly lower taxes. While some industries currently cause three times as much unemployment costs as they pay in UI taxes, each rating system would more than halve this ratio. Further analyses cover effects on small employers, impacts on those with the highest tax increases, and how the increases would

affect their finances.

Second, a full distribution of marginal tax rates is given for different events, including a hiring and different layoffs. One event at a time, the same event is injected into each employer's history. The tax responses vary significantly. For example, after a simulated layoff that would result in a medium-duration unemployment spell, the median tax increase ranges from roughly 1,000 to 4,500 euros between systems. The variability of responses between employers also differs across regimes, and different systems produce different degrees of volatility. Large differences are due to the choice between the benefit and reserve ratio allocations even when the minimum and maximum tax rates and aggregate tax revenues are fixed.

Finally, the simulation addresses the effects of seemingly technical choices, such as which UI costs are excluded from rating. For instance, excluding unemployment that follows fixed-term jobs reduced total UI-related costs attributed to employers by about a fifth in the simulations. As another example, restricting the responsibility of the latest employer reduced tax rates in the top brackets by 1 percentage point on average.

The rest of the paper is organised as follows. Section 2 covers the Finnish institutional setting and data. Section 4 describes cost attribution: how unemployment spells can be attributed to employers, and how varying this choice affects the simulated tax rates. Section 5 examines the different methods of translating the costs to tax rates, while Section 6 presents the marginal costs for counterfactual events. Section 7 concludes.

2 Institutional setting

Direct monetary costs of dismissals, the topic of this paper, are only one aspect of barriers to layoffs. Broadly speaking, it can be said that the US has stronger taxation incentives for employers to avoid layoffs but weaker formal employment protection, while the opposite is true for Europe.

The mechanisms used for adjusting labour demand in Finland currently vary greatly in their costs and constraints. Table 1 summarises the most important mechanisms. Compared to other OECD countries, Finnish workers have above average protection against collective and individual dismissals, but below average protection in temporary contracts.[1] For brevity, this paper may sometimes use "layoffs" to refer to any employer choices that result in unemployment, such as not renewing a temporary contract or furloughing workers; similarly, "hiring" may also refer to ending a furlough.

Because of the institutional constraints, different industries use different mechanisms to manage their workforce. For example, furloughs are frequent in construction and in

[1]The OECD employment protection strictness dataset ranks the Finnish protection against collective dismissals at 2.8 (8th best out of 38 ranked OECD countries, average 2.4), protection against individual dismissals at 2.4 (17th, 2.2) and protection in temporary contracts at 1.6 (23rd, 1.8). The scale is 0–6.

some manufacturing industries. In the public sector, expiration of fixed-term contracts is a common reason for unemployment. However, the actual patterns of seasonal unemployment can be quite similar: for example, both construction workers and substitute teachers remain strongly attached to their employer, despite being suspended for 1–3 months on many years during a slow season. Both are compensated by UI; the main difference is that the furloughed formally retain their job contract, while the teachers in temporary contracts do not. The Finnish furloughing system is covered in more detail in Korpela (2024) and Alasalmi et al. (2024). The system is likely to capture much of the temporary unemployment that in systems with weaker employment protection might manifest as contract terminations followed by rehirings.

In some situations, layoffs may also trigger additional costs, such as requirements to arrange training or provide time off for searching new jobs. These mandates are usually only required for some job termination types, worker groups or employers. The potential benefits of these regulations need to be weighed against the drawbacks; besides the immediate costs, they can make other contract or termination types comparatively more attractive. In cases where the positive effects of such rules are uncertain and the costs high, experience rating may provide a more efficient and flexible alternative to reach the same goals, as the employers have a direct financial stake in shortening unemployment.

Table 1: Labour demand adjustment mechanisms in Finland

Mechanism	Primary constraints	Frequency
Fixed-term contracts	Valid cause required at start of contract, e.g. job tied to a fixed-term project or substituting another employee	20.3% of UI spells, 11% of employees
Adjustable hours contracts	Employee request, or demonstrated need for less hours	9% of employees, 5% with zero min. hours
Voluntary quits	-	2.2%–5.9% of UI spells
Collective dismissals	Substantial and permanent reduction in available work, collective negotiations, recall mandate, paid notice period (up to six months)	4.2% of UI spells
Furloughs	Substantial reduction in available work, collective negotiations, recall mandate, 200 day soft cap	31.5% of UI spells
Individual dismissals	Severe violation of employee obligations, prior warning, paid notice period	0.6% of UI spells

The shares of new UI spells are for all spells started in 1999–2020, including spells with an unknown or unclear reason. The reasons are considered unclear if the registered reason for entry into unemployment was unrelated to a job or if there was a long delay between the last job and entering unemployment. The shares of employees for fixed-term and adjustable hour workers are from the Labour Force Survey.

2.1 Unemployment benefits

Finland has a two-tiered system of unemployment-based benefits. The majority of the newly unemployed and furloughed job seekers start on unemployment insurance (UI),

which is based on prior earnings and has a limited duration (the entitlement) of 60 to 100 weeks. Some older workers are entitled to a much longer maximum duration, effectively until retirement.

This paper focuses on UI, and largely ignores the second-tier benefits, flat-rate unemployment assistance (UA) benefits. The UA is available to those who do not have sufficient recent work experience, do not belong to an unemployment fund, or have exhausted their maximum UI duration. It is almost entirely financed by central government general revenue, rather than earmarked UI taxes. Most persons on UA tend to have weaker labour market attachment, reflected in longer mean unemployment durations.

Insurance is based on prior wages. In 2019, the mean observed payment was 333 euros per benefit week for UI, while the median gross replacement rate has varied between .55 and .6 from 1999 to 2021. Persons who are employed part time but look for a full-time job may apply for part-time benefits. This paper does not distinguish between part-time and full-time benefits for any purposes; in most cases only a short fraction of a spell is spent in partial unemployment.

To qualify for UI, persons must have sufficient recent work experience. The required number of weeks worked has varied between 26 and 43 weeks between 2006 and 2022[2]. The default base period for counting the weeks worked is nominally the last two years. However, this period can be extended to up to nine years due to full-time studies, parental leaves, sickness, and military or civil service. As a result, there is often a long gap between losing a job and entering insured unemployment.[3] This implies unemployment costs may need to be attributed to distant former employers, as seen in Section 4. A person has a three-month waiting period if they quit a job voluntarily, refuse to renew a contract when offered, or cause their own dismissal by some severe violation of their obligations.

During the qualifying weeks worked, the individual must also have been a member of an unemployment fund. The funds administer the UI, but their membership fees cover a minimal fraction of the costs.

2.2 UI financing

UI is financed jointly by central government revenues, earmarked taxes on all wages, and the unemployment funds. The central government finances a flat-rate fee for almost all unemployment benefits, whether UI or UA; on average, this corresponds to about 30% of annual UI-related costs. The funds pay 5.5% of the direct costs. The rest is covered by earmarked UI taxes (mandatory insurance premiums).

[2]Temporarily lowered to 13 during the COVID-19 pandemic.

[3]30% of benefits are for benefit spells that start after 6 months or longer from last qualifying job, 21% are for spells that start after one year or longer, and 11% are for spells that start after two years or longer. For these estimates, the last qualifying job was required to have lasted at last 10 weeks and paid at least 75% of the wage used as basis wage for the benefits.

Both employers and employees pay the UI tax. Practically all workers below retirement age pay the same flat-rate UI tax, which has varied between 0.2% and 1.5% from 2006 to 2022. The taxable wage base is unlimited in Finland for both types of tax.

Employers pay a lower flat rate (varying between 0.5% and 1% over the years) up to a threshold, and then a higher flat rate (1.7%–3.2%) for any wages in excess. The threshold was about one million euros (in year 2019 wage levels) until 2008, when it was increased to two million. The simulations in Section 5 treat this structure as a given preference of the planner, and use it to allocate a separately tracked shared tax that would finance costs not covered by the rated tax.

In this paper, the UI tax refers to the taxes by the employers. Similarly, when attributing UI costs in Section 4, only the share corresponding to the annual employer share of taxes is attributed to employers. The true incidence of this tax across employers, employees and consumers is deemed beyond the scope of this paper.

There are three main reasons for this focus on the employers. First, there is almost a century of history of rating employer taxes from the US to guide the simulations; rating worker taxes is uncharted territory. Second, keeping the changes to be examined limited makes comparisons between systems and the existing structure easier. Third, there are other existing tools for incentivizing the unemployed, such as changing jobseeker obligations, the replacement rate, or the time profile of benefits.

Because the central government directly covers some of the UI costs, it does not pay the employer UI tax for its employees by historical agreement. Academic universities and a small group of government enterprises also pay a smaller rate. The law recognizes a set of other exemptions for both employees and employers, but their empirical relevance appears very small, and these are ignored in the simulation.

In the simulations, central government is exempt from shared costs, but is allocated the rated tax similarly to other employers. Even if the central government as a whole has a direct stake in unemployment costs, it appears unlikely that different governmental units directly face these costs when they make hiring and firing decisions. Making the government subject to experience rating could thus help curb excess unemployment.

The UI taxes and government contributions are funneled through a central Employment Fund (EF). The Fund is a strictly regulated quasi-private body, governed by employer and employee union representatives. The EF also proposes the tax rates based on the regulations and predicted wages and unemployment; the rates are then nominally confirmed by the government. The Fund further manages a legally mandated business cycle buffer with peak values of about 1.7 billion euros. This buffer is taken as a given for the simulations, and costs related to maintaining the buffer are considered part of the shared costs.

In the Finnish system, pensions also accrue during insured unemployment. On average, for each euro in UI benefit payments, the Employment Fund makes an additional transfer

of 30 cents to pension funds. The pension transfer is fully financed by the UI tax. The employer tax share of these pension costs are also attributed to employers. The UI tax has also been used to finance an adult education subsidy, adding an expenditure of about 4% on top of the UI-related costs on average. Generally, the fraction of taxes that finances any costs unrelated to specific UI spells is considered shared.

2.3 Historical experience rating

Finland has experimented with two small-scale experience rating systems. The first one levied a flat fee for each new furlough in early 1990's. The tax amount corresponded to the flat-rate benefit for two weeks. The system was phased out when a new tripartite agreement on UI financing was reached in the late 1990's, dividing the current cost responsibilities between employers, employees and the government. The historical furlough rating was simulated separately, with the results appearing in Appendix A. According to the simulation, such a system would only have covered about a fifth of the collective employer share[4] of furlough UI costs between 2006 and 2021, even if the fixed fees were adjusted for inflation and then doubled.

Another system, still in force, applies to employers who dismiss older workers. Historically, individuals who were aged 55 when the usual UI entitlement period was exhausted have been granted an UI extension until old-age retirement. Nominally, the latest employers are responsible for up to 80%–90% of the costs of the extension since 2009 (a total of 2.1 billion over 2009–2021 in 2019 euros), with smaller employers paying less.[5]

Despite the high nominal rating, experience rating has covered less than a quarter of the relevant costs. A separate simulation in Appendix B explains this result in terms of the regulatory constraints. The simulations in this paper take the existing system as a given: these rated payments and a corresponding amount of extended benefits are simply dropped and then ignored. The residual, unrated extended benefits are treated as shared costs due to overall censoring of very long spells; the effect of censoring is reported separately in Section 4.

Overall, the results for both of the historical rating systems illustrate that the choices in experience rating matter. Both systems only cover a small minority of the costs in their scope because of the restrictions imposed upon them. On the other hand, Kyyrä and Tuomala (2023) estimate that the extant experience rating system has reduced excess layoffs of older workers despite its limitations, although the estimates are somewhat imprecise.

[4]Defined as employer share of the UI tax times furlough costs.

[5]Technically, this extra payment is collected as a lump-sum fee that covers *predicted future* UI costs over the extension period. In practice, most individuals who reach the regular maximum duration of UI and become eligible to the old-age extension remain unemployed for the entire extension period.

3 Data and definitions

This study combines extensive register data on employment, unemployment benefits, registered unemployment, incomes, individual characteristics, and employer finances. Most of the data covers years 1999 to years 2019–2023, depending on the specific dataset. Register data on employment, incomes, registered jobseekers, and employers[6] were obtained through Statistics Finland; each dataset covers the entire Finnish population. The Financial Security Authority provided the data on the universe of unemployment insurance for benefits paid until 2021. When employment or wages for a future year is predicted, the predictions come from state budget proposals, published by the Ministry of Finance in September–October of the preceding year.

The unemployment benefit data are at the level of each individual payment and the corresponding period of unemployment. Regarding employment data, the data cover the start and end dates of *job contracts* from 1999 to 2018. For these years, annual wage data per each (employee, employer, year) triplet are paired with job contract data to estimate a daily wage. From 2019 to 2023, data for both work and wage are at the level of *payment periods*, typically per month. Appendix C covers how a Finnish peculiarity, a holiday bonus earned through the year but typically paid in the summer, is handled.

The reason for the termination of last job comes from the jobseeker register data. The termination reason is not used if the recorded termination date precedes unemployment by more than six months.[7] When the reason is missing or not used in this way, it is not given any special relevance when attributing costs to employers.

The separating or suspending employer is identified from employment data; it is not observed in the jobseeker register. Section 4 discusses the alternatives for identifying the separating employer.

An UI spell is defined as a period of time that a person claims UI for. During a spell, the person may alternate between participation in active labour market programs and unemployment, as long as they continue to collect UI. A spell ends when no UI claims are made against a period of at least 30 days. All unemployment spells are censored at two years. If a spell spans multiple years, costs from each year are attributed to employers separately.[8]

All monetary terms such as wages, benefits and taxes are indexed to 2019 levels by

[6]Employer-level data on UI taxes was not available for this project, and the existing taxes were instead estimated using tax law and employer-level characteristics. The resulting aggregate taxes matched annual aggregate revenue statistics with a typical relative measurement error of about 0.1%.

[7]For determining voluntary quits, a separate sanctions dataset was checked to see if the person had been assigned a no-benefits sanction period due to a resignation. While both the job seeking data and the sanctions data come from the same PES offices, they have some inconsistencies. This is why Table 1 in Section 2 presents the share of voluntary quits as a range.

[8]Technically, the UI costs for year t cover the costs from quarter $Q4$ of year $t-1$ to quarter $Q3$ of year t. It is assumed that tax rates for t need to be calculated and given to employers well before the year-turn, while benefit costs are only observed with a slight lag.

the national wage index unless otherwise noted.

When discussing typical values, raw percentiles and means across all employers might not be representative. More than 90% of the smallest employers in the data paid less than 10% of the cumulative wages. In most cases, any mean and percentile values are weighed by wages. For example, the weighted median of tax rates is constructed by putting employers in the order of their taxes, and then choosing the first employer where at least 50% of wages were subject to a lower tax. This also roughly corresponds to the median employer tax rate across workers.

4 Cost attribution

Most existing rating systems require that UI costs are attributed to individual employers. The only exception is Alaska, which uses a system of payroll variation. Miller and Pavosevich (2019) point to the various practical and theoretical problems in this attribution as one reason to simply avoid it altogether. Section 5 discusses the pros and cons of their proposal, which simply tracks net changes in either employment or wages.

There are three main choices in attributing costs: how per-spell costs are translated to attributable amounts, which kinds of spells that are covered, and to whom they are attributed. As explained in Section 2 on the Finnish context, UI costs are jointly covered by employer and employee taxes, the central government and individual funds. Additionally, collecting UI also accrues pensions, and the pension costs are also covered by the taxes. To account for these features, for each year t a multiplier e_t defines the share of UI costs and related pension costs that were covered by employer taxes. This multiplier is used to multiply the directly observed benefit costs per spell to yield attributable costs.

The US rating systems use various principles for excluding some cases where attributing the costs to an employer is considered unreasonable. In this paper, three potential cases are considered: no exclusions, dropping voluntary quits and all dismissals for cause[9], and excluding fixed-term contracts on top of that.

The exclusion of fixed-duration jobs may seem natural. In principle, these contracts should only be used in cases where setting an end date ex ante is what makes the hiring possible, so penalising employers after the expected expiration might be counterintuitive. In practice, these contracts are very widely used, and excluding them would mean a significant share of the costs would end up shared across all employers. Increasing the costs of active dismissals alone might also distort the choice between fixed-term and open-ended contracts.

The third question involves the choice between potential employers, as jobseekers may

[9]Individual dismissals in Finland typically require severe violation of employee obligations, and are empirically rare. For simplicity, the interpretation in this paper is that all individual dismissals were for cause.

have held several jobs preceding their unemployment. Conceivably, prior employers may share some responsibility even if the jobs were not simultaneous: perhaps the worker was fired by X in January, and only enters unemployment in September because they found a temporary job with Y until then. According to Miller and Pavosevich (2019), the US states use a set of more or less arbitrary rules to decide the extent to which different preceding employers are responsible for unemployment. In the simulation, five methods are considered: (A) picking the latest employer paying the highest wage, (B) distributing costs evenly across simultaneous latest employers, (C) imposing some wage and duration restrictions before choosing the latest employer, (D) restricting the responsibility to the base UI-qualifying period, and finally (E) the inverse assignment. Of these, the inverse assignment is used as the baseline for tax rate allocation and other calculations.

The inverse assignment limits the responsibility for each employer. Initially, the responsibility is with the latest employer (paying the highest wage if there were several). The maximum UI attribution per worker is up to one third[10] of their wages over the last N years. Values $N = 3, 5, 9$ were simulated separately, while 5 constitutes a compromise baseline. If the costs to be attributed would exceed this threshold, the preceding employer is picked.

Figure 1 captures the simulated effects of the above choices. Under each attribution mechanism, costs from year t_0 are considered to have been *lost to exits* if the employer no longer pays wages in any of the observed years $t > t_0$. In these cases, even if one were to ignore wages and dip into the net equity or liquid funds observable for these employers, those would cover less than 1% of the attributed costs. The share of costs lost to exits is considerable in all mechanisms, implying full experience rating is probably unfeasible.

When the responsibility of an individual employer is limited in both time and monetary scope (inverse assignment for up to three years), this increases the share of UI costs that could not be attributed to any specific employer. Excluding quits, individual dismissals for cause and fixed-term contracts from being attributed will also substantially increase the fraction of costs that would continue be pooled.

Suboptimal attribution can impose costs in three main ways. First, there are the direct administrative costs: information systems would need to be updated so that the tax administrator can link each UI spell to the correct employer. While a very reasonably simulation of the attribution can be done with data that has some limitations, attribution that has legal and monetary ramifications has no room for approximation. Significantly more data would need to be reported and transfered between the public employment services, the benefit administration, employers and the Employment Fund.

Second, allocation of employer-specific taxes requires a way to contest unjustified taxes. Lachowska, Sorkin, and S. A. Woodbury (2022) report that about 3.5% of all UI

[10]This number roughly corresponds to the median net replacement rate of wages and the pension costs, multiplied by the share of UI-related costs that is covered by the employer taxes.

claims in the US are challenged by employers who wish to avoid the tax penalties. They estimate that the expectation of such appeals drive down the initial claiming rates and UI take-up for some workers. The challenges further drain the resources by employers, employees and the administration.

Finally, even with a functional appeal system, some costs may be misattributed to an employer that did not expect the penalty. In such cases, the rating system provides no incentive effect to prevent the layoff, but a strong disincentive effect to limit hirings: some risk, deemed unpredictable by employers, of a later tax penalty is attached to all new contracts.

Some institutional features specific to Finland make attribution especially difficult. Individuals can leave the labour market for a number of valid reasons such as studies, child homecare, or sickness without losing their UI eligibility, and this often leads to long delays between job loss and the first insurance claim. Assigning UI costs for a fresh graduate to their summer jobs over the last two years might well appear arbitrary and unpredictable to their employers. On the other hand, these cases constitute a significant share of all UI spells, and the more restrictions are based on attributing costs of layoffs, the more the externalities end up being covered by other, lower-risk jobs.

The variation by attribution choice can be assessed in at least two ways. While the clear majority of employers are not affected much by the choice of the simulated attribution methods, Appendix D shows that for employers with the top resulting tax rates, the mean difference between no restrictions (methods A and B) and any restrictions (methods C to E) is 1.0 ppt lower annual taxes. On the other hand, results of restrictions C–E are similar to each other; in other words, it is probably desirable to have some constraints for individual employer's responsibility, but the choice between such constraints is less impactful.

Second, Appendix E demonstrates that simply dropping the single longest UI spell per employer reduces annual tax rates by almost 1.0 ppt in the top brackets, and cumulative rates by about 0.3 ppt. This is the extent to which very the highest tax rates depend on single long spells on average.

Some rules are also needed for cases where employer sells the entirety or a part of their operations, including their staff. The experience from the US suggests that these rules to prevent the dumping of accumulated tax responsibilities can be complicated. For the purposes of this paper, a coarse algorithm for transfering the attribution was used, covered in Appendix F. A simplified summary is that if 50% or more of a large personnel moves to another employer over a short period, a similar share of remaining UI responsibilities also follows them.

Figure 2 combines the various limitations to the rating system that arise from various sources. After accounting for the various limitations described above, only about 60% of the current UI tax could be realistically subject to rating – before considering any explicit

maximum tax.

Figure 1: Unattributed and uncovered costs under attribution mechanisms. The figures track the share of UI costs under different attribution mechanisms that are either non-attributable, are excluded due to proposed restrictions on job termination reasons, or would be likely to be uncovered by any rating system because the employer has ceased to employ any workers.

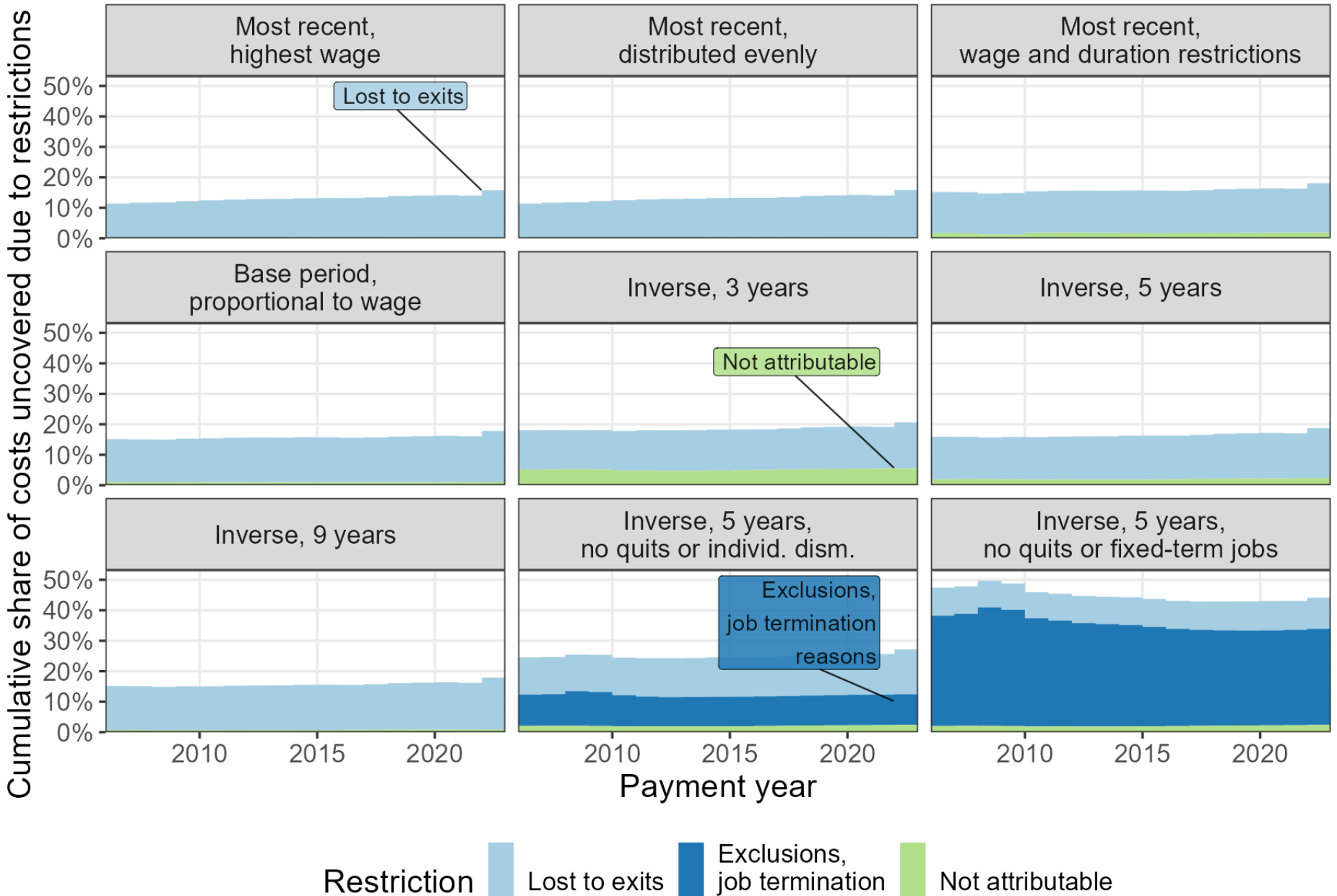
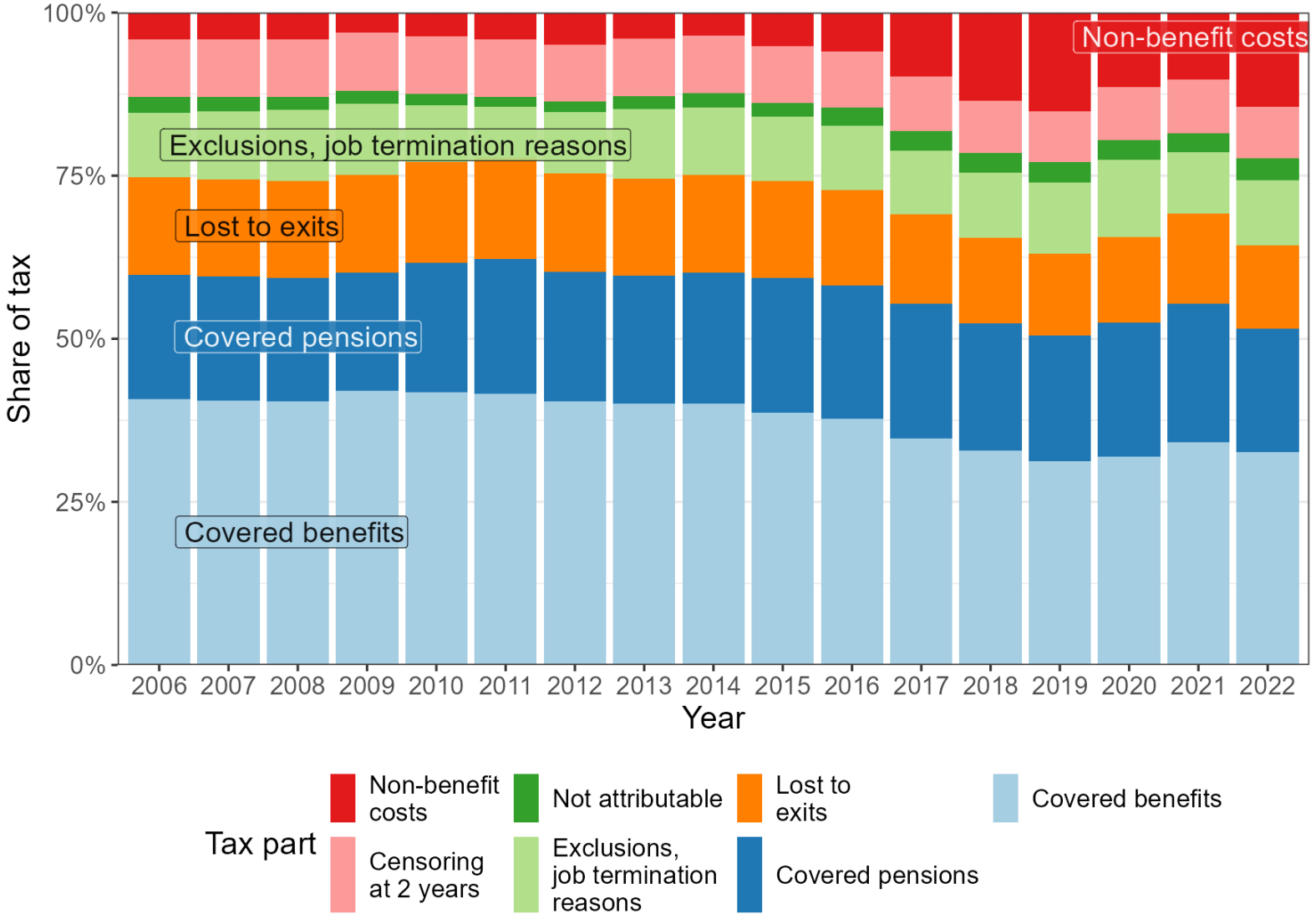


Figure 2: UI tax decomposition: attributable and non-attributable parts. The annual employer UI tax is decomposed into different parts. Covered benefits and pensions correspond to UI benefits and related pension costs that are attributable to employers. Exclusions include voluntary quits and individual dismissals. Non-attributable cases refer to cases where the previous employer could not be identified from the data. The censoring effect refers to the annual shares of payments that were due to spells exceeding a maximum follow-up of two years. Non-benefit costs refer to miscellanous expenditure financed by UI taxes but not directly related to UI costs.



5 Translating attributed costs to taxes

All the existing rating systems in the US translate past UI costs into future tax rates. Most states base the taxes on one of two indices: the benefit ratio or the reserve ratio. In addition to these systems, the employment and payroll variation indices (EVI and PVI) proposed by Miller and Pavosevich (2019) are simulated.

In comparison, the simplest assignment would be to require that each employer pays the attributed UI costs from year t at the end of year $t + 1$. While this assignment is not used to a substantial extent anywhere in the world, it produces a useful benchmark for the other simulated mechanisms. The results in the main text reflect a constrained version that caps the annual cost at 10% of wages and passes any residual to future years, while Appendix G compares it to alternatives with a higher or no cap.

Table 2 summarizes the different methods for transforming past costs to indices. Each experience rating system first calculates an index value based on the past. This index value is then further translated into a tax rate by state officials, often by dividing the employers into an array of index value brackets and then assigning a tax rate to each bracket. Appendix H shows example index value calculations for synthetic employers, based on real firms but with numerical values jittered to protect sensitive information.

While the other mechanisms can be summarized by a single formula, the variation indices require a slightly longer definition. For calculating employment or payroll variation, Miller and Pavosevich propose the formula

$$\frac{\sum_{t=t_0}^{t_N} (\text{positive changes}_t - W \times \text{negative changes}_t)}{N \times \text{average employment from } t_0 \text{ to } t_N}, \tag{1}$$

weighing reductions with a penalty $W > 1$. The penalty factor discourages temporary unemployment where large decreases in period would otherwise be canceled out by increases in a later period. The change in period t is the change in headcount from the previous period. For this paper, the baseline measure uses one month as the frequency for t, twelve months as the number of periods N to calculate the index over, and $W = 1.5$. Appendix I examines changing the frequency and the number of periods; the resulting tax rates are on average very similar to the baseline, but a larger number of periods reduces volatility for small employers.

For the benefit and the reserve ratios, the number of base years X is set at five (corresponding to, for example, Iowa). While it is more common in the US for the reserve ratio to count the payment-cost balance over all recorded past years, the available individual-level benefit data for Finland only goes back to 1999. Years 1999–2005 were used as background data, while the simulations were run over 2006–2021 as if experience rating was first used to set tax rates for 2006.

Under all existing rating systems, employers need to qualify for the rated tax by having

Table 2: Tax assignment mechanisms

Mechanism	Index formula	Features
The existing schedule	Index = firm's payroll Rate t_l for wages up to 2 M€ Rate $t_h > t_l$ for part over 2 M€	+ Very simple and predictable − Marginal rate jumps at 2 M€ − No incentives for hires/layoffs
Direct assignment	Index = costs	+ Simple assignment − Unadulterated rate fluctuation − No incentives to hire
Benefit ratio	$\frac{\text{Benefits over last } X \text{ years}}{\text{Wages over last } X \text{ years}}$	+ Index can be used as a rate +/− Gradual responses − Weak incentives to hire − Wide variation in marginal responses
Reserve ratio	$\frac{\text{Payments } - \text{benefits over last } X \text{ years}}{\text{Wages over last } X \text{ years}}$	+/− Reacts quickly + Good eventual match from costs to responses − Translation to tax rates less obvious − Weak incentives to hire
Employment variation	$\frac{\text{Employment changes over last } X \text{ periods}}{\text{Average employment}}$	+ Simple to implement + Best incentives to hire + Treats all increases and decreases equally − Arbitrary translation to tax rates − No incentives to aid former workers − Weaker reactions to layoffs

"Benefits" refer to benefits paid to workers previously hired by the employer, following the attribution rule in the previous section. "Payments" refer to rated UI tax payments. For the first simulated years, the reserve ratio system is initialized using past taxes paid under the existing system over the preceding five years.

some wage history; until they do, they pay a fixed rate. In this simulation, the aggregate mean tax rate (predicted rated payments divided by predicted wages) is used for new employers. To qualify for rating, employers must have paid wages in at least three of the last five years. The new employer rate involves a tradeoff: a lower rate imposes a smaller tax burden on new employers, but might increase incentives for employers with large accumulated tax burdens to shift their workers to a new business ID for tax purposes.

In the US, an important parameter of the tax is the taxable wage base, ranging from 7 000 to 62 500 dollars across states for the UI tax. An individual's wages are only taxable up to the base. In Finland, the entire wage is taxed, and the simulations do not use a taxable base.

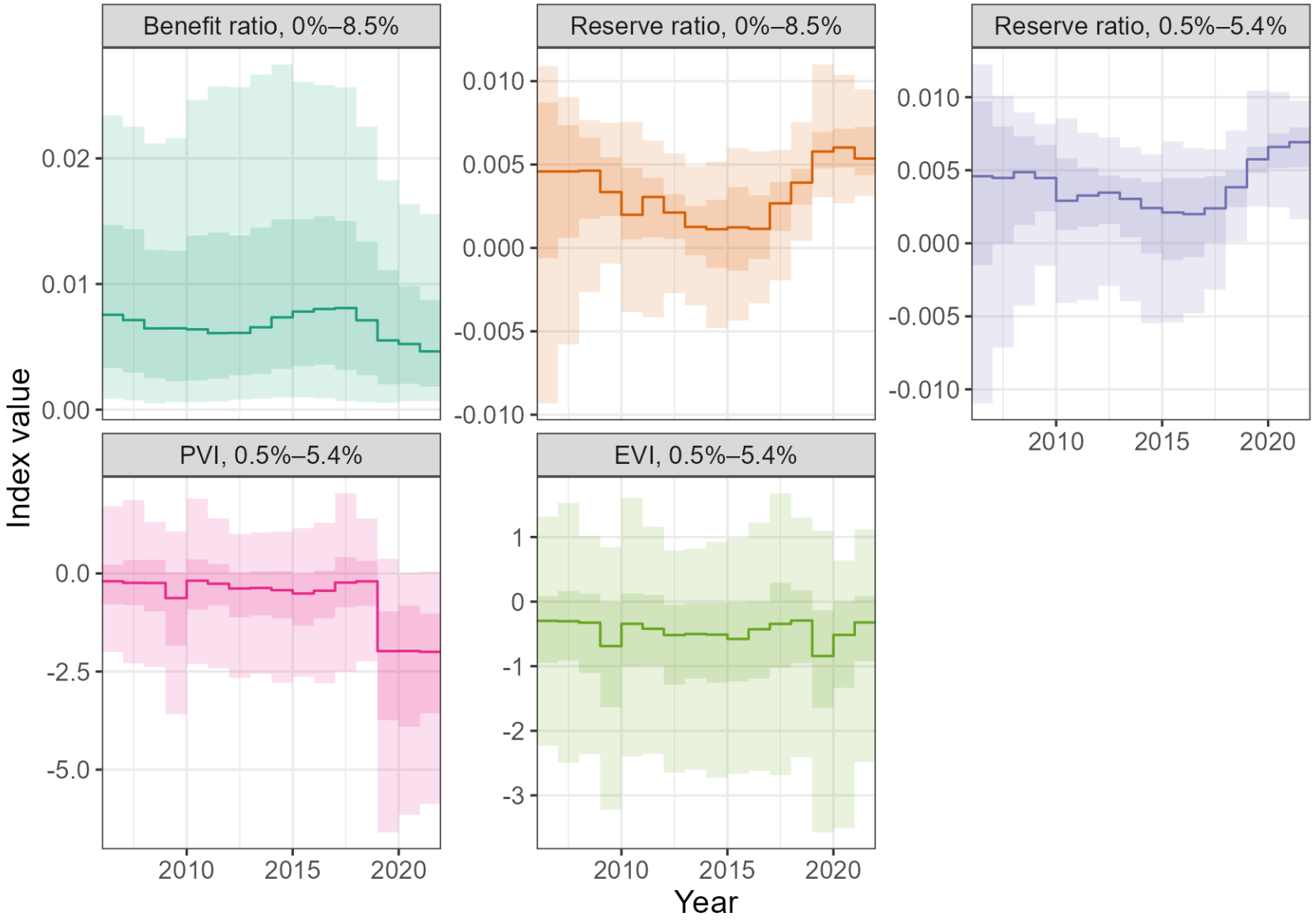
All rating systems also have a maximum tax rate, often also a minimum. For this paper, the tax range of 0.5%–5.4% from Oregon were used as a baseline for simulations. Wyoming provides an alternative range of 0%–8.5%, which was also simulated the illustrate the impact of the maximum rate. While Oregon provides a reasonable match to Finland in terms of its high wage base, size, UI fund solvency and replacement rates, the

Wyoming range was mainly chosen as an example of a wider tax range for comparisons.

In all simulations, the taxes were divided into two parts: the rated tax and a shared tax. For the direct assignment, the rated tax is simply the last year's UI cost; for the other methods it is the rate given by a separate translation from costs to indices and indices to rates, described in the next subsection.

For all the simulations, the pool of shared taxes is calculated by deducting the total predicted rated tax from the revenue target. For simplicity, the planner's aggregate revenue target is taken to be the actual tax revenue under the current system. To improve comparability, the shared tax part is calculated similarly to the existing tax system for each employer, but scaled by a multiplier of $m = 1 - \frac{\text{rated taxes}}{\text{revenue target}}$. As an example, suppose an employer pays a 1% tax under the current system, that the revenue target is 1 billion euros, and that the predicted rated tax revenue in the simulation would be 700 million euros. The old tax would be scaled down by $m = 1 - 0.7$ for all employers, so the employer would pay a 0.3% shared tax.

Figure 3: Index value ranges by year. The solid line represents the wage-weighed median value per year, while the shaded areas represent the areas between 10th and 90th weighed percentiles and the weighed interquartile range. A weighed percentile of 10 means the value where employers paying 10% of wages had that index value or lower.



5.1 Benefit ratio assignment

For the benefit ratio, the index value could be used directly as a tax rate. However, to create a basis for translating the other indices to rates, an array procedure is used instead. This procedure does not produce substantially different tax rate from simply using the ratio: for 80% of wages, the difference is ±0.008 ppt. However, the resulting distribution of per-employer cost-to-payment ratios is slightly more symmetrical around 1, and leaves a smaller fraction of taxes unrated.

In the array allocation, for each year, employers are ordered by their index value and placed in 100 brackets, where each bracket holds 1 percent of total wages. This distribution appears in panel 1 of Figure 4 for year $t = 2016$. Then the wages for the following three years are predicted for each bracket (panel 2). The predictions use empirical year-to-year correlations for similar brackets from early set-aside years. The prediction recognizes that employers with larger UI costs are slightly more likely to have smaller wages in the future on average.

The tax rates in each bracket are then set to reflect the *per-bracket* cost ratio to predicted wages.[11] Put differently, the goal is to match the predicted distribution of payments in panel 5 as closely as possible to past costs in panel 4. However, because the rates are confined to be between the minimum and maximum rates set, panels 5 and 4 are not fully identical.

The bracketed rates are then transformed into an increasing polynomial schedule[12]. Polynomialization ensures that for large firms, even small changes in their index value trigger a response, even if their index bracket does not change. Panel 6 in Figure 4 reflects the actualized rates according to the simulation, taking into account prediction error in wages and the polynomialization. Appendix J presents the polynomial transformations for all the values.

All existing rating systems may end up assigning taxes to employers that are higher than their actual costs. A simple illustration of this is an employer that pays 100,000 in wages in year 1, causes 5,000 in costs and is allocated a tax rate of 5%, but ends up paying 10,000 in taxes in year 2 because their wages increased to 200,000. Only the reserve ratio dynamically adjusts for this effect over time. The bracketing approach could in theory excarberate this phenomenon, because employer A has to pay high taxes simply because they are in a high bracket and a high fraction of neighbouring employers B are predicted to go bankrupt. In the simulations, high per-employer payment-to-cost ratios are mostly observed for low tax rates; for higher simulated taxes, the constraining impact of the maximum rate dominates any within-bracket pooling effect.

[11] If this would produce any rates where a higher ratio would lead to lower taxes, those rates are replaced by linear interpolation from surrounding brackets.

[12] All index values are transformed by the inverse hyperbolic sine to reduce sensitivity to extreme values before polynomialization. The schedule is set using an algorithm by Murray, Müller, and Turlach (2016).

The employment variation index has no known natural translation of index values to rates. This paper thus follows the simulation by Miller and Pavosevich (2019) and copies the array allocation of benefit ratio rates instead. For example, if a firm is in the 50th bracket by reserve ratio, their bracketed tax revenue is assigned to the 50th bracket of employers by the variation index. Wages were then predicted as before, the revenue translated into bracketed rates, and bracketed rates again polynomialized.

The reserve ratio has a somewhat more natural translation, but the most obvious translation produced strongly fluctuating aggregate revenues, and was very sensitive to parametrization of the calculation. Results for such a direct translation of ratios to rates are discussed in Appendix K. To improve comparability of the simulated systems, the array translation from benefit ratio was also used for reserve ratio. For 50% of wages, the resulting annual tax rates differed from the direct translation by between -0.3 and 0.6 ppt at the employer level.

In each simulation, the shared costs were used in the final stage to balance revenues. When setting taxes for year $t + 1$, the actualized revenues from year $t + 1$ were taken as the target, interpreting them as objectives set annually by the planner and treating them as a given. However, the tax rates for $t + 1$ only used wages predicted from year t data to estimate the predicted rated tax revenue, since the tax setter would not know the exact taxes in advance. In practice, the simulated revenues matched actual revenues up to a relative error of 0.2% on average, implying that the methods can produce reasonably predictable aggregate revenues.

Figure 4: Medium-term balance of wages, costs and payments for the benefit ratio, base year 2016. The solid line represents the wage-weighed median value per year, while the shaded areas represent the areas between 10th and 90th weighed percentiles and the weighed interquartile range. A weighed percentile of 10 means the value where employers paying 10% of wages had that index value or lower.

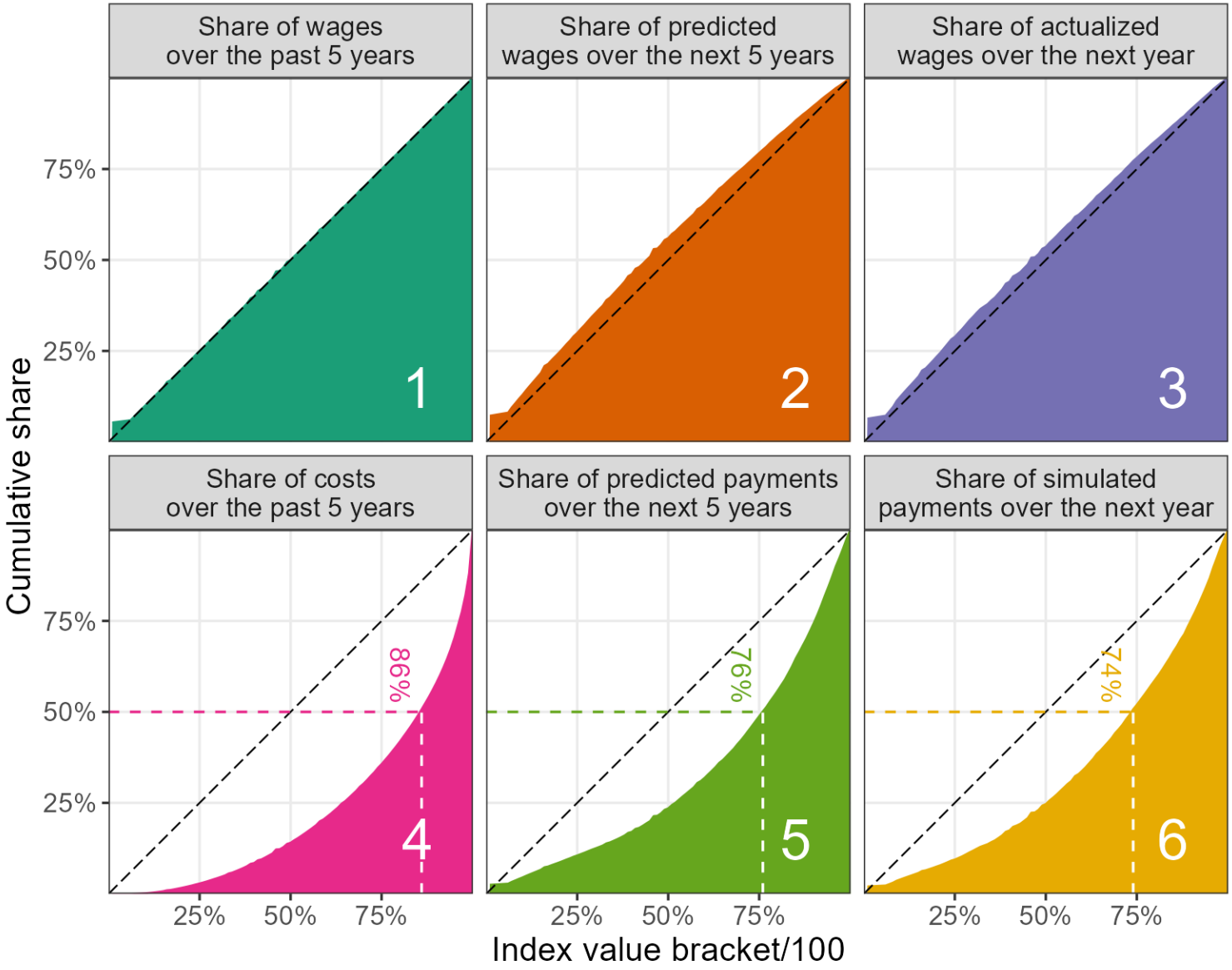
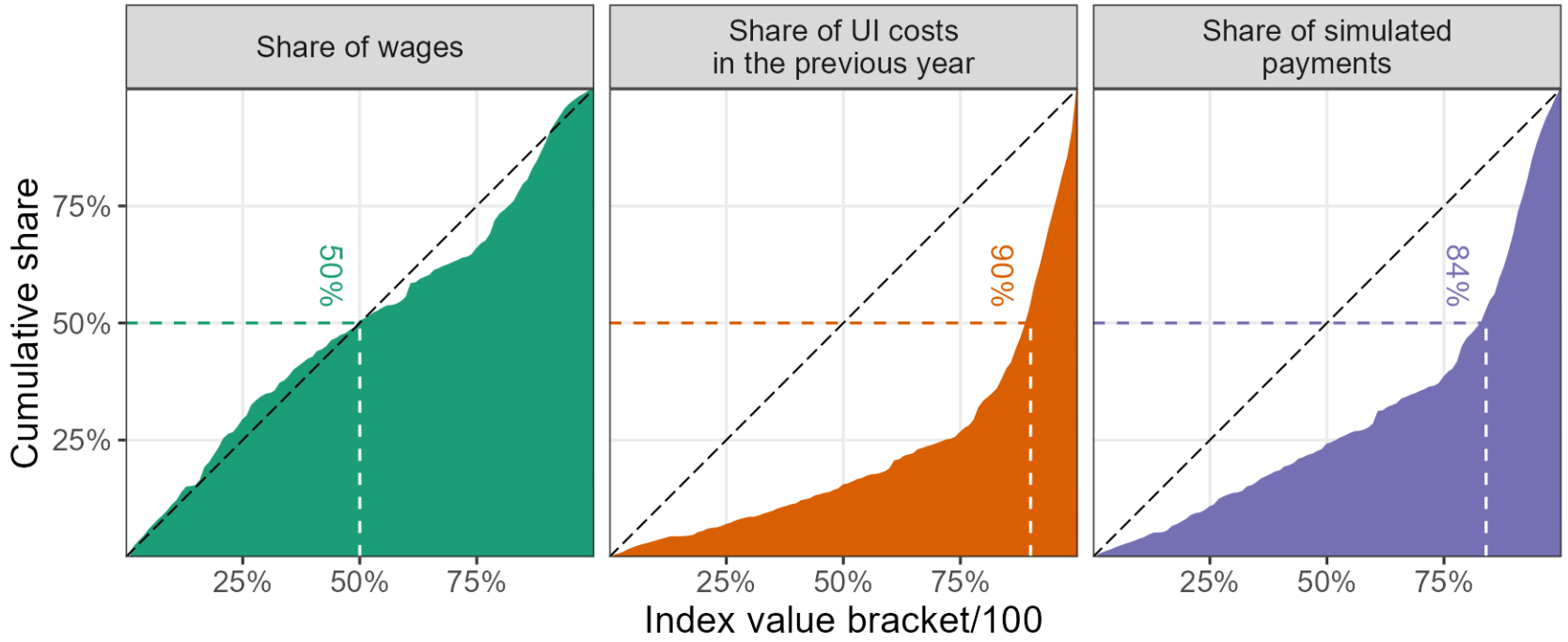


Figure 5: Short-term balance of wages, costs and payments for the reserve ratio. The colored areas represent the cumulative share of wages, costs and payments, ordered by the reserve ratio in 2016. Each bracket holds 1% of cumulative wages over the preceding 5 years.



5.2 Resulting rates and cost-to-payment ratios

Figures 6–7 show the distributions of resulting annual tax rates and per-employer differences in rates between systems, pooling all the years together and adding together the simulated shared and rated taxes. Under each system, the majority of wages would be subject to slightly lower rates than they currently are, while a smaller share of employers would pay higher wages on some years. Appendix L shows the corresponding figures for cumulative tax rates and mean tax rate differences by industry.

The simulated ratios combine both rated and shared taxes and rated and shared costs. For this comparison, shared costs are defined by dividing total unrated costs across employers in proportion to their wages. The representative employer has a cost-to-payment ratio of 1. Appendix R illustrates a split version where the rated costs are compared to rated taxes and shared costs to shared taxes.

Figures 8–9 show the resulting cost-to-payment ratios for industries and firm size categories. The industry classification follows Korpela (2024) and flexibly highlights industries that are either major employers or have a high unemployment risk from different classification levels.

The figures illustrate, firstly, that all the mechanisms reduce the disparity of costs and payments, particularly for high-risk industries. However, even the direct assignment of costs does not eliminate differences because some employers are would be simply unable to pay. Second, the simulations also significantly equalize the ratios of *rated* taxes to costs across employer sizes, while retaining the current allocation of *shared* costs, with smaller firms paying smaller rates, reflecting the choices in the current system.

A part of the disparities between industries may be due to the strong role public sector employers have in Finland. Most of the wages in health and education are paid by regional public sector employers and publicly funded universities. These employers are usually much less exposed to volatility in market conditions and competition than private employers are, which may partially explain lower unemployment risk.

Table 3 represents the shares of taxes paid by employers by highest and lowest cost-to-payment ratios. All the simulated systems significantly increase the share of payments for employers who are attributed 50% of all benefit-related costs. A hypothetical direct assignment system where the annual tax rate would be capped at an exorbitant 100% of wages is also listed here to show that even such a radical system could not entirely eliminate the discrepancy.

Employment and payroll variations provide the weakest equalization of attributed costs to payments. This is to be expected, because these methods do not try to attribute those costs at all, and are meant to provide incentives for both hirings and separations. The disparities in estimated cost-to-payment ratios need to be weighed against the advantages of a substantially simpler system and clear rewards for employment increases.

Ultimately, the calculated ratios reflect a somewhat arbitrary view on which unemployment costs of their ex-workers employers are responsible for, and they completely ignore reductions in UI costs when employers hire new workers.

There is a mechanical reason that could explain high cost-to-payment ratios even if unemployment risks were in fact distributed randomly. If employers go randomly out of business early in their lifecycles and have to dismiss all their workers, their lifetime tax payments will be lower than of those employers who survived longer.[13] While this explains a part of the disparities, it does not appear to be a very large part. Empirically, the employers with highest cost-to-payment ratios, responsible for 50% of the costs, continue to pay about 40% of their wages after accumulating more than half of their payments. Appendix M presents visual evidence of annual entries, exits and average age of employers with high, medium and low cost-to-payment ratios; while employers with high ratios have somewhat elevated exit rates, they are not exorbitantly high.

[13]The fact that a large share of unemployment costs are unrecoverable due to exits does not directly imply this phenomenon would be common. Employers can accumulate tax payments over a long time before finally going out of business, and still have a balanced lifetime cost-to-payment ratio.

Figure 6: Distribution of annual rates. Shaded grey areas correspond to the interquartile range of wages, while the vertical dashed line is the weighted median rate, using wages as weights. The direct assignment's tax rates are winsorized at 8.0%.

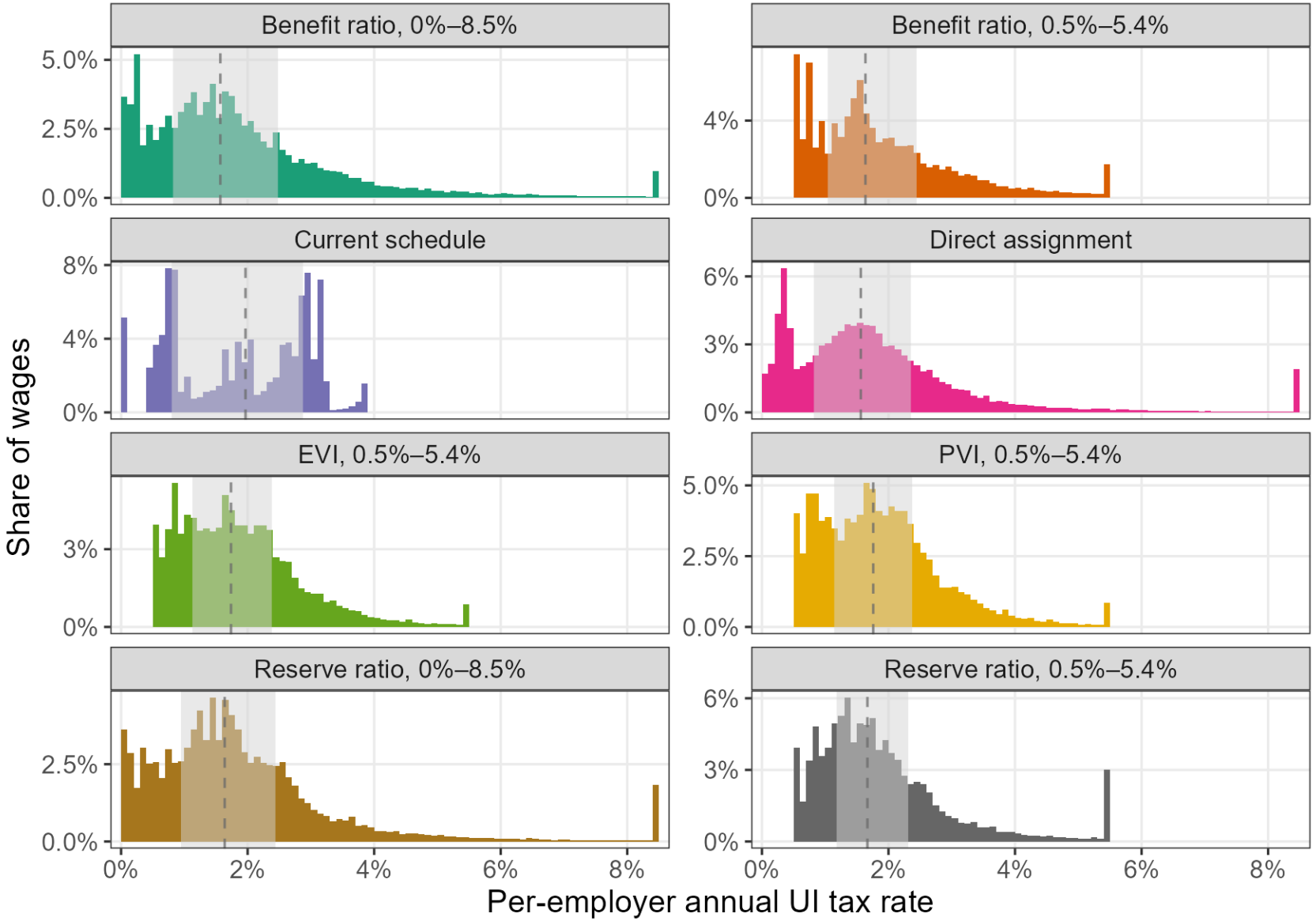


Figure 7: Distribution of annual changes in rates. Each method is compared to the same baseline, which is the employment variation index (EVI). Since all of the simulated methods differ significantly from the current schedule, using a simulated method as a baseline makes it easier to observe the differences between rating methods. The difference, in percentage points, is calculated as $\text{rate}_{\text{EVI}} - \text{rate}_{\text{alternative}}$, i.e., the result of moving *to* the EVI *from* one of the methods listed. The plotted differences are winsorized at ±5.0 percentage points.

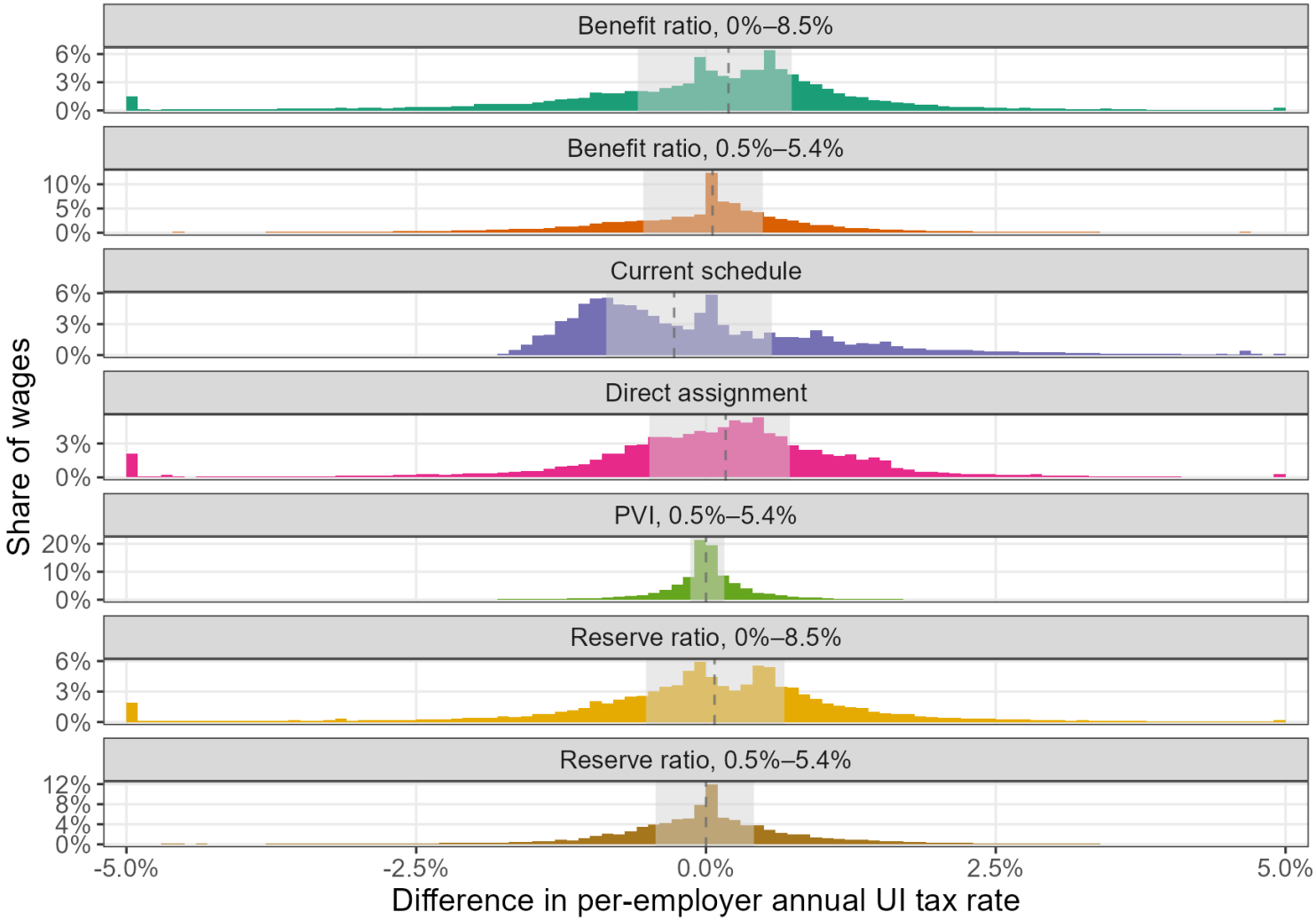


Figure 8: Cumulative benefits-to-payments ratio, by method and industry. Industries that were in either the top 3 or bottom 3 by ratio for at least one of the methods were plotted. If a firm operated in multiple industries, its industry is the one in which it paid the most wages.

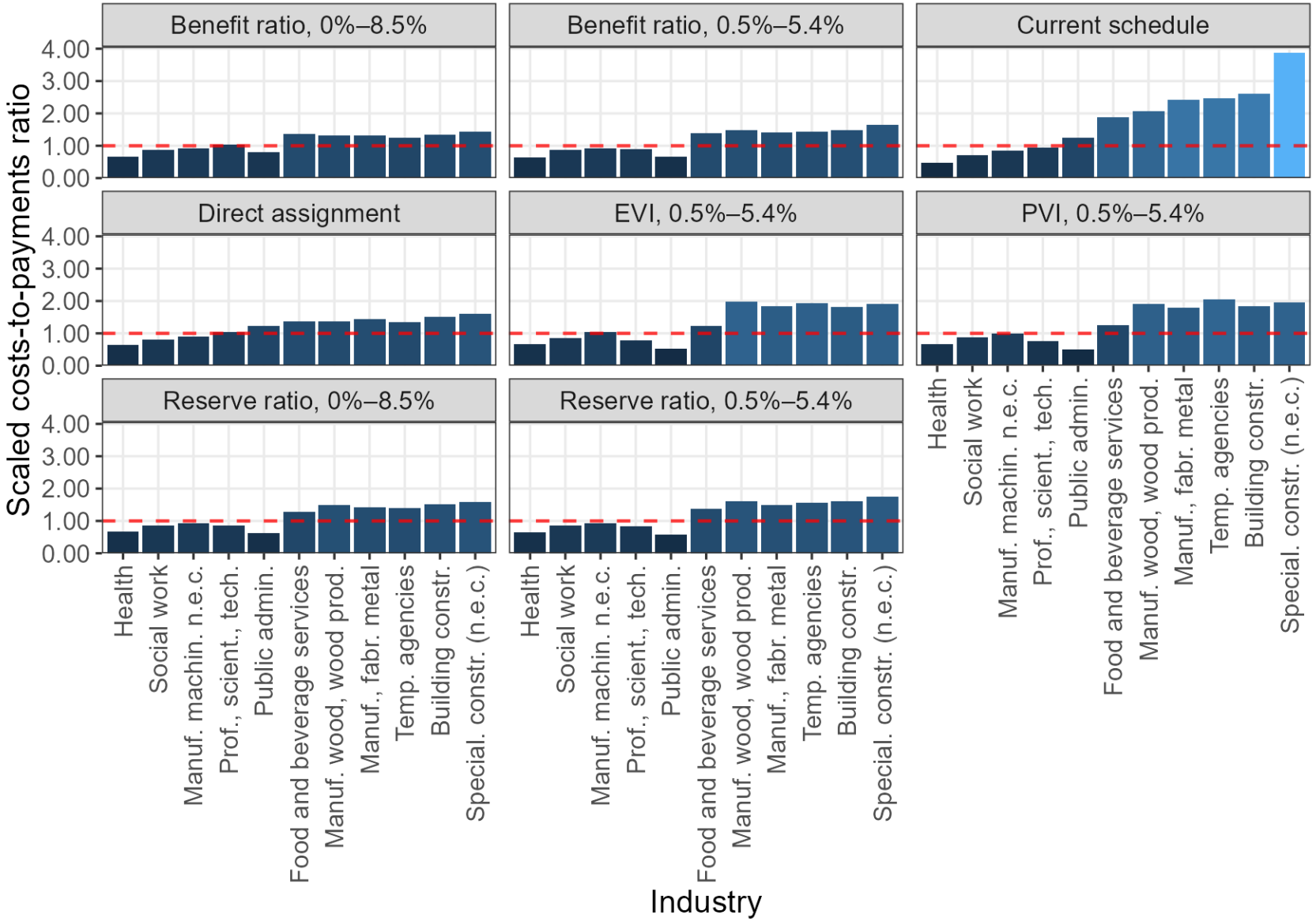


Figure 9: Cumulative benefits-to-payments ratio, by method and size. A firm's size is defined as the sum of annual headcounts, divided by the years it was observed paying wages.

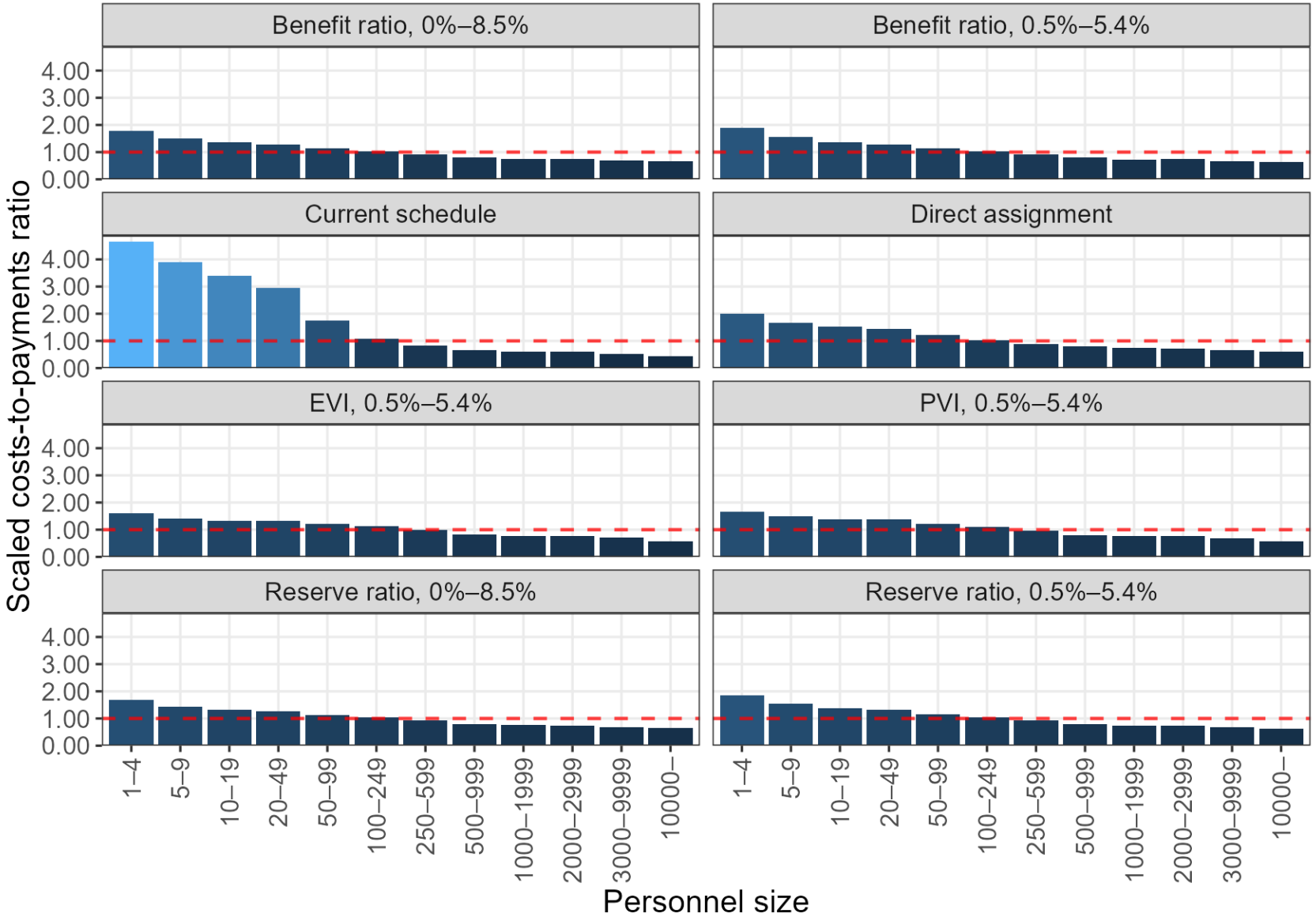


Table 3: Payment shares by method and group

Method	Top 50% of costs	Bottom 20% of costs	Top 20% of costs	Bottom 20% of wages	Top 20% of wages
Current system	8.7%	62.4%	0.8%	8.8%	21.5%
EVI, 0.5-5.4%	17.9%	54.0%	3.1%	23.1%	18.7%
PVI, 0.5-5.4%	17.5%	55.2%	3.1%	22.7%	19.7%
Reserve ratio, 0.5-5.4%	25.7%	42.8%	4.4%	32.1%	12.8%
Reserve ratio, 0-8.5%	28.8%	38.9%	5.3%	33.5%	11.0%
Benefit ratio, 0.5-5.4%	26.3%	38.2%	5.3%	29.5%	10.3%
Benefit ratio, 0-8.5%	29.4%	33.4%	4.6%	14.3%	15.8%
Direct assignment, 10% cap	35.6%	25.8%	5.8%	27.9%	15.5%
Direct assignment, 100% cap	40.8%	23.7%	7.8%	25.0%	21.7%

Employers are put in order of their cumulative cost-to-payment ratios, and then split into groups according to either their share of cumulative costs (columns 2–5) or wages (columns 6–7). The cost-to-payment ratios divide benefits by simulated rated taxes. No costs divided by no payments is defined as a ratio of zero, positive costs divided by no payments is defined as an infinite ratio.

5.3 Effects on small employers

The current tax schedule imposes lower tax rates on smaller employers. For the shared part of the tax, this design is replicated in all simulations. However, all the simulated systems would increase the effective mean tax rates for small employers. While for most small employers and most years the the taxes would not change much in the simulated systems, some employers in some years would pay significantly more. Figure 10 shows the mean tax difference by personnel size relative to the EVI, while Figure 11 shows the distribution of the taxes under EVI by headcount.

The different mechanisms also produce different year-to-year fluctuations in tax rates. Similarly to the findings by Vroman et al. (2017), the baseline simulation of employment variation exhibits more volatility for small employers than other methods. However, when the reference period is increased from the baseline 1 year to 3 years, the EVI shows fluctuation similar to the reserve ratio, although still somewhat higher than the benefit ratio. Appendix I covers a more detailed comparison of the parameters for EVI.

Table 4: Year-to-year variations in tax rates

Method	All employers	Small employers	Small employers, excluding new employers
Current system	$[-0.20, +0.15]$	$[-0.05, +0.05]$	$[-0.05, +0.05]$
EVI and PVI	$[-0.58, +0.51]$	$[-0.97, +0.99]$	$[-1.18, +1.21]$
EVI variant, 36 months	$[-0.39, +0.28]$	$[-0.51, +0.39]$	$[-0.43, +0.55]$
Reserve ratio, 0.5-5.4%	$[-0.35, +0.27]$	$[-0.25, +0.18]$	$[-0.24, +0.19]$
Reserve ratio, 0-8.5%	$[-0.56, +0.64]$	$[-0.47, +0.27]$	$[-0.47, +0.47]$
Benefit ratio (both rate ranges)	$[-0.27, +0.25]$	$[-0.20, +0.16]$	$[-0.17, +0.23]$

The shown range captures the extent of annual variation, in tax rate percentage points, for firms paying 50% of the wages in the respective class. Small employers refer to employers with a headcount of less than 10 (in both the running and the preceding year) and who paid at least 1,000 euros per year.

The tax increase is due to three reasons. First, smaller employers appear to cause somewhat more unemployment relative to their wages than larger employers. Second, the index responses tend to be mechanically larger for small employers, because the index denominators (wages and headcounts) are smaller.

Third, most new employers start out small, and many small employers are new employers. New employers were assigned a mean tax rate in the simulations. In a static simulation, this choice can easily be altered without a significant impact on aggregate revenues. The main concern of lowering the rate for new employers is that this might encourage employers with large accumulated unemployment experience to move their operations to a new business ID to avoid the tax. How relevant this concern is depends on

the effectiveness of provisions against this sort of tax dumping[14].

Small employers could be shielded in many ways under a rating system. All the index values have either wages or headcount in the denominator. It is straightforward to impose a floor value to the denominator, for example setting it at the larger of the true headcount and 10. This would attenuate large index value and tax rate fluctuations towards zero for small employers. Another option would be to take size into account when the indices are translated to tax rates.

Such changes would have a limited impact on aggregate revenues. This is because the smallest employers only pay a limited fraction of wages.

However, there is an inherent tension between such protections and incentives. Firstly, the above alternatives would directly decrease the tax response that small employers face due to unemployment or headcount changes. Secondly, special treatment of small firms could discourage growth. Such potential issues are also present in the current UI tax: in 2024, the marginal UI tax rate almost quadruples between the 60th and 61st employee.[15] Ultimately, the policymakers have a wide menu of choices between no special treatment and very strong protections for small employers.

[14]The US officially calls the practice State Unemployment Tax Dumping in their 2004 Act that seeks to curb dumping.

[15]The marginal tax rate threshold depends on wages rather than personnel size, but is translated to corresponding empirical headcounts for exposition.

Figure 10: Mean changes in tax rates, by personnel size. Each method is compared to the same baseline, which is the employment variation index (EVI). The per-employer difference, in percentage points, is calculated as $\text{rate}_{\text{EVI}} - \text{rate}_{\text{alternative}}$, i.e., the result of moving *to* the EVI *from* one of the methods listed.

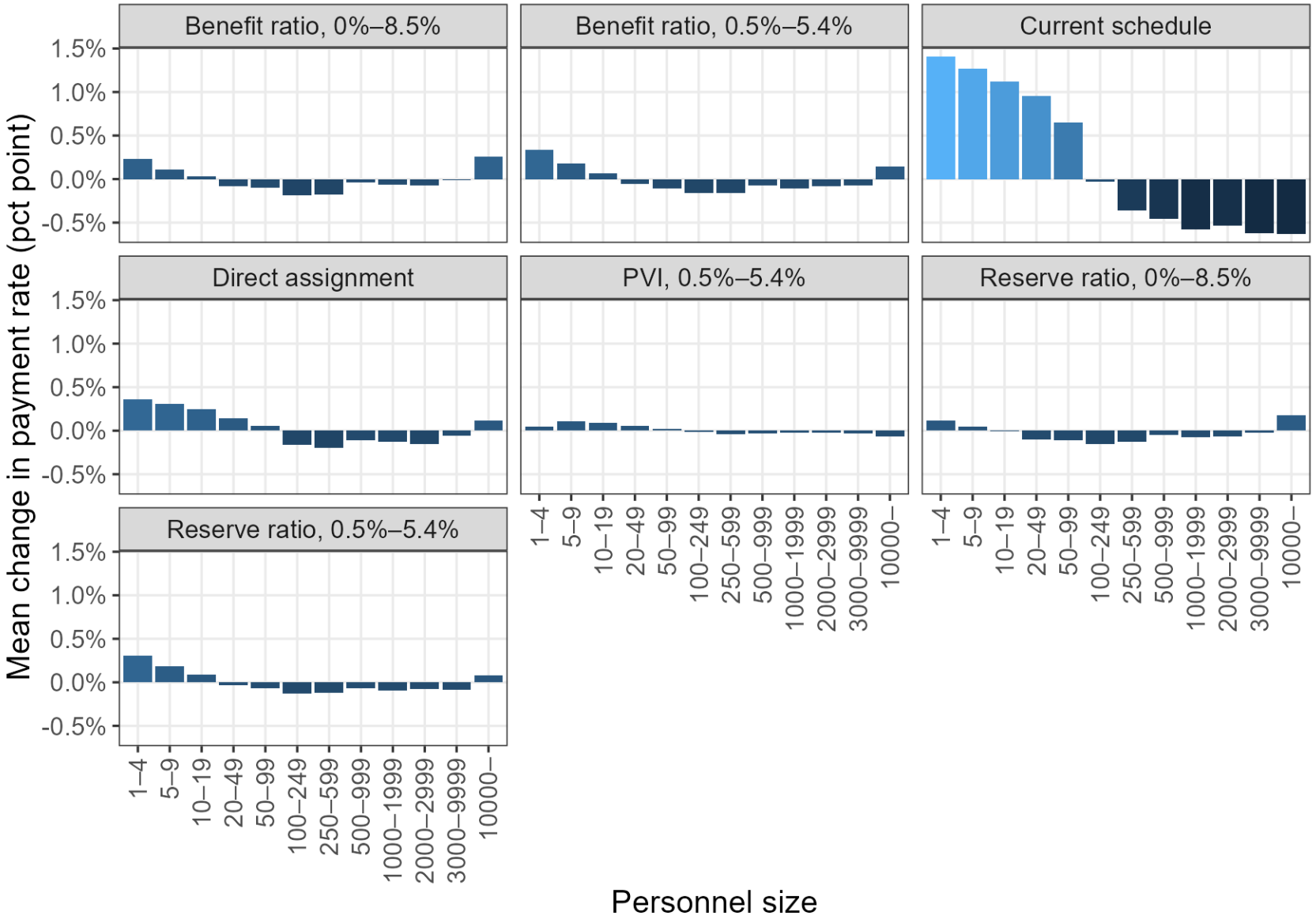
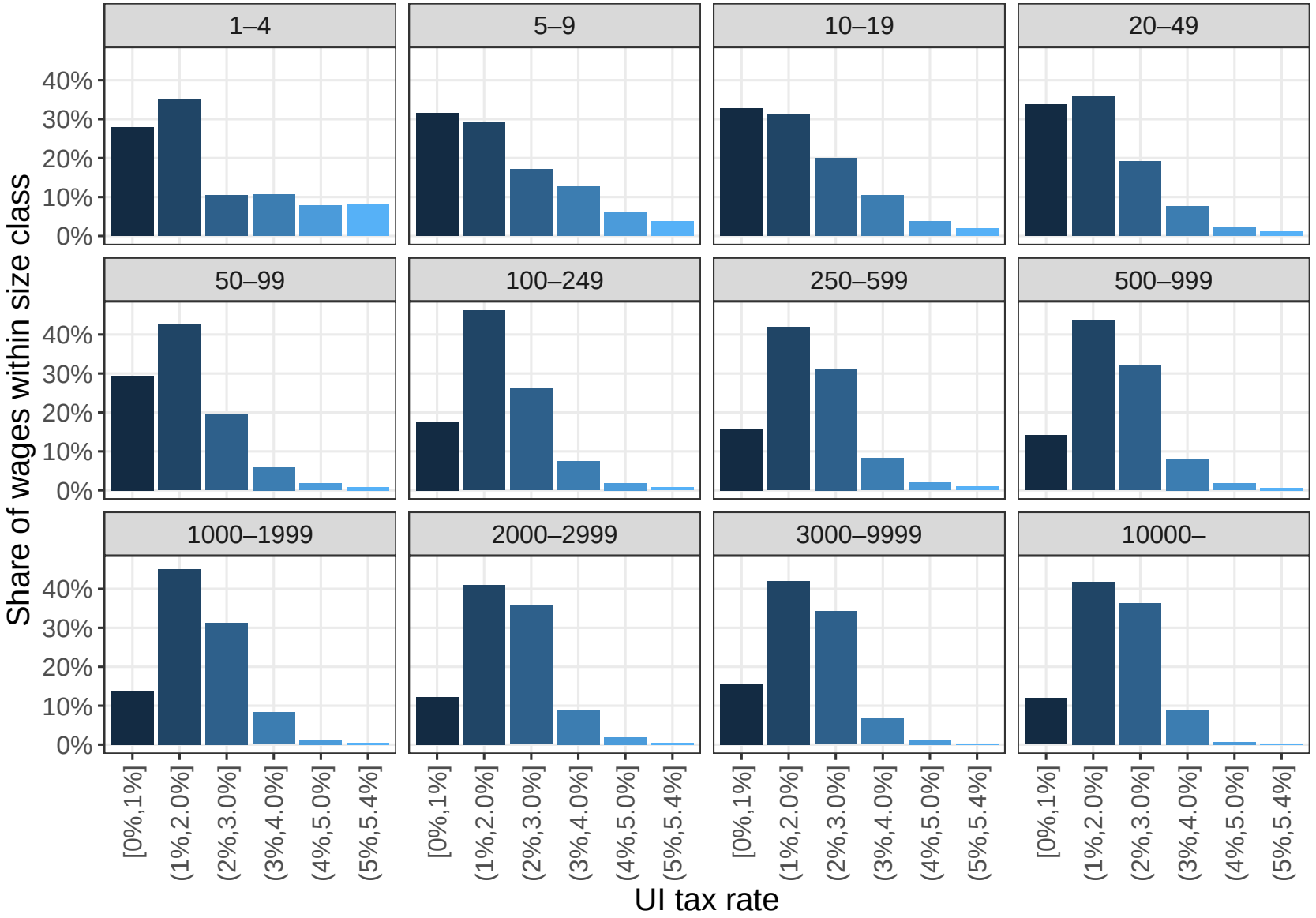


Figure 11: Distribution of tax rates for the employment variation index



5.4 Effects on profits and liquidity

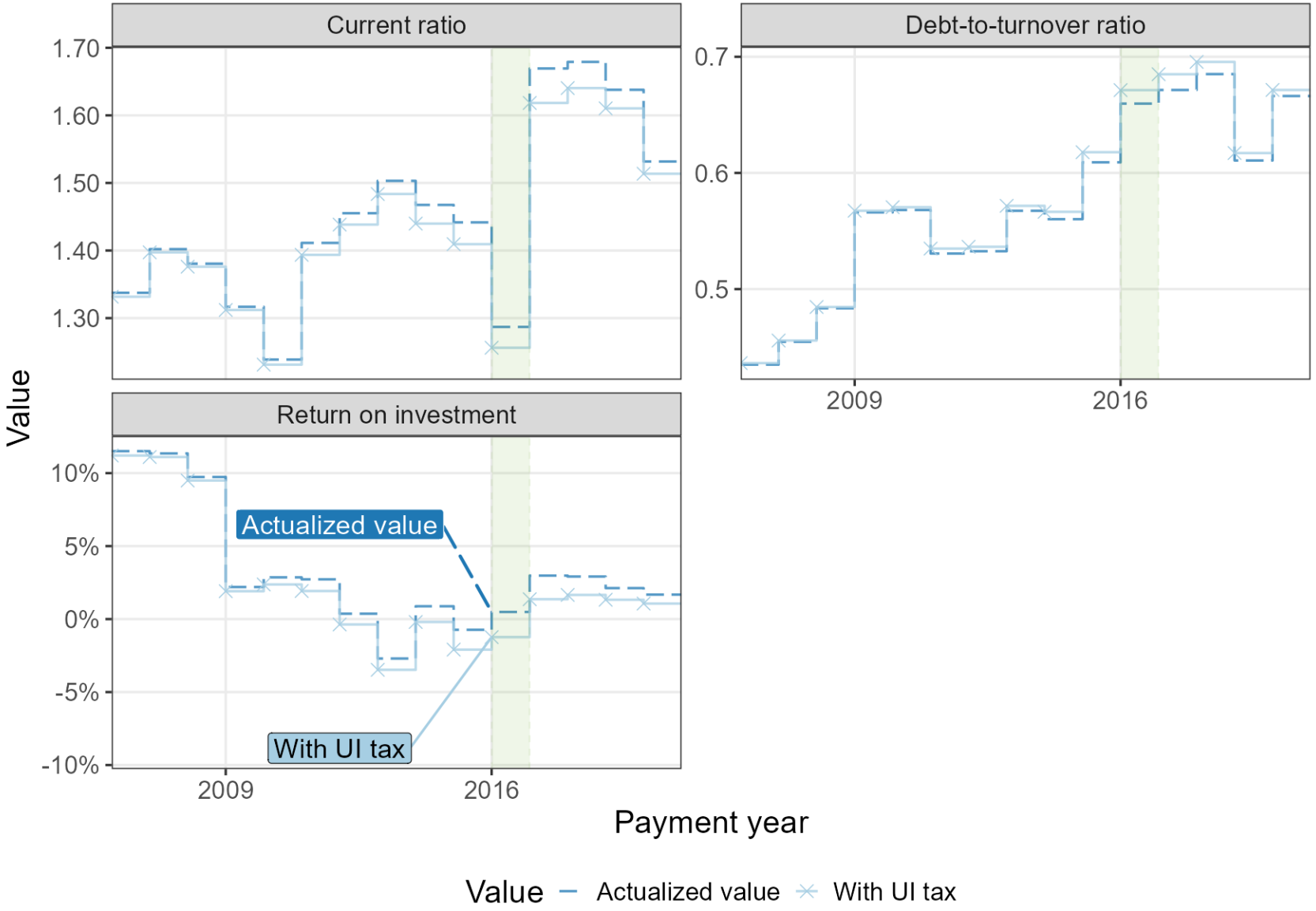
Compared to variation by employer size, rate changes appear largely uncorrelated with measures of profitability, indebtedness and liquidity of firms. To assess the impacts of very high taxes on employer finances, the most extreme rating variant was examined in more detail: the direct assignment of costs as next year's taxes. The total UI tax was capped at 10% of annual wages, higher than the tax rate in the other simulated regimes.

Figure 12 illustrates both the baseline profitability of employers who would reach the maximum 10% in 2016 and the effect of the tax on their profits on that year. In Figure 13, these employers are followed over time.

There is significant variation in both the baseline profitability of employers with large unemployment costs and the effect that the extreme version of rating would have on their profits. While the tax would further intensify their problems, the average effects of taxes on profits appears to be generally modest in size classes where average profits are negative under the current system. The average effects of the tax on liquidity and indebtedness of these firms appear even weaker. Appendix G covers more details of this assignment mechanism and some further analysis of the employers who would reach the annual cap.

Figure 12: Effects of the simulated tax on profits by group and employer size in 2016. The aggregate return on investment (ROI) is calculated at the group and size level. The upper panel shows the ROI for employers who did not reach the 10% cap under the simulated direct assignment of costs. The lower panel plots the ROI for those that reached this maximum. For each size category, the left bar shows the baseline ROI in 2016, while the right bar shows the ROI after deducting the simulated UI tax difference from profits.

Figure 13: Effects of the simulated tax on employers reaching a 10% in 2016. Each measure is calculated for an aggregate employer that represents all firms that would reach the 10% UI tax cap in 2016. One measure at a time, the difference between the simulated and original UI tax is either deducted from liquid funds and profits or added to debt.



5.5 Questions specific to the employment variation index

Employers arguably have limited choice over the duration of a former worker's unemployment. The most obvious exception is when a person is recalled to their previous job. When this is not feasible, the allocation of costs from a single long spell to a small employer may appear arbitrary and unpredictable, while the risk of such an event could conceivably decrease the willingness of small employers to hire such risky employees in the first place. In contrast, employers exert significant control over new hirings, which often directly interrupts a person's unemployment.

On the other hand, the variation indices may also reward and penalise transfers that occur between jobs and do not increase or decrease aggregate labour demand. While establishing a causal link between these incentives and changes in unemployment is beyond the scope of this paper, the scope of different types of hirings and firings can be assessed descriptively. From March 2022 to March 2023, between 30% and 45% of all monthly gross job departures and entries were job-to-job transfers; Appendix N covers the measurement protocol used in detail. Overall, the lagged aggregate sums of monthly employee changes (ranging from −80,000 to +120,000) correlate strongly with aggregate UI costs: after scaling and centering annual values, the net headcount changes and UI costs have a correlation of −0.7.

Further, when an employer experiences a net increase or decrease in headcount, this appears to be a lasting change. The median positive and negative relative changes were +2.2% and −2.3% respectively. Consider a monthly net headcount decrease of at least 2% from t_0 to t_1, say, May to June. Across such cases, the average headcount from June to September was 9.6% smaller than in May, with negligible regression towards mean. For increases, the corresponding medium-term mean increase was 9.7%.

Overall, the observed headcount increases and decreases appear to be a relevant but imperfect measure of longer-term employer choices that are related to aggregate labor demand and unemployment. In comparison, the same can conceivably be said for any mechanism that attributes unemployment costs to employers instead.

The two variation indices could easily be constructed from data in the official Incomes Register; for years 2019–2022, the data from the Register was used to calculate the simulated indices. The Employment Fund already uses this data to send a bill for the current UI tax to each employer four times a year; it appears conceivable that with the last bill it could send the calculated index for the current year and the corresponding tax rates for the next year. In comparison, attributing unemployment payments to previous employers would require a substantial amount of information collection and sharing, plus a cumbersome system for appeals.

6 Marginal responses to hirings and firings

Marginal costs were calculated for four different events in 2017: a short furlough, a dismissal followed by either a medium-duration or a long spell in unemployment, and a hiring. Details for the scenarios appear in Table 5. Whenever an employer's headcount was reduced or increased, their payroll was reduced or increased by the economy's median wage for this duration. Marginal effects were simulated for all employers that had more than one employee in 2017, paid at least the median wage in total wages, and qualified for experience rating in that year and subsequent years. Using empirical data means that the simulated results of an event at t take into account true variation in both the baseline indices in t and the pathways of baseline wages and costs over $t+1, ..., t+n$.

Because reductions and increases in wages mechanically change the tax payments, the marginal cost is defined as the change in tax rate, multiplied by wages fixed at the baseline values. This makes the marginal effect of employment increases and decreases directly comparable. Table 6 shows an example of injecting a cost increase and wage decrease injected into 2017 and the implied changes to the benefit ratio, tax rate and cumulative payments.

Figures 14 and 15 show the range of marginal responses to the events in the next year and cumulatively over the next five years across all employers in the population. The medians and the quartiles are unweighted, unlike in most of the other analyses in this paper. The costs presented in the figure correspond to the same share of UI costs that are attributed to employers throughout this paper.

Each of the systems have their own strengths and weaknesses. The benefit ratio (BR) schedules provide incentives that are phased in gradually. The median response to the unemployment events slightly overshoots their simulated cost. Depending on the goals of the system, this overshoot could be justified by the fact that unemployment imposes additional externalities on the society beyond just UI costs. More problematic is the fact that the range of simulated responses is very wide. The benefit ratios provide the weakest rewards for new hires among simulated systems, although they are still better than in the current unrated system.

The reserve ratio produces the responses closest to the simulated costs of unemployment over the long run, with the least variation. Its potential weakness is that most of the response occurs immediately in the next year, which might not give employers in financial difficulty enough time to recover. On the other hand, employers get more immediate monetary feedback for their behaviour, which may be desirable if employers learn how the system rewards choices through experience. The incentives for hirings are better than with the benefit ratio, but still clearly asymmetrical: the reward for potentially pulling someone out of long-term unemployment is much smaller than the penalty for pushing them in.

Employment and payroll variations provide the strongest incentives for new hirings. Their immediate tax penalties for unemployment are broadly comparable to the benefit ratio in the next year, but fall behind in future years. This can partially be attributed to how the events are chosen: the variation indices see the unemployment events as decreasing employment in 2017, but this is matched by a corresponding increase (return to normalcy) in 2018. Because employment increases are rewarded by design, this reduces the tax penalty in later years. If the return to normalcy was dropped, the results would change in all systems; for EVI and PVI, the long-term response would then identical to the short-term response. Regardless, the variation indices would still have weaker long-term penalties for unemployment.

The marginal responses also vary somewhat by employer size. Generally, the very smallest employers would be faced with smaller marginal responses on average for all events. Figure 16 presents an example of the one-year responses to a long unemployment event. Appendix P covers the responses to the other events and the year-by-year range of responses by event and method.

Figure 14: Marginal change in payments in the next year

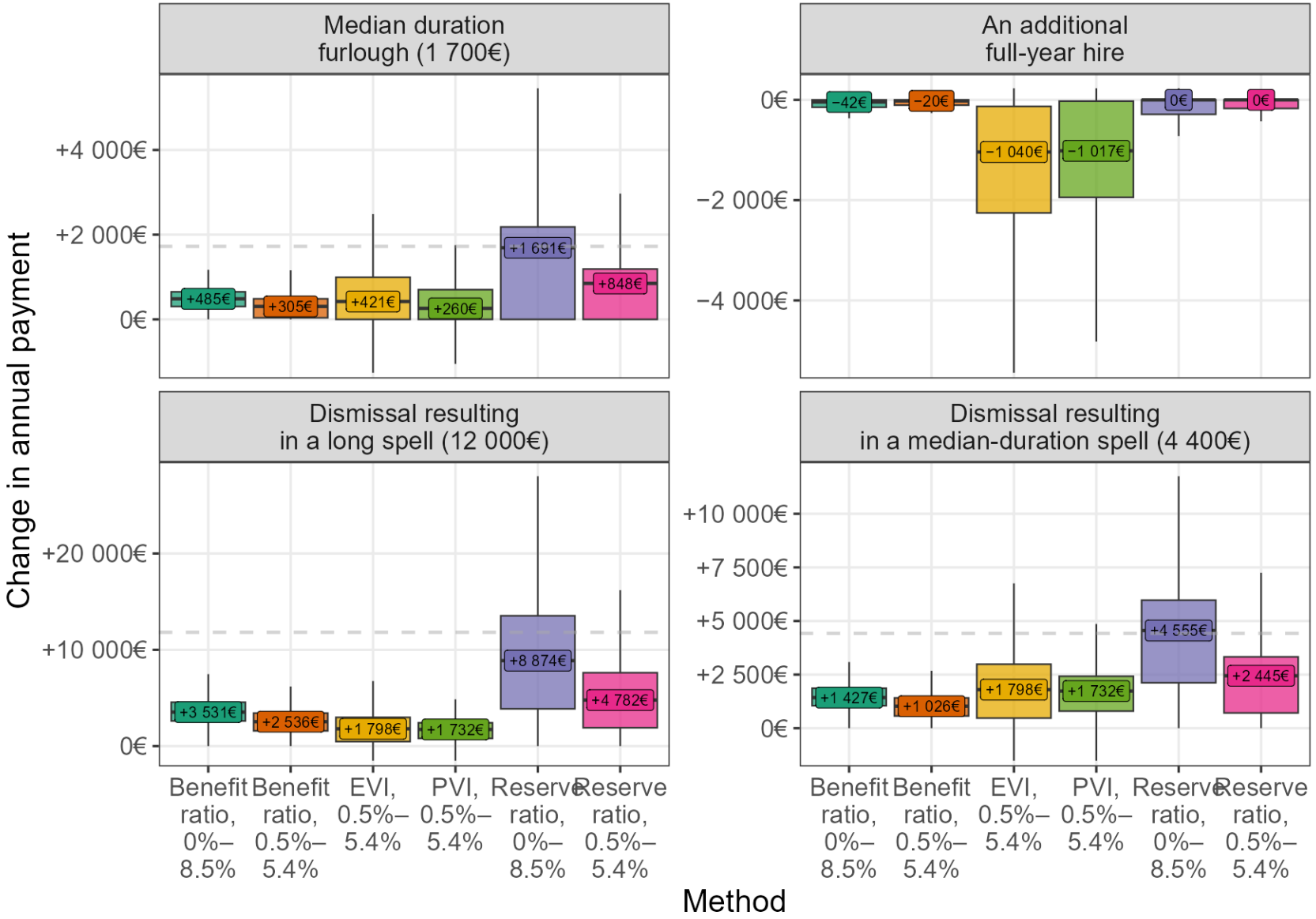


Figure 15: Cumulative marginal change in payments over the next 5 years

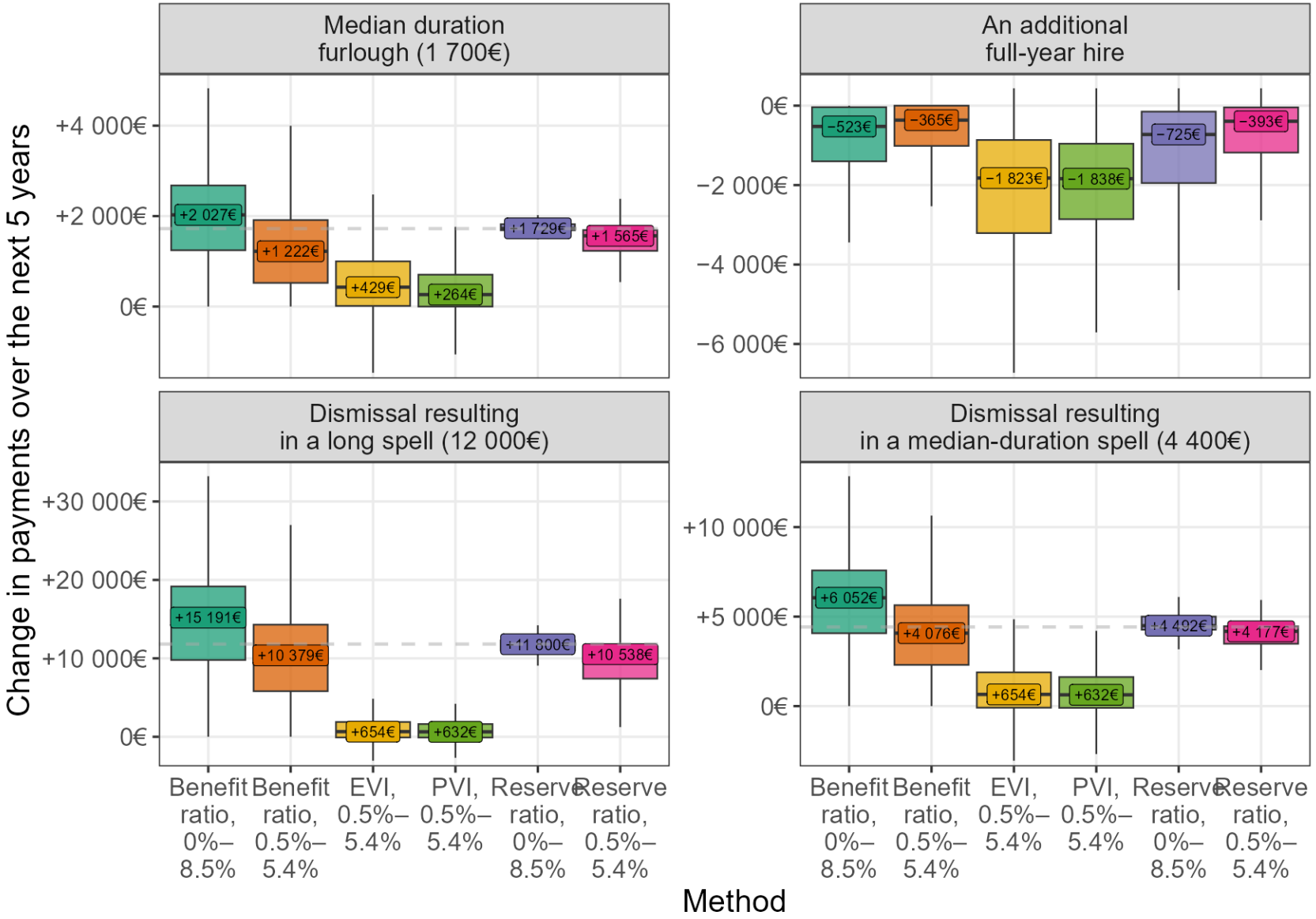


Figure 16: Marginal response to a long unemployment spell in the next year, by employer size

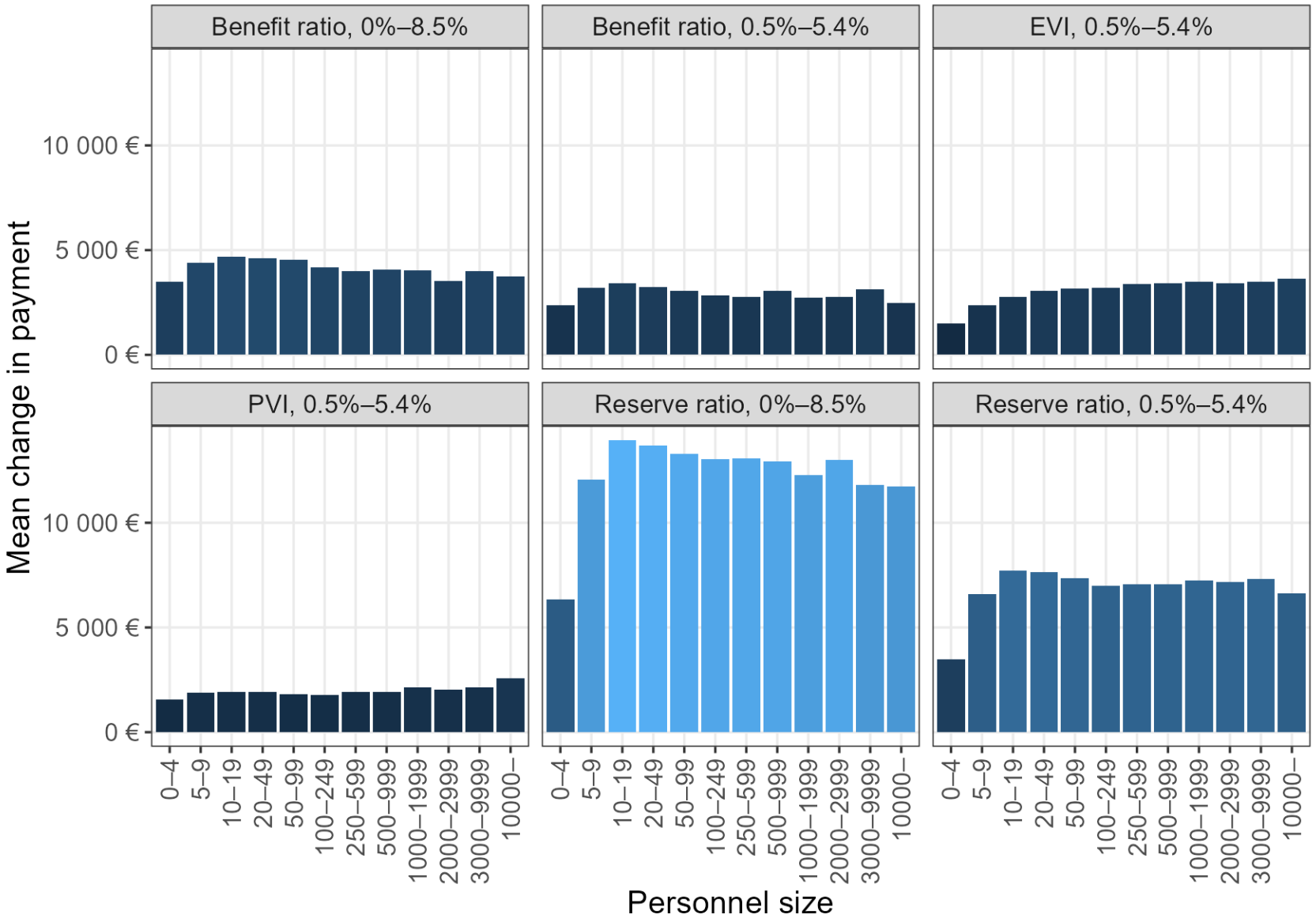


Table 5: Counterfactual scenarios simulated

Event	Definition
Median duration furlough	One of the employees is removed from the payroll in January 2017 for the duration of a median furlough. The median furlough cost is attributed to the employer.
Dismissal, median-duration spell	One of the employees is removed from the payroll in January 2017. The employer is attributed the cost corresponding to the median cost of UI spells. The employer rehires a person in January 2018.
Dismissal, long spell	Same as above, but the attributed cost is for the 75th percentile cost of UI spells.
An additional hire	A new median-waged employee is hired in January 2017 and continue to work until the end of the follow-up.

Table 6: Example of an injected unemployment spell, benefit ratio

Firm	Time	Sum of costs	Sum of wages	Index	Rated tax	Cum. payment (fixed wages)
A	2017	+4.4 k (19.1 k)	-31.2 k (961.9 k)	+0.00541 (0.020)	(2.61%)	
A	2018	+4.4 k (9.0 k)	-31.2 k (944.8 k)	+0.00516 (0.010)	+0.541% (2.64%)	+1.1 k (5.2 k)
A	2019	+4.4 k (7.5 k)	-31.2 k (927.1 k)	+0.00521 (0.008)	+0.656% (1.42%)	+2.3 k (7.8 k)
A	2020	+4.4 k (7.4 k)	-31.2 k (914.4 k)	+0.00529 (0.008)	+0.636% (1.24%)	+3.3 k (9.9 k)
A	2021	+4.4 k (1.6 k)	-31.2 k (892.9 k)	+0.00519 (0.002)	+0.646% (1.22%)	+4.4 k (11.8 k)
A	2022				+0.601% (0.50%)	+5.3 k (12.6 k)
B	2017	+4.4 k (404.1 k)	-31.2 k (42.8 M)	+0.00011 (0.009)	(1.30%)	
B	2018	+4.4 k (413.7 k)	-31.2 k (41.8 M)	+0.00011 (0.010)	+0.014% (1.40%)	+1.1 k (105.9 k)
B	2019	+4.4 k (362.1 k)	-31.2 k (39.6 M)	+0.00011 (0.009)	+0.014% (1.46%)	+2.1 k (208.5 k)
B	2020	+4.4 k (300.6 k)	-31.2 k (37.6 M)	+0.00012 (0.008)	+0.014% (1.38%)	+3.2 k (302.7 k)
B	2021	+4.4 k (249.3 k)	-31.2 k (36.4 M)	+0.00012 (0.007)	+0.015% (1.21%)	+4.2 k (385.7 k)
B	2022				+0.016% (1.08%)	+5.4 k (461.2 k)

Employers A and B are synthetic employers. Their relative employment paths correspond to real employers with typical cost-to-payment ratios, but wages and costs have been multiplied by a random number. Values in parentheses correspond to the baseline values. Values without parentheses correspond to the difference of the counterfactual from the baseline. The illustrated rating system is that of the benefit ratio with a 0.5% minimum tax and a 5.4% maximum.

7 Discussion

This paper has examined the potential effects of different experience rating systems for UI taxes in a country that does not currently have one. No rating system emerges as superior in all respects; rather, the menu of systems presents a set of tradeoffs.

All the rating systems would reduce the existing disparities in cost-to-payment ratios, but no feasible system can eliminate these differences. While previous literature has pointed that maximum rates will make the system imperfectly rated, it is far from the only limitation. Firms that go out of business pay no taxes, and losses to firm exits reduce the scope of otherwise attributable unemployment costs by about a fifth.

Other things being equal, rating systems with higher maximum tax rates would pool less of the UI externalities across all employers. However, in the simulations the differences in incentives and the attributory power of the system are minor between maximum rates of 5.4% and 8.5%. This suggests increasing the maximum rate may provide diminishing benefits. On the other hand, very high maximum rates might significantly increase the adverse effects of experience rating, such as its tendency to amplify employers' financial difficulties and to increase the unpredictability of taxes.

Besides the choice of mechanism and the maximum tax rate, the fluctuation in rates depends on the number of past years used as a basis for future rates. This can be particularly significant for small employers. For the variation indices, increasing the number of basis years from one to three more than halved the typical range of variability for employers with less than 10 workers. There are tradeoffs, however: if more basis years are required, then new employers will also need more years to qualify for rating instead of a default rate, the informational feedback for employer choices is less sharp, and more employers may quit before they've paid back the accumulated costs.

The lag between employment changes and tax rate responses involves a similar tradeoff. In this US systems and in this paper, tax rates are calculated based on index values of the previous year, but the rates could also be calculated with a longer delay to give employers time to recover from difficulty.

In Finland, employment protection and effective job termination costs already vary widely between open-ended and fixed-term contracts. The situation is similar in many European countries. Given the choice, employers are likely to prefer contract types which leave them more legal flexibility for the future. The resulting arrangements are not necessarily the ones that would otherwise suit workers and employers best.

At present, for every new unemployment spell that started because an employer actively fired a worker, there are four spells that started because a temporary contract expired at its due date. If experience rating was introduced but temporary contracts were exempt, this could further intensify the existing distortions. The limited scope of two historical small-scale experience rating systems in Finland illustrates the significance of

such restrictions: due to the constraints imposed, less than a quarter of the targeted costs have been actually covered by both systems.

Attributing unemployment costs to previous employers is always going to be controversial and imprecise. Doing it in a legally adequate manner would require costly new systems for collecting and sharing the required information.

In addition to administrative burden on both employers and officials, the examples from the US suggest that many of the attributions would be appealed by employers. As Finland already has a long-established and widely used system for recognizing and penalising voluntary quits, such an appeal process appears unlikely to enhance the intended targeting of UI substantially. Instead, contested claims could lead to burdensome arbitration processes, delays of payments for jobseekers and reduced initial claim rates due to deterrance. Results by Lachowska, Sorkin, and S. A. Woodbury (2022) imply that low-wage workers would be affected more than median-wage workers by appeals.

An alternative to methods requiring cost attribution, employment and payroll variation indices (EVI/PVI) proposed by Miller and Pavosevich (2019), has been simulated in this paper. The EVI and PVI provide a very simple heuristic for employers: steady employment growth is rewarded and headcount decreases are penalised, regardless of the formal ways in which individual jobs start and end. The indices are also substantially easier to administer than the systems in use in the US, and could conceivably be implemented in Finland based on the data that is already being used by the agency responsible for charging the UI tax. Further, compared to systems that depend on unemployment attribution, the variation indices do not discourage employers from hiring insured workers, or jobseekers deemed at risk of long future unemployment.

The variation indices also provided the strongest incentives for hirings in the simulations. Employers exert significant control over hiring someone, while their ability to affect their former worker's duration in unemployment may often be very limited. On average, increasing the amount of hirings will draw more persons out of unemployment, either directly or indirectly; thus, if increases in UI costs are to trigger disincentives, then it is logical that hirings are rewarded.

Regarding the simulated mechanisms currently in use in the US, the benefit and the reserve ratios also differed from each other in the simulations. The results varied even when the mechanisms had the same minimum and maximum rates and were calibrated to produce the same revenues. The benefit ratio produces smaller year-to-year fluctuations in tax rates and more gradually phased incentives and has a wider range of long-run responses to layoffs and hirings. The reserve ratio yields long-term incentives that correspond closely to the simulated costs, but is also characterised by sharper swings in rates. While these rapid changes can produce more immediate feedback to employers, they also have potential drawbacks, such as intensifying stress on firms in slumps and decreasing the predictability of the UI tax.

Overall, there is a wide menu of options for designing a rating system. It is possible to construct a system with a narrow range of minimum and maximum tax rates and limited fluctuations in the rates from year to year. A more constrained system will provide weaker rewards and penalties for changes in employment. However, even a limited system would reduce the existing disconnect of UI costs caused and payments paid – and even moderated incentives would be more than exist under the current tax, which offers practically no incentives for hirings and dismissals.

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