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ABSTRACT

We use administrative data to quantify the firm role in unemployment insurance (UI) take-up. First, there are firm effects in both claiming and appeals, and, consistent with deterrence effects, these are negatively correlated. Second, low-wage workers are less likely to claim and more likely to have their claims appealed than median-wage workers, and firm effects explain a large share of these income gradients. Third, high-claiming and low-appealing firms are desirable firms: they are higher-paying and have lower separation rates. Finally, the dominant source of targeting error in the UI system is that eligible workers do not apply. Our findings emphasize a novel dimension of the role of firms in the labor market, and have implications for the financing of UI.

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There has been a revival of interest in studying the role of firms in the labor market. The dominant focus has been the role of firms in setting pay (e.g., Abowd, Kramarz, and Margolis, 1999; Card, Heining, and Kline, 2013; Song et al., 2019; and Lachowska, Mas, and Woodbury, 2020). Less work has examined the non-pay dimensions of firms. We study a specific non-pay dimension of firms: the role of firms in facilitating or hindering take-up of a social insurance program, unemployment insurance (UI).

From the perspective of the firm's role in program take-up, UI is particularly interesting because it incorporates the employer in two ways: first, firms have explicit incentives to care whether workers collect because they effectively pay for some of their laid-off workers' benefits through an experience-rated payroll tax.[1] Second, and relatedly, UI agencies involve firms in determining whether workers who claim are eligible for UI by asking them for information on the reason for separation and giving them the opportunity to appeal a worker's claim. Indeed, there is an industry devoted to helping firms minimize UI taxes (in part, by suggesting claims to appeal) and policy-makers have long expressed concerns about firms being too aggressive in appealing claims.[2] Despite this institutional setting, work on UI take-up has emphasized worker-side factors, linking incomplete take-up to UI benefit generosity (Anderson and Meyer, 1997), limited information about the program (Vroman, 2009), and the hassle of claiming UI (Ebenstein and Stange, 2010).[3] More generally, work on program take-up rarely emphasizes the firm's role.[4]

[1]See Baicker, Goldin, and Katz (1998) for an interesting historical perspective on how the U.S. ended up with an unemployment insurance system that combines federalism, experience rating and limited duration of benefits. Interestingly, the paper does not mention take-up as being a factor in these historical debates. See Ganong and Noel (2019) and Gerard and Naritomi (2021) for recent analyses of consumption and unemployment insurance in the U.S. and Brazil. See Johnston (2021) for a recent analysis of the effects of experience rating on hiring.

[2]The relevant trade organization is the Association of Unemployment Tax Organizations. Its website says: "Many employers have found Unemployment Insurance cost management companies to be a cost-effective "best practice," in terms of administering UI claims and managing UI tax liabilities. Professional service organizations ... can help you minimize your unemployment insurance taxes and exposure ...." `https://www.autax.org/employers.html`. Last accessed July 8, 2021). In terms of policy-maker concerns, the report of the U.S. Advisory Council on Unemployment Compensation says: "Some members of the Council are concerned [that]...under a system of experience rating, some employers might make excessive use of the appeals system..." (U.S. Advisory Council on Unemployment Compensation (1996, p. 19)). For an interesting journalistic account of the unemployment insurance cost management industry, see Jason DeParle, "Contesting job loss claims becomes a boom industry," New York Times, April 3, 2010, `https://www.nytimes.com/2010/04/04/us/04talx.html`. Last accessed July 5, 2022.

[3]A few papers have studied the possible role of employers in limiting UI claims. Anderson and Meyer (2000) find that, when the payroll taxes paid by employers to finance UI became experience-rated in Washington in 1985, UI claims fell, and denials of claims increased. Based on interviews with job losers, Gould-Werth (2016) finds that some firms actively help workers in claiming UI, whereas others are indifferent, and still others actively impede claims. Auray, Fuller, and Lkhagvasuren (2019) and Auray and Fuller (2020) use state-by-time variation in unclaimed benefits to study the effect of denied claims on UI take-up and link their results to experience rating.

[4]For surveys of program take-up, see, for example, Currie (2006) and Ko and Moffitt (2022), which do

In this paper, we use rich administrative data from Washington state from 2005 to 2013 to study the firm's role in UI take-up. We document that there are firm effects in UI claiming and appeals that are negatively correlated, that these firm effects explain steep income gradients in claiming and appeals, that high-claim and low-appeal firms tend to have additional desirable characteristics, and that eligible workers who do not apply for UI are the most significant source of targeting error in the UI system.

We begin by describing the institutional setting for UI take-up, which highlights the window into the UI take-up process offered by our data. UI eligibility rests on three criteria: monetary eligibility (did the worker earn enough in the base period?), non-monetary or separation eligibility (did the worker separate through no fault of their own?), and non-separation eligibility (is the worker able, available and searching for work?). Workers who claim UI are asked to state a reason for their separation, and the UI agency routinely asks the employer for the conditions of separation. If the employer responds with a reason that differs from the worker's, then the agency may gather additional information and determine eligibility through a formal adjudication. We refer to this process as an appeal. The administrative data include the information used to determine monetary eligibility, whether the worker claimed UI, the worker's and employer's reasons for separation, and whether the worker ultimately received benefits. Thus, we observe the key relevant worker action, claiming UI, and the key relevant firm action, appealing the worker's claim.

We show that claiming is incomplete, and there are steep income gradients in claiming and appeals. Although we observe monetary eligibility reliably, we face the common issue in the literature of not observing non-monetary eligibility. We follow the literature (e.g., Anderson and Meyer (1997)) in constructing a "likely eligible" sample. We find a claim rate of about 45 percent, similar to Anderson and Meyer (1997), and an appeal rate of about 4 percent, which as far as we know has not previously been reported in the literature. We also find steep income gradients in both statistics: workers in the bottom decile of wages are about 20 percentage points less likely to claim UI than workers in the fifth decile, and those low-earnings workers are about twice as likely to have their claims appealed.

To motivate our analysis of the firm role in UI take-up, we study workers who are either twice-eligible to claim UI or claim UI at two firms and thus could have faced two appeals. We develop three pieces of evidence suggesting that exogenous mobility is approximately satisfied in our sample. First, our sample consists of workers switching through spells of

not discuss the role of firms. Notable exceptions are Bana et al., Forthcoming and Aizawa, Mommaerts, and Rennane, 2022, who study parental leave and worker's compensation take-up, respectively. There are several advantages of our setting: first, we can construct the denominator (the set of potential claimaints); second, we can control for worker effects; third, we observe a firm action (appeals) that speaks directly to mechanisms.

unemployment, and so there is less scope to direct search than in a standard Abowd, Kramarz, and Margolis (1999) setting. Second, we show following Finkelstein, Gentzkow, and Williams (2016) tthat moves are approximately balanced in the space of firm averages, which suggests that workers are not directing their search on the basis of the firm component and so it is less likely that they are doing so based on the error term. Finally, we show that show following Card, Heining, and Kline (2013) that the changes in worker-level outcomes are approximately symmetric in the change in the firm averages. Indeed, the change is approximately linear, which supports the additively separable specification that we adopt.

Having established the approximate validity of the two-way fixed effects specification, we use a variance decomposition to show the presence of large firm effects in the claiming and the appeal decisions. To address limited mobility bias, we report Kline, Saggio, and Sølvsten (2020) bias-corrected variance components. The standard deviation of the claim rate is about 15 percentage points; the relative importance of firm effects to worker effects is larger for UI claiming than for wages, and if all firms with below-median claim effects firms had the median value then take-up would increase by 6 percentage points. Firm effects in appeals are even more significant: the standard deviation is similar to the sample mean, and the relative variance of firm effects is even closer to that of worker effects.

Firm effects also explain a large share of the income gradient in both claiming and appeals. We project firm effects onto workers' wages and find they account for well over half the income gradient in both claims and appeals. Given that the firm effects mechanically control for worker characteristics such as income level, this finding emphasizes the key role of firms beyond individual characteristics in explaining UI take-up.

Consistent with firms using appeals to deter workers from claiming, firm effects in claims and appeals are negatively correlated. Workers are less likely to claim UI when they are laid off from firms that appeal claims more aggressively.

Firms with high claim effects and low appeal effects tend to have other characteristics that are generally associated with more desirable firms, consistent with models of imperfect competition in the labor market. Sectors with higher pay and more unionization tend to have firms with higher claim effects and lower appeal effects. These sectors include mining, construction, and public administration. In contrast, retail trade, accommodation and food services, and education have low claims and high appeal rates. More directly, higher-claim and lower-appeal firms are higher-paying and have lower separation rates. Consistent with the idea that unions facilitate access to UI, we also find that more unionized sectors tend to have higher firm claim effects and lower firm appeal effects.

Historically, one firm characteristic that has been associated with intensive use of the UI system is temporary layoffs (e.g., Feldstein (1978) and Topel (1983)). In our main results, we

omit workers who were recalled to their previous employer and thus omit temporary layoffs. When we include temporary layoffs, we find that the variance of the firm effects is essentially unchanged. Perhaps surprisingly, this finding suggests that cross-firm heterogeneity in the use of temporary layoffs plays very little role in explaining the variance in firm effects that we find.

To make precise the conceptual link from experience rating to firm effects, assess the targeting properties of UI, and validate the firm effects, we develop and estimate a stylized model of UI claiming, appeals, and experience rating. The key assumption in estimating the model is that the marginal workers who separate when their firms contract are eligible for UI. We use this feature of the data to assess the targeting properties of UI, and find that the main source of targeting error is that eligible workers do not apply, rather than that ineligible workers apply. This finding suggests that UI financing reforms that reduce experience rating and thus reduce firms' incentives to appeal would reduce targeting errors.

To show that the estimated firm effects in appeals and claims reflect cross-firm heterogeneity in claiming and appeals among the eligible separators — rather than differences in the mix of eligible and ineligible separators — we carry out two exercises. First, we re-estimate the model on firms grouped by their claim effects, which gives us an estimate of claims and appeals among eligible workers. We find that the claim and appeal rates among eligible workers closely track the firm effects, suggesting that the estimated firm effects reflect variation among eligible workers.[5] Second, we consider a sample of separators who are likely ineligible for UI because they either left the labor force or made an employer-to-employer transition. Variation in the firm effects in this broader sample is very similar to that in the main sample, which suggests that the worker effects effectively control for persistent differences in eligibility status across workers. Thus, we conclude that the firm effects reflect variation in how eligible workers behave, rather than in the mix of eligible and ineligible separators across firms.

1 Institutional setting

Three features of UI are central to whether workers ultimately take-up benefits. First, there are three types of eligibility conditions for UI: the worker's (1) employment history, (2) conditions of separation, and (3) availability and willingness to search for reemployment. Second, UI benefits are financed by a firm-side payroll tax which is experience rated. Benefits

[5]This exercise is similar in spirit to the robustness checks in Anderson and Meyer (1997) of showing how claim rates vary as we restrict to firms that contract. The reason is that the model uses this source of variation.

paid to a worker laid off by a firm are "charged" to the firm, which affects the firm's payroll tax rate. Third, because experience rating gives employers an interest in the outcome of UI claims, the UI agency notifies employers when their separated workers claim UI benefits and requests information about the worker's separation conditions, which is ultimately used to determine eligibility. This section describes these three features in turn.

1.1 Eligibility for UI benefits

UI benefits are not automatically paid to laid off workers. The worker needs to file a claim and then there is a process to determine whether the worker is eligible. Figure 1 illustrates the process of claiming and determining eligibility for UI benefits. The figure describes the process and indicates what aspects of it we observe in our data.

If a worker files a claim, then the state UI agency, in our case the Employment Security Department (ESD), determines the worker's eligibility for benefits based on three sets of criteria:[6]

1. *monetary* eligibility: whether she has an adequate work history to qualify for benefits;
2. *separation* or *non-monetary* eligibility: whether she lost her job due to lack of work and through no fault of her own;
3. *nonseparation* eligibility: whether she is able, available, and searching for work.

In Washington, the monetary eligibility requirement is working at least 680 hours in approximately the year before the claim, which is known as the base period.[7] The ESD determines monetary eligibility by referring to administrative wage and hour records.

[6]The claiming process is broadly similar among the states, but we refer to specifics of the process used in Washington, which are described in an extensive "Unemployed Worker Handbook" (Employment Security Department, 2019). In 2013, most initial claims in Washington were filed either online (about 47 percent) or by telephone (51 percent), with most of the remaining few percent filed by employers. The use of the telephone filing is higher in Washington state than nationally: according to the U.S. Department of Labor's Benefit Accuracy Measurement program, nationally in 2013, 63 percent of claims were filed online and 30 percent by telephone, with the remainder filed by employers, in person, or by mail. Ebenstein and Stange (2010) show that telephone and internet claims largely replaced in-person claims between 1995 and 2005, but this apparently dramatic change had no appreciable effect on UI take-up overall or on the mix of claimants by previous earnings.

[7]This work must be for an employer covered by the UI system. The base period can be defined in either of two ways. The regular base period is the first four of the last five completed quarters before the quarter in which a claim is filed. The alternative base period, for claimants who do not meet the 680-hour requirement in the regular base period, is the last four completed quarters before the quarter of filing. Technically, "monetary" eligibility is a misnomer in Washington because the state uses *hours* to determine eligibility. All other states use some measure of previous earnings, so we use this conventional terminology.

To determine the conditions of a worker's separation and hence the separation eligibility, the ESD first asks claimants questions about why they became unemployed.[8] In general, workers who quit voluntarily or were discharged for work-related misconduct are disqualified from receiving benefits; however, there are some exceptions.[9]

If the ESD believes the worker meets the separation eligibility requirements, then the ESD informs the worker's base period employer(s) that the worker has claimed benefits and requests information about why the worker separated. If the employer either does not respond or indicates the worker separated due to lack of work and was not at fault, then the claim is typically certified, and the worker can expect to receive benefits within four to five weeks.[10] If the claimant's and employer's reasons for separation differ, then the agency detects a separation issue and may decide to make a formal "determination," requesting additional information and adjudicating the claim.[11] As we discuss in more detail below, it is the event of claimaint's and employer's reasons for separation differing that we refer to as an employer appeal.

The claimant must also satisfy a nonseparation eligibility criteria, which is to be "able, available, and searching for work." Typically, the claimant needs to keep a record of employer contacts and other job search activities.[12] A claimant may also be required to attend job search workshops and receive other employment services, including job referrals by the agency.

[8]The process of determining non-monetary eligibility — under both separation and nonseparation criteria — varies substantially among the states and is been described and analyzed in Corson, Hershey, and Kerachsky (1986) and Fishman et al. (2003).

[9]Workers discharged because they did not have the skills to perform a job, or who quit for "good cause," may still meet the separation criteria. Washington currently has several good-cause reasons for quitting: sickness or disability; need to care for an immediate family member who is sick or disabled; a cut in usual pay or work hours by 25 percent or more; and moving with a spouse or partner who is relocating, among many. The criteria are fully described in Employment Security Department (2019) and Revised Code of Washington, Chapter 50.20 ("Benefits and Claims") (`https://app.leg.wa.gov/RCW/default.aspx?cite=50.20`, last accessed April 21, 2022).

[10]Washington made the first UI payment within 28 days of the end of the week in which the initial claim was made for at least 90 percent of initial claims in most months during the time period we are examining. See US Department of Labor, "Benefits: Timeliness and Quality Reports." Employment and Training Administration. `https://oui.doleta.gov/unemploy/btq.asp`.

[11]Even without involving the employer, the agency might start a formal determination process based on the claimant's responses about either the reason for separation or their availability for work. See Corson, Hershey, and Kerachsky (1986) and Fishman et al. (2003). Either the claimant or the employer can appeal the outcome of this determination to a separate state agency. In Washington, the agency is called the Office of Administrative Hearings. Appeals are conducted by an administrative law judge who hears testimony and evidence given under oath. Typically, the judge reaches a decision within two to three weeks. If a worker receives benefits during an appeal, and the appeal goes against the worker, then the benefits must be repaid.

[12]On the effects of work search requirement in Washington State, see Lachowska, Meral, and Woodbury (2016).

1.2 Experience rating and the employer's role in eligibility determination

In the U.S., UI benefits are financed by experience-rated payroll taxes, which are typically collected from employers. Experience rating means that the employer payroll taxes increases as a function of the benefits collected by workers who separate from the employer. While the schedule in Washington state is complicated, there is a range of the schedule where this experience-rating is close to full, such that in expectation the taxes go up by $1 for each $1 of benefits the worker collects.[13] There is also a range, known as the flat part, where there is effectively no marginal experience rating.

Experience rating is a unique feature of the U.S. system and had three core goals at is inception (Blaustein, 1993). First, it provides incentives for employers to provide information to the state UI agencies about the reasons for separation. Second, it finances UI benefits "equitably" by charging more to those employers who use the system more. Third, it acts as a layoff tax because in expectation some laid-off workers will collect UI; moreover, the size of the tax is counter-cyclical because workers who separate in recessions are likely to collect more UI benefits.

A point of this paper is that in addition to providing incentives for firms to not layoff workers experience rating also provides incentives for firms to dissuade workers from collecting UI. Indeed, in Appendix F we show that across firm variation in claiming has as much explanatory power for firm's payroll taxes as the more traditional explanatory factor of separation rates. Mechanically, the part of the process where the employer can directly become involved is when the agency contacts it about the conditions of separation. The employer can state that the worker separated in a way that renders them non-monetarily ineligible, such as by quitting voluntarily or being discharged for misconduct.

2 Data and estimates of UI claiming and appeals

2.1 Data description

We use administrative wage and claims records from 2005 to 2013, which are provided by the ESD.

[13] Naturally, this summary omits certain details. First, not all benefits are chargeable and increase the employer's tax bill. For example, those paid to workers who have quit with good cause. Second, Washington is a benefit ratio state with a look-back window of four years, which means that the tax rate depends on the ratio of benefits charged to the taxable payroll in the last four years. The taxable wage base in Washington state was $30,500 in 2005 and $39,800 in 2013. See Miller and Pavosevich (2019) and Lachowska, Vroman, and Woodbury (2020) for further discussion and analysis of experience rating methods.

The wage records include the quarterly earnings and work hours for each worker-employer match, and the NAICS industry code of the employer.[14] To simplify the analysis and ensure that we correctly identify the chargeable employer, we restrict the sample to monetarily eligible claims associated with separations where the worker had only one base period employer and separated from that employer. The hours data tell us whether the worker satisfies the monetary eligibility criteria. We define a *separation* as an event in which a worker has positive work hours in quarter t and no work hours in quarter $t+1$.

The claim records, which are linked to the wage records, contain the date the worker claimed UI, the weekly benefit amount, the benefits actually paid to the claimant, the reasons for separation given by the worker and by the employer, and basic demographic information.[15]

Figure 1 shows the parts of the claims process we observe in our data, which are indicated by the nodes shown in bold. Importantly, we observe job separation, whether the worker files a claim and is monetarily eligible, and whether the claimant ultimately receives benefits. As described in the next section, we almost always observe the reason for separation given by the claimant. Because the employer has discretion over responding to the agency's request for a separation reason (and thus only sometimes provides one), we interpret disagreement between an employer's and a claimant's reason as an employer appeal. While we observe the outcome of the appeal, we do not know whether the claim was settled through an agency determination or a formal appeal.[16]

2.2 Estimating the UI claim rate

We want to estimate the UI claim rate, or the percentage of UI-eligible job losers who claim benefits. The claims records tell us the numerator of this rate—the number of job separators who claim benefits. We do not directly observe the denominator—the number of job losers who could have claimed UI. To estimate the denominator, we determine monetary eligibility using the work history in the administrative data. To determine non-monetary eligibility among non-claimants, we need to infer whether a separation was due to lack of work and

[14] A firm and an employer are not necessarily the same, though we use the terms interchangeably. The employer is the unit of observation in the wage and claims records. For firms with a single establishment, the employer is the firm. For multi-unit firms, there are sometimes multiple UI accounts (and thus multiple employers), especially when the firm has establishments in different industries. In all cases, we only capture activity in Washington state.

[15] About two-thirds of the claims in the sample occur in same quarter as a separation, with the remaining third split between the quarter before a separation (in anticipation of a layoff) or in the quarter after (when a separation occurs late in a quarter or a worker delays in filing).

[16] We know the outcome of an appeal because we know whether the claimant received benefits. A negative eligibility determination could also be made by the agency alone (without information from the employer), and this determination could be appealed by the claimant, but we do not observe this event.

not the fault of the worker.

We drop many separators who are unlikely to have been non-monetarily eligible—in particular, those who likely quit to take a different job and those who appear to have left the labor force.[17] To eliminate job-to-job transitions, we drop any separator who moved to a different employer in either the same or the following quarter, and whose work hours decreased by at most 15 percent in the transition. The hours decrease is relative to the quarter before the transition, and corresponds to roughly a two-week reduction in work, during which it is unlikely a worker would claim UI. To eliminate labor force dropouts but retain seasonal hours reductions, we drop separations that were followed by five or more quarters with zero work hours.

These screens are imperfect because they do not eliminate all workers who were discharged for misconduct, or separated voluntarily. Thus, because our denominator includes ineligible workers, our estimates represent a lower bound on claim rates. Nonetheless, we show below that our estimates are within the range of estimates from other data sources. How does this limitation affect our analysis of the role of firms in claiming? If being discharged for misconduct or separating voluntarily are time-invariant characteristics of people, then our firm effects will be purged of these factors and will represent variation in claim rates. If these are not time-invariant characteristics of people, then the firm effects will also reflect differences in the probability of non-monetarily ineligible workers separating and evading our screens defined in the previous paragraph. We address this possibility in two ways. In Section 3.4, we show that including workers who are likely ineligible has little impact on our estimates, suggesting that including the worker effects captures the relevant heterogeneity. In Section 5.6 we make use of the fact that the spirit of UI eligibility is that the marginal workers who separate when a firm contracts are non-monetarily eligible for UI because they separate due to whatever firm-level shock led the firm to contract. We use this feature of the data to show that our estimates of firm effects likely represent differences in claim rates among non-monetarily eligible workers.

Our definition of separation excludes workers on temporary layoff who are recalled. Thus, these workers are excluded from both the numerator and denominator of the take-up rate calculation. Such workers were the focus of classic work on firm-side factors in UI claiming (and take-up), notably Feldstein (1978) and Topel (1983). As we discuss in section 3.4, our main conclusions regarding firm effects change very little when we count them as both separating and claiming UI.

We do not have direct information on whether workers satisfy the non-separation (job

[17] Our approach builds on Anderson and Meyer (1994) and Anderson and Meyer (1997), as well as work by Bjelland et al. (2011), Hyatt et al. (2014), and Sorkin (2018).

search) eligibility criteria. We view it as plausible that if a worker wanted to claim UI, then they could find a way to satisfy this criteria (indeed, Anderson and Meyer (1997) do not discuss this criteria in measuring take-up rates).

2.3 Incompleteness of UI claiming

The first two columns of Table 2 show summary statistics for all worker-quarter observations and for worker-quarter observations that would result in a monetarily-eligible UI claim if the worker separated in that quarter. Conditioning on monetary eligibility reduces the sample size by about a quarter. Workers who would be monetarily eligible for UI if they separated earn more, are employed at larger firms, and have accumulated more tenure at their firms.

The next two columns of Table 2 show estimates of UI claiming. Among monetarily eligible workers, about 30 percent of the separations result in a UI claim. About two-thirds of separations lead quickly to a new job or to exit from the labor force. Dropping these separations increases the estimated claim rate to 45 percent. Relative to all separators, workers who separate and do not make immediate transitions or exit the labor force have lower earnings and longer work hours.

These claim rates are broadly in-line with what others have found, and what we can measure in other datasets. The claim rates are slightly higher than those found by Anderson and Meyer (1997, Table 3) using similar samples. This difference makes sense because, although Anderson and Meyer were examining an earlier time period (1979–1983) when claim rates were generally higher, the six states they examined all tend to have lower UI recipiency rates than Washington. The UI take-up rate we estimate is similar to the UI take-up rate estimate in the most recent Unemployment Insurance Nonfilers Supplement to the Current Population Survey.[18]

2.4 Worker and employer reasons for separation: measuring appeals

Having discussed how we measure the claim rate, we now discuss how we measure appeals and the appeal rate.

Table 1 shows the joint distribution of claims in Washington during 2005–2013, classified by the reasons for separation given by the claimant and the employers. The claimant's reason for separation is reported in more than 90 percent of the cases. In contrast, employers report

[18]In the 2018 Nonfilers Supplement, the UI take-up rate is about 37 percent, U.S. Department of Labor (2019, Table 3).

a reason in only about 4 percent of cases. This low number suggests that in the vast majority of cases the employer decided not to challenge or appeal the UI claim of the separated worker.

When the employer did give a reason for the separation, in almost 90 percent of cases it was because the worker had given "lack of work" as the reason for separation, and the employer disagreed, usually saying the worker had quit voluntarily (34% of cases) or was discharged (53% of cases).

Table 1 also shows the percentage of claims for which benefits were paid under each of the circumstances shown. For example, when the worker said the separation was due to lack of work and the employer said the worker had quit voluntarily, the case was resolved in the worker's favor 51.1 percent of the time. When the worker said the separation was due to lack of work and the employer said the worker had been discharged, the case was resolved in the worker's favor nearly 70 percent of the time.[19]

Unlike for claiming, for appeals we know the denominator exactly because we observe the set of workers who claim. Similarly, we observe the numerator.

To summarize, Table 2 shows that in about four percent of the UI claims, the worker and employer gave different reasons for separation, so what we are calling appeals are relatively rare. In more than 60 percent of these cases, the appeal was decided in favor of the claimant and resulted in benefits being paid. So from the employer's standpoint, most appeals are "unsuccessful" in that the employer's reason for separation was rejected in favor of the claimant's.

2.5 Wage gradients in UI claims and appeals

This subsection shows that there is a strong wage gradient in UI claim rates. Using our preferred sample (column (4) of Table 2), Figure 2, panel (a), shows a binned scatterplot of UI claim rates against the average hourly earnings rate that a worker earned in the base period. The relationship has an inverted-U shape. At $10 an hour, the claims rate is only 30 percent, but rises steeply to over 50 percent at about $20 an hour; so workers earning the lowest hourly earnings rates are least likely to claim. At earnings rates greater than $20 an hour, the claims rate gradually falls.

Panel (b) suggests that claim rates fall at wage rates above $20 an hour because the replacement rate falls. The panel plots the average weekly benefit amount as a function of the hourly wage rate. The weekly benefit amount increases with the wage up to about $20

[19]Interestingly, this table suggests ambiguity and confusion about what is meant by "discharge" under UI laws. Discharge can refer to either discharge for cause, in which the case worker is not eligible for UI, or to inability to perform the job, in which case the worker is eligible for UI. About a quarter of the time the worker said she was discharged the employer did not challenge the claim, suggesting that these were cases where the worker was unable to perform the job and thus eligible for UI.

an hour, and is constant thereafter. Thus, above $20 an hour, both the replacement rate and the incentive to claim fall.

Panel (c) of Figure 2 shows that deterrence through appeals is one possible explanation for why the claim rate increases between $10 an hour and $20 an hour: lower-wage claimants are almost twice as likely to have their claims appealed as median-wage claimants. Thus, there is also a strong wage gradient in appeals. Panel (d) shows that appeals of claims by lower-wage workers are also more likely to be decided in favor of the employer. This finding has at least two interpretations. First, a lower-wage worker may be more likely to make a claim when she is non-monetarily ineligible. Second, a lower-wage worker may be less likely to have the legal means or institutional understanding to present her case effectively.

3 Firm effects in claims and appeals

In this section, we estimate firm effects in claims and appeals. We first lay out our empirical model. We then present several tests of the exogenous mobility assumption necessary to interpret the firm effects causally and show that we do not fail these tests. Next, we discuss the role of firm effects in UI claims and appeals, discuss some interpretive issues, and show that the firm effects explain wage gradients in both claims and appeals. Finally, we present some firm-level correlates of these effects, which suggest that high claims and low appeals firms are in general more desirable.

3.1 Empirical model of claims and appeals

We assume that worker i's decision to claim UI after separating from firm j in quarter t is described by the following model:

$$c_{ijt} = \alpha_i + \psi_{j(i,t)} + x'_{it}\beta + \epsilon_{ijt}, \tag{1}$$

where c_{ijt} equals one if the worker claims UI following the separation from j and zero if the worker does not claim. We interpret the α_i as time-invariant individual-specific factors that affect whether i claims regardless of their employer, such as differences in knowledge, resources, propensity to be fired for cause, or the returns to claiming implied by their income level. The ψ_j represent firm j's firm-specific claim environment, and reflects differences across firms that range from some firms filing UI claims on behalf of workers, to some firms actively dissuading workers from applying (see Gould-Werth (2016) for ethnographic evidence on this point). The x_{it} is a year-quarter dummy that controls for seasonal and business cycle fluctuations in the propensity to claim, and ϵ_{ijt} is an unobserved random error term.

To interpret ψ_j as a firm effect, we assume that workers do not sort into employers on the basis of the error term, ϵ_{ijt}. More informally, the assumption is that workers do not seek out employers where they are especially likely to be able to claim UI beyond what the worker would expect based on the firm effect. Given that our analysis sample is restricted to workers who spent time in unemployment or nonemployment between spells and likely separated involuntarily, we expect this type of sorting to be less likely than in a canonical AKM analysis of wages, which typically includes all transitions. Below, we outline two testable implications of exogenous mobility.

Worker effects are identified only for workers who separate—and are monetarily eligible and satisfy our other restrictions—more than once. Because we use the Kline, Saggio, and Sølvsten (2020) estimator, firm effects are identified only for employers linked by two job switchers to the dual-connected set of firms. Columns (5) and (6) of Table 2 show that while these restrictions cut the sample size substantially, these workers are not that different than our larger set of likely eligible separators.[20] In these restricted samples, the claim rates are slightly higher and workers earn slightly more and work slightly longer hours, but these differences are small. One notable—though unsurprising—difference is that the smallest employers are less likely to be in these samples: the median employer size is about fifty percent larger.

We structure the analysis of firm effects in appeals in a parallel way. Specifically, we restrict the sample to workers who claimed UI twice and therefore could have had their claims appealed twice. Using this set of twice-claiming workers, we estimate the analogue of Equation (1) using a dummy for whether the claim was appealed as an outcome variable. Columns (7) and (8) of Table 2 shows summary statistics on these samples. Relative to the twice-eligible separators, there are only slight differences in hours worked. Again, the notable difference is that the employers tend to be larger.

3.2 Tests of the exogenous mobility of movers

In this section, we describe two tests of the plausibility of the exogenous mobility assumption.

The first test follows Finkelstein, Gentzkow, and Williams (2016) and looks at balance in the distribution of changes in the firm-level UI claim rate among twice separating workers ("switchers"). The intuition is that if workers are selecting firms on the basis of the error term in claims, then they likely also select firms on the basis of the firm effects in claims. To the extent that we do not see evidence of selection in the firm-level measure, then it is less likely that there is selection on the basis of the error term.

[20] In columns (5) and (7) we omit workers whose spells of eligibility occur within the same calendar year.

The second test follows Card, Heining, and Kline (2013) and looks at symmetry in the change in worker outcomes when moving to higher- and lower-claim rate firms. The intuition is that if workers are moving on the basis of the error term in claims, then they would only move to a lower claiming firm if they had a favorable draw of the error term. In this case, the change in the claim rates when moving from low to high claim rate firms would be larger in magnitude than the move from a high to low claim rate firm.[21] In contrast, if movement is appropriately exogenous, then we expect symmetric changes in claim rates.

Somewhat more formally, suppose there are two firms, a low-claims employer denoted by l and a high-claims employer, h. Under exogenous mobility, we expect the change in the individual claim rate to be symmetric:

$$E\left[\Delta c_i | j(i,t) = h, j(i,t-1) = l\right] = \psi_h - \psi_l, \tag{2}$$

$$E\left[\Delta c_i | j(i,t) = l, j(i,t-1) = h\right] = \psi_l - \psi_h, \tag{3}$$

where Δc_{ij} is the within-worker change in claiming and $j(i,\cdot)$ indicates the identity of worker $i's$ employer in period t. We conduct this test by running the following regression:

$$\Delta c_{ij} = \delta \Delta \bar{c}_{j,-i} + \theta(\Delta \bar{c}_{j,-i} \cdot \mathbf{I}[\Delta \bar{c}_{j,-i} > 0]) + \Delta \epsilon_{ij}, \tag{4}$$

where the $\bar{c}_{j,-i}$ is the shrunken leave-one-out firm average claim rate (our shrinkage procedure, based on a beta-binomial model, is detailed in Appendix B), and $\mathbf{I}[\cdot]$ is an indicator for whether the change in the firm claim rate is positive. We test the null hypothesis $\theta = 0$, that is, that there is no change in the slope at 0. Informally, we examine whether the slope of the change in individual-level claims probability against the change in the firm-level claim rate is approximately linear.

3.3 Results from tests of the exogenous mobility assumption

Figure 3a shows the results of the switcher analysis for UI claims. The histogram in the background of Figure 3a shows that the distribution of moves is approximately symmetric around zero change in firm-level UI claim rates, with a spike at zero because we shrink the firm-level claim rates and so switchers between small firms are assigned a change of zero. Thus, we do not fail the first test.

The binned scatterplot in Figure 3a shows the approximately linear relationship between the change in firm- and individual-level take-up rates. We estimate a slope of 0.82 (see

[21] This test has some limitations, which are discussed in Bonhomme, Lamadon, and Manresa (2019, p. 707).

column (1) of Table 3). Column (2) of Table 3 shows that the slope does not statistically change at zero, which supports the symmetry of claim rate changes around zero. Thus, we do not fail the second test.

Figure 3b presents the parallel analysis of the relationship between the probability of an appeal and the firm appeal rate. The histogram shows that the change in the firm-level appeals probability is approximately balanced around zero. The estimated relationship is again linear, with a slope of 1.075 (see column (3) of Table 3) and we cannot reject a coefficient of 1. Again, the slope of the relationship does not change at zero (see column (4) of Table 3). Thus, we do not fail either test for the appeals.

In summary, the switcher analysis implies that both the worker's decision to claim UI and the appeal process satisfy an exogenous mobility condition andd are well approximated by an additive model with worker and firm fixed effects. Thus, in the next section we estimate an Abowd, Kramarz, and Margolis (1999) variance decomposition.

3.4 Variance decomposition of claims and appeals

Table 4 shows the variance decomposition implied by equation (1) for both the UI claims and appeals rates. We show the decompositions computed using the Kline, Saggio, and Sølvsten (2020) (KSS) estimator (in Panel A), which corrects for limited mobility bias, and the plug-in variance estimator (in Panel B). Column 1 in Panel A shows the decomposition for claims (column 2 shows the decomposition for appeals, discussed further below). The variance of the firm effects, 0.022, is large, and corresponds to a standard deviation of about 0.15 ($= \sqrt{0.022}$). Panel B shows that the plug-in estimator is severely biased. We find minimal firm-worker sorting.

There are three senses in which the variance of firm effects is large. First, with a sample mean take-up rate of 0.5, the 16th to 84th percentile range corresponds to a UI claim rate range of 0.35 to 0.65. Second, if firms with below-median claim rates had the median claim rate, then claiming would increase by about 6 percentage points, or 12 percent.[22] Third, the firm component is also large in relative terms: it is almost half the size of the variance of the worker effects. Thus, firm effects play a larger role relative to worker effects in explaining UI claiming than they do in explaining earnings and wages.[23]

Columns 3 and 4 in Panel A shows that the variance of the firm component is very

[22]This calculation uses the normal distribution.

[23]For example, Kline, Saggio, and Sølvsten (2020, Table 2) find that the variance of the firm wage effect is about one-fifth ($\frac{.0240}{0.1119} = 0.21$) the size of the variance of worker wage effects. Similarly, Sorkin (2018, Table 1) finds that the variance of firm earnings effects relative to worker effects is $\frac{0.14}{0.51} = 0.27$. Finally, using Washington State data Lachowska, Mas, and Woodbury (2020, Appendix Table B2) find the variance of firm effects relative to worker effects is $\frac{0.123}{0.309} = 0.40$ for log earnings and $\frac{0.053}{0.247} = 0.214$ for log hourly earnings.

similar in two alternative samples: first, we add temporary layoffs, and, second, we add back the monetarily eligible separators who we drop because we think they made a job-to-job transition or left the labor force. We restrict the set of firms in these alternative samples to be the same as in the main sample. In both cases, the variance of the firm component is basically unchanged.[24] The robustness across these samples is reassuring: while sample choices affect the claim rate, they do not affect our assessment of the firm role in explaining claiming.

Column 2 of Panel A shows the decomposition for the probability of an appeal. The standard deviation of firm effects is 0.028 ($= \sqrt{0.0008}$), which is large relative to the mean of 0.036. The firm component is also large relative to the worker component: the ratio of the firm to worker variance is 0.73, which is larger than this ratio for claiming, where it is 0.44. Thus, firm heterogeneity plays an even larger role in explaining appealing than claiming behavior.

3.5 The role of information

Lack of information among workers is one reason for incomplete UI take-up. It is also a threat to the underlying logic of our two-way fixed effects model in that it posits a particular mechanism by which the worker-level factor is time-varying: essentially, once the worker has successfully claimed, then the worker knows how to claim and so the worker-level factor has changed. We undertake two pieces of analysis which suggest, perhaps surprisingly, that such an information channel has limited quantitative importance.

First, the symmetry property that we emphasized in the previous section is inconsistent with a large role for information. Information is particular model of why when a worker goes from a high claiming firm to a low claiming firm that they would be likely to have unusually high claiming propensity (a high draw of ϵ_{ijt}) at the low claiming firm: specifically, the worker would learn how to apply for benefits at the high claiming firm, and then do so when they separate from the low claiming firm. The symmetry we document thus speaks against the importance of this information channel.

Second, we can more directly quantify the role of information by estimating an augmented version of equation (1) that parameterizes the role of information in claiming. We do so by allowing a worker's fixed effect to change if they have previously successfully claimed. Mechanically, worker i's effect changes from α_i to $\alpha_i + b$ after they have successfully claimed. Intuitively, b captures the effect of previously having claimed on claiming (of course, we do not have experimental variation in previously claiming). The last column in Panel A of

[24] One difference is that the variance of the person effects increases when we add the temporary layoffs, which is mechanical because we are adding a subsample of workers with take-up rates of 100 percent.

Table 4 shows that including this additional term reduces the variance of the firm effects, but there remains significant variation among firms: a standard deviation in the firm effects is 0.12, rather than 0.15 in the baseline specification.

Combined, this evidence suggests the limited role of information about how to apply in explaining claim rates, consistent with limited success of interventions intended to increase take-up by reducing application barriers (e.g., Ebenstein and Stange, 2010).

3.6 Firm effects partially explain the wage gradient in claims and appeals

We previously showed that there are strong wage gradients in the worker-level UI claims and appeal rates. Here we show that these gradients are partially explained by firm effects.

Figure 4 shows that the wage gradients in firm effects in UI claims and appeals are very similar to the wage gradients in worker-level claims and appeal rates. We assign each worker the firm effect that we estimate using equation (1), so we control for individual factors such as hourly wages. We then plot these firm effects against the hourly wages. Firm effects in claims are strongly increasing in wages up to about $25 an hour, a pattern we also saw at the individual level. And, similar to the individual level analysis, firm effects in appeals are strongly decreasing in wages.

We use Table 5 to quantify the extent to which firm effects explain the wage/take-up gradient. In column (1), we regress a dummy for whether a separating worker claimed UI on the decile of the worker's base-period hourly earnings. In column (2), we repeat the same exercise except that the outcome is the firm effect in UI claiming for the separating worker. (Column (3) is the same as column (2) except that we change the sample to the leave-one-out-connected set so that we can report KSS-corrected standard errors.). Our quantification compares the coefficient at the fifth decile of base-period hourly earnings in the individual outcomes to the firm effects. At the fifth decile, firm effects explain nearly 60 percent (= 0.117/0.197) of the claiming/wage gradient. At other deciles, the firm share is similar.

Table 5 shows that firm effects in appeals explain even more of the appeals/wage gradient. At the fifth decile, firm effects explain about 75 percent (= 0.6/0.8) of the appeals/wage gradient.

In summary, firm effects play a large role in explaining wage gradients in both UI claims and appeals.

3.7 Correlates of firm effects in claims and appeals

So far we have documented that there are firm effects in claims and appeals. In this subsection, we project them onto various firm-level characteristics to describe and interpret them.

In Figure 5, we plot the industry averages of the firm effects in claims and appeals. A general theme is that higher-paying and more unionized sectors have higher average firm effects in claims and lower firm effects in appeals. Some of the industries that have high claims and low appeals rates are mining, public administration and construction. Some of the industries that have low claims and high appeals rates are education, retail trade, and accommodation and food services.

Figure 5 also shows, consistent with deterrence effects, that there is a negative relationship between the industry-level firm effects in claims and appeals. Using firm-level data, we compute the elasticity of firm claims with respect to appeals, which is about -0.20, and is within the range of elasticities for claims to separation issue denials found by Anderson and Meyer (2000).[25]

Figure 6 extends our empirical investigation and shows the slope of a regression of firm effects on a variety of firm characteristics. To make the units interpretable across characteristics, we standardize each to have unit variance. Panel (a) shows the coefficients for the firm effects in claims and panel (b) shows analogous coefficients for appeals.

The first two rows show that higher claims and lower appeals firms tend to be more desirable firms. Specifically, they have lower separation rates (in order to include voluntary separations, we use all separators to compute this rate) and higher-pay. This finding is consistent with the idea in models of imperfect competition (e.g., Lang and Majumdar (2004) and Sorkin (2018, Section 6)) that if amenities are a normal good and there is utility dispersion across firms, then some firms will offer higher utility to workers through both amenities and wages. In this case, the amenity is the firm-claiming environment, which encompasses the fact that the firm is less likely to appeal claims. This positive correlation between social benefit take-up rates and firm pay is similar to that found in Bana et al. (Forthcoming).

The third row shows that larger firms have lower claim rates but also slightly lower appeal rates. There are competing intuitions about the correlation with size. Work on firm size-wage effects (e.g., Brown and Medoff (1989)) suggests that larger firms would be higher-paying

[25] To calculate the elasticity of firm claims with respect to firm appeals, we regress firm claims effects on firm appeal effects. We then convert the KSS-corrected slope from this regression to an elasticity computed at the sample means of worker-level claims and appeal rates. Appeals and separation-issue denials are similar: Anderson and Meyer's elasticities range from -0.128 to -0.279. See Appendix C for details of this calculation.

and so the logic in the last paragraph might suggest a positive correlation between size and claim rates. In contrast, to the extent that there is a fixed cost to setting up an appeals infrastructure (such as setting up a human resources department or hiring an unemployment compensation claims management company), then we might expect a negative correlation. The data are mixed in adjudicating between these hypotheses.

The final row looks at the relationship with sector-level unionization rates. There is a literature (e.g., Budd and McCall (1997) and Budd and McCall (2004)) which shows that at least blue-collar unionized workers are more likely to claim unemployment insurance. The posited mechanism is that unions might help workers claim and also help workers address firm appeals. In addition, by offering help to workers with appeals, unions might deter firms from appealing. Unlike the cited papers, we can control for worker effects. Consistent with this mechanism, there is weak evidence of a positive relationship between sector-level unionization rates and claims effects, and a strong evidence of a negative relationship between unionization rates and appeal effects.

In summary, the key message of this section is that there are firm effects in UI claims and appeals, and consistent with deterrence effects these are negatively correlated. Finally, consistent with high claim rate firms being more desirable firms such firms are on average higher-paying and lower-separation rate firms.

4 Model of experience rating, take-up, and targeting

So far we have established that there are firm effects in UI claims and appeals. In this section, we write down a model which serves three purposes.[26] First, it makes precise the connection between experience rating and incomplete take-up, by showing how the presence of experience rating generates incentives for firms both to not lay workers off, as well as to deter them from claiming UI. Second, it shows how in the presence of firm heterogeneity in the perceived cost of appealing a claim it is natural to expect the type of heterogeneity we documented in the previous section. Third, the model sets up a framework to estimate and discuss the targeting properties of UI.

4.1 Environment and timing

A firm j enters a period with employment $E_{j,-1}$. The production function is $F(E_j, z_j) = z_j E_j^{\alpha}$ and the firm draws a productivity level z from a distribution. The wage w is set exogenously and output sells for a unit price.

[26] The model follows aspects of Auray and Fuller (2020).

Separations happen for two reasons. First, δ share of workers separate exogenously. For the appeals process to make sense and there are ineligible workers who might apply, we assume that share $\Pr(e = 1) = \sigma$ of them are fully eligible for UI, where $e \in \{0, 1\}$ is an indicator for UI eligibility status. Second, if a firm wants to lay off additional workers (because of its draw of z), then it can do so and these additional workers will *all* be eligible for UI. This assumption follows the spirit of the UI system that workers who are laid off because of shocks to firms are eligible for UI.

In order to collect benefits, a worker needs to claim UI. Workers face heterogeneous fixed costs of claiming UI. This heterogeneity reflects some combination of stigma costs, information, the returns to claiming via the replacement rate, and other individual-specific factors, some of which might be directly affected by a worker's unionization status. This cost follows a different distribution depending on the worker's eligibility status, $\mathcal{P}_e$, and we denote a worker's draw from the distribution by χ.

After a worker claims UI, a firm decides whether to appeal. The firm knows the true eligibility status of the worker and follows a different appeals rule for eligible and ineligible workers. The appeals rule is an eligibility-type firm-specific appeals probability, $p_{e,j} \in [0, 1]$. Appeals are costly, with cost $c(p_{e,j}) = \eta_j p_e^\zeta$, with $\zeta > 1$. The key source of firm heterogeneity is in the cost of appealing function, η_j. Consistent with our previous discussion, this heterogeneity could reflect economies of scale in appealing (firm size), the perceived reputational cost of treating well or badly (correlations with wage and separation rate), the unionized status of its workforce, among other factors.

Conditional on an appeal, the probability that a worker whose eligibility status is e receives UI is r_e. Thus, r_e parameterizes the accuracy of the determination and appeal process. Accordingly, we assume that following an appeal, eligible workers are more likely to receive UI than ineligible workers, $r_1 > r_0$.

We make assumptions on payoffs such that workers want to be employed, and, if unemployed, want to collect UI. Working earns a wage w. A worker who does not collect UI receives non-labor income d, and a worker who collects UI receives benefits b, where $w > b > d$.

We model experience-rating as a flat fee that a firm pays when a worker who separates from the firm collects UI. When a worker who separated from firm j receives UI, firm j pays τ.

An equilibrium consists of firms and workers making optimal decisions. The worker's optimal decision consists of a cutoff rule of whether to apply, which depend on whether the worker is eligible and the identity of the separating firm, $\{\chi^*_{e,j}\}$. The firm's optimal decision consist of an an optimal layoff rule and eligibility-specific appeal probability $\{p^*_{e,j}\}$.

4.2 Equilibrium and its properties

We summarize the model's properties in a number of formal results (proofs are in Appendix D).

Result 1. *Firm j's optimal appeal probability for a worker of type e is given by:*

$$\left(\frac{(1-r_e)\tau}{\eta_j\zeta}\right)^{\frac{1}{\zeta-1}} = p^*_{e,j}. \tag{5}$$

The appeals probability is increasing in experience rating (τ), decreasing in the accuracy of the determination and appeal process (r_e), and decreasing in the firm-specific cost of appealing (η_j). We can see that heterogeneity in the cost of appeals, η_j, generates across-firm heterogeneity in the probability of appealing. Equation (5) shows that $1/\zeta-1$ is the elasticity of appeals with respect τ, the experience-rated layoff tax.

Result 2. *The threshold cost for claiming for a worker whose eligibility type is e and who separates from employer j is given by:*

$$(1-(1-r_e)p^*_{e,j})(u(b)-u(d)) = \chi^*_{e,j}, \tag{6}$$

so a worker with $\chi < \chi^*_{e,j}$ applies and a worker with $\chi > \chi^*_{e,j}$ does not apply.

The threshold cost for claiming increases in the difference between the utility when receiving benefits and when not receiving benefits ($u(b)-u(d)$), in the probability of receiving benefits conditional on an appeal, and decreasing in the probability of appeal. We define the claim rate among the eligible workers as $C_{e,j} \equiv \mathcal{P}_e(\chi^*_{e,j})$. This claim rate is heterogeneous across firms because of the heterogeneity in the cost of appeals.

Result 3. *If the productivity shock, z_j, is such that $\left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}} > (1-\delta)E_{j,t-1}$ then the firm hires and optimal employment is $E^*_{j,t} = \left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}}$.*

If z_j is such that $\left(\frac{\alpha z_j}{w-C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]}\right)^{\frac{1}{1-\alpha}} > (1-\delta)E_{j,t-1} > \left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}}$ then the firm neither hires nor fires and $E^*_{j,t} = (1-\delta)E_{j,t-1}$.

If z_j is such that $(1-\delta)E_{j,t-1} > \left(\frac{\alpha z_j}{w-C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]}\right)^{\frac{1}{1-\alpha}} > \left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}}$ then the firm lays workers off and $E^*_{j,t} = \left(\frac{\alpha z_j}{w-C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]}\right)^{\frac{1}{1-\alpha}}$.

This result illustrates the employment "smoothing" benefits of experience rating. Because experience rating acts as a layoff tax, it creates a wedge between the cost of hiring and firing a worker (the $C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]$ term) and induces a region of inaction. Similarly, because of this wedge, when a firm does lay off workers, it lays off fewer workers. However, because experience rating decreases the odds that an eligible worker will claim and ultimately receive UI, the employment smoothing effects of experience rating are dampened.[27]

Result 4. *An increase in experience rating (increase in τ):*

- *increases the appeal probabilities* ($\frac{\partial p^*_{e,j}}{\partial \tau} > 0$),
- *decreases claim rates* ($\frac{\partial C^*_{e,j}}{\partial \tau} < 0$),
- *and has an ambiguous effect on the firing cost* ($\frac{\partial C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]}{\partial \tau} \lessgtr 0$).

The first two parts of this result ask: what happens to appeals and claiming among a fixed pool of separators when experience rating increases? The result shows that increasing experience rating reduces errors of inclusion in that fewer ineligible workers apply, but it also increases errors of exclusion in that fewer eligible workers claim (and more of their claims are appealed). The third part of the result shows that the employment smoothing benefits of experience rating are at least partially undone by its effects on take-up. Increased experience rating has the direct effect of increasing the layoff tax, which smoothes employment. At the same time, it results in an increase in the appeal rate and a decrease in the claim rate, thus reducing the effective layoff tax because laid-off workers are less likely to claim and receive UI.

5 Quantifying the model

We now quantify the model and discuss the targeting properties of UI, the effect of experience rating on targeting, and use the model validate the firm effects.[28]

[27] Interestingly, MaCurdy, Pearce, and Kihlthau (2004, p. 10) emphasize that the incomplete UI take-up decreases the desirability of work-sharing arrangements in the United States: "Because only a fraction of employees who are laid off will collect UI benefits, firms can expect total claims to be lower if they choose to lay off workers instead of selecting work sharing."

[28] There is a conceptually distinct set of questions about how take-up affects optimal UI calculations in the spirit of Baily (1978)-Chetty (2006).This question is distinct because it involves a change in benefits while also changing the tax rate. implicitly, this literature assumes that UI is 100 percent experience rated. The paper in the literature that comes closest to studying this point is Kroft (2008).

5.1 Assumptions

We make two assumptions:

Assumption 1.

1. *When a firm contracts, the additional (marginal) separators are all eligible for UI;*
2. *The degree of experience rating, τ, does not vary with the firm's growth rate.*

The first assumption follows the spirit of the UI system that workers who separate because the firm contracts are eligible for UI. This assumptions allows us to use the change in the claims and appeal rate of a contracting firm relative to when it is not contracting to identify the share of eligible workers and their behavior.

The second assumption allows us to use the variation in firm growth rates to identify model parameters. Assuming that the extent of experience rating is invariant to a firm's growth rate allows us to bypass concerns that firms' incentives change from year to year. We show below that this assumption is approximately satisfied within firm.

5.2 Aggregation

Because we do not have sufficient data to estimate the model parameters for each firm, we quantify the model by analyzing an aggregated, or representative firm version of the model. Accordingly, we define $C_e \equiv \sum_j \omega_{e,j} C_{e,j}$ and $p_e^* \equiv \sum_j \omega_{e,j} p_{e,j}^*$ as the employment-weighted firm averages, where $\omega_{e,j}$ is the share of all separators of type e who separate from firm j. Thus, we need to estimate six parameters: $\{C_0, C_1, p_0, p_1, r_0, r_1\}$.

We use Equation (5) to solve for the elasticity of appeals with respect to experience rating, $1/\zeta - 1$, in terms of $\{r_1, r_0, p_1, p_0\}$:

$$\frac{1}{\zeta - 1} \approx \frac{\ln p_1/p_0}{\ln 1-r_1/1-r_0}, \tag{7}$$

where this approximation is exact when $\omega_{1,j} = \omega_{0,j} \forall j$. The details of this derivation are in Appendix E. The intuition for this expression is that the model implies that there is an experiment in the data that identifies the effect of experience rating: in expectation, eligible workers are more experience-rated than ineligible workers, and so the difference in the appeals probabilities for these two types of workers identifies the elasticity of appeals with respect to experience rating. Combining this parameter with an estimate of the elasticity of take-up with respect to appeals allows us to conduct counterfactual policy analyses of how a change in experience rating affects appeals, claiming, and targeting.

5.3 Using firm growth rates to estimate parameters

To estimate the parameters, the feature of the data we use is how various outcomes change as firms contract. Heuristically, the firm contraction is an instrument for the number of eligible separators. The assumption that the marginal separators are eligible for UI means that the compliers with this instrument are all eligible. Hence, the change in the claim rate, the appeal rate , and the rate of receipt conditional on appeal for the eligible (C_1, p_1, and r_1) are identified from this experiment. We need one more data moment to estimate these parameters for the ineligible, and we discuss this moment below.

We estimate the following regression (as in Davis, Faberman, and Haltiwanger (2012, Figure 6) or Flaaen, Shapiro, and Sorkin (2019, Figure 1)):

$$y_{jt} = \psi_j + \sum_{g'=-10}^{+10} \mathbf{1}(g = g')\eta_g + \epsilon_{jt}, \tag{8}$$

where y_{jt} is one of five firm-level outcomes, ψ_j is a firm fixed effect, and g denotes 5 percentage-point bins of the firm growth rate. The firm growth rate is defined as the annual change in the total hours at the firm. The η_g are the parameters to be estimated. We estimate equation (8) with and without including ψ_j.

Figure 7 plots the estimates of η_g, with and without controlling for ψ_j, where we normalize the firm effects so that we match the sample means in the zero growth bin. Panel (a) shows the relationship between the firm growth rate and the probability of being on the flat portion of the experience rating schedule next year. The OLS estimate shows, as expected, that firms that expand or contract are more likely to be on the flat of the tax schedule than firms where hours are constant. But, when firm effects are added, and the comparison is made within a firm, the relationship is near zero and invariant to the firm's growth rate. This finding supports the approximate validity of the second assumption made above that firms face constant marginal experience rating incentives even when they contract.

Panels (b)-(e) of Figure 7 show the relationship between the firm growth rate and separation rates, claim rates, appeal rates, and receipt rates conditional on appeal. Panel (b) of Figure 7 shows that as firms contract, the separation rate increases.[29] Panel (c) shows that

[29]This increase is lower than the rates reported in Davis, Faberman, and Haltiwanger (2012, Figure 6) where at a 50 percent contraction, the separation rate is closer to 50 percent. The reason is that we focus on separations of a more stable subset of the workforce: workers who are monetarily eligible and who only have one base-period employer (and who do not make an employer-to-employer transition when separating). The small increase (about 5 percent) in the separation rate is similar to in Flaaen, Shapiro, and Sorkin (2019, Figure 1) who look at separations among workers with at least a year of tenure. Appendix Figure A1 plots the same relationship for *any* quarter-to-quarter separation in the data. The average separation rate is much higher in the overall sample.

as firms contract, the claim rates increases, which is consistent with the model (and with robustness checks in Anderson and Meyer (1997)) in that, the marginal separators are more likely to be UI eligible. It is notable that even during a massive contraction the claim rate never exceeds 60 percent, which implies that claiming even among the eligible is incomplete. Panel (d) shows that as firms contract, the appeal rate decreases, which implies that firms are less likely to appeal claims of eligible workers. Panel (e), shows that the relationship between firm growth rates and receipt rate conditional on appeal is very noisy (because appeals occur relatively rarely) but suggests that it slightly increases, consistent with the idea that eligible workers are more likely to receive UI when their claims are appealed.

To compute the share of ineligible separators and the same three outcome, we need an estimate of the share of ineligible workers who receive UI at firms that are neither growing nor shrinking. The reason is that even once we know the claim rate among the eligible, the observed claim rate reflects a mix of the share of ineligible workers and the claim rate among the ineligible. To identify the ineligible share, we use the U.S. Department of Labor's Benefit Accuracy Measurement (BAM) program, under which each state investigates random samples of weekly benefit payments to determine whether claimants were paid the proper benefit amount (Department of Labor, 2020). For each investigation, the BAM record indicates what the payment should have been. From 2005 to 2013, 12.7 percent of payments in the Washington sample, should have been zero.[30]

Appendix E provides further details on quantifying the model, which includes formalizing the heuristic identification arguments made above.

5.4 Results from quantifying the model

5.4.1 Parameter estimates for eligible and ineligible claimants

Table 6 reports parameter estimates from the model.[31] The claim rate among eligible workers is about 60 percent, which is about four times the rate among ineligible workers. The appeal rate for ineligible claimants is four times that of eligible claimants (12 percent vs. 3 percent), and the receipt rate conditional on appeal of eligibles is twice that of ineligibles (80 percent vs. 37 percent). Finally, about two-thirds of separators are eligible for UI.

To summarize the model fit, we use the separation rate from panel (b) and the model parameters to predict the claim rate, appeal rate, and receipt rate by firm growth rate, which are shown in panels (c) through (e) of Figure 7. Since it was used in estimation, the model

[30]This compares with 11.8 percent of payments for the entire U.S. We thank Ross Miller of the Employment and Training Administration, U.S. Department of Labor, for providing the data and documentation of the BAM data, and for helpful advice.

[31]See Appendix Table A2 for a summary of the moments we use.

fits the data perfectly at the zero growth rate bin, and the contraction of 15 percent. The model is fairly close for the claim and receipt rates at non-targeted moments. The model struggles with the appeal rate—its predictions are higher than the data at very negative growth rates, which suggests that our estimate of the appeal rate for eligible claimants are too high.

We find that the elasticity of appeals with respect to experience rating, $1/\zeta_{-1}$, is about 1.4. The feature of the data that pins this elasticity down is that the change in the receipt rate as firms contract is small relative to the change in the appeal rate as firms contract. We convert changes in appeals into changes in applications using the cross-sectional elasticity of -0.20 that we estimated in Section 3.7.

5.4.2 Targeting properties of unemployment insurance

In the analysis of social programs, we are often interested in the targeting properties of the program: are the people who receive the program the intended recipients? Are the people who do not receive the program supposed to not receive the program? There exist attempts to quantify such targeting properties for other programs,[32] here we offer to our knowledge the first quantification of the targeting properties relative to program eligibility for unemployment insurance.[33]

Following Kleven and Kopczuk (2011), we distinguish among three sources of targeting errors, and Table 6 reports the results. First, Type IA errors are false negatives that stem from eligible workers not claiming: about 28 percent of workers are in this category. Second, Type IB errors are false negatives that stem from eligible workers who claim but do not receive (because their claim was appealed): only 0.2 percent of workers are in this category. Finally, Type II errors are false positives that stem from ineligible workers who claim and receive: about 5 percent of workers are in this category.

We arrive at two important conclusions from this analysis. First, targeting errors are wide-spread: about a third of separators incorrectly receive or do not receive UI. Second, the main source of targeting errors in UI are eligible workers who do not claim.

[32] Reeder (1985) studies housing assistance, Benitez-Silva, Buchinsky, and Rust (2004) study Supplemental Security Income and disability insurance, Low and Pistaferri (2015) and Deshpande and Li (2019) study disability insurance, Finkelstein and Notowidigdo (2019) study food stamps, and Lieber and Lockwood (2019) study Medicaid home health care.

[33] Some of the cited studies look at targeting in terms of the marginal utility of consumption; we instead look at targeting relative to program rules, which is also of interest to policy-makers.

5.5 The effects of a change in experience rating

The model posits a tight link from how UI is financed to the take-up rate of the program. Experience rating affects firm's decisions to appeal claims which in turn affects worker's decisions to claim. Thus, changing how UI is financed potentially affects claiming behavior of workers and appeals behavior of firms, and thus the targeting properties of the system.

To get a sense of the magnitudes, Table 6 shows how a 10 percent decrease in experience rating (τ) affects take-up and targeting; see Appendix E.5 for details. We find that the claim rate for eligible and ineligible workers both rise. This result highlights the trade-off presented by experience rating: decreasing experience rating encourages ineligible workers to claim, which is undesirable, and encourages eligible workers to claim, which is desirable. The mechanism for this change is that firms appeal claims less often.

Table 6 shows that decreasing experience rating increases targeting efficiency. Mechanically, what drives this result is that there are more eligible workers who claim than ineligible workers, and so increasing their claim rates by the same percent—as we assume in our model by having the same elasticity of appeals to claims and appeals to experience rating for both types—increases the number of applications more for eligible workers. We view this qualitative result as quite robust, however, in that undoing it would require that the responsiveness of claims to experience rating is about seven times higher for ineligible workers than eligible workers.[34] Thus, if the policy-maker weights different types of targeting errors equally, then decreasing experience rating is desirable.[35]

5.6 Validation of firm effects

In Section 3, we estimated firm effects in UI claims and appeals. There are two reasons why we think these firm effects likely reflect differences in claims and appeals among eligible separators. First, we controlled for worker effects, which control for time-invariant characteristics of workers such as propensity to discharged for cause. Second, we showed that our estimates of the variance of firm effects were remarkably similar when we included workers who we suspect are ineligible (which suggests that our worker effects operate as expected). Nonetheless, it is still possible that our estimates reflect some differences across firms in the mix of eligible and ineligible separators. In this section, we use the model to provide further

[34]The numbers in Table 6 imply that there are about seven times as many applications from eligible workers than ineligible workers: $\frac{0.575 \times 0.661}{0.164 \times 0.329} \approx 7$.

[35]The estimates in the table also imply that the endogenous response of appeals undoes some of the direct effect of changing experience rating on the effective layoff tax facing firms. When experience rating declines the layoff tax decreases. At the same time, firms are also less likely to appeal claims which means that workers are more likely to collect, which increases the effective experience rating. Our estimates imply that the behavioral responses undo just over a quarter of the direct effect.

evidence on this point.

The basic idea of the validation exercise is to relate firm-level estimates of claiming among the eligible to the firm effects in claiming. The model gives us an estimate of the claim rate (C_1) among the eligible. If we had enough data (and variation) to estimate the model at the firm-level, then we could relate the the firm effects in claims (the $\hat{\psi}_j$) to the firm-level claim rate of eligible separators ($C_{1,j}$). A high correlation would indicate that the estimated firm effects reflect variation in claims among eligible separators.

As noted above, we do not have sufficient data and variation to estimate firm-level measures of claiming among the eligible. Instead, we group firms into five bins based on the quintiles of the estimated firm effects in claiming. We then assess the relationship between the average firm effect in each bin and the estimated take-up rate among eligible separators in each bin.[36] Parallel reasoning and an analogous procedure holds for the appeal rates, except that we use same grouping of firms for the appeals as for claiming.

The top panel of Figure 8 shows that the claim rates among the eligible claimants are tightly related to the estimated firm effects in claiming. The corresponding regression coefficient on the claim rate is 0.54 (with a standard error of 0.17). The bottom panel shows that the appeal rate among the eligible claimants track the firm appeal effects even more tightly with a coefficient of 1.31 (with a standard error of 0.19).

Naturally, regressions with five data points should be interpreted with a grain of salt. Nevertheless, we do find tight relationships between firm effects in claims and claim rates among eligible separators, and similarly for appeals. Thus, the exercise in this section provides further evidence that the firm effects we estimate reflects variation in the firm environment, rather than the composition of non-monetary eligibility among separators.

6 Summary and conclusion

In this paper, we document a novel dimension of the role of firms in the labor market: firms affect UI take-up. We use administrative data from Washington state. UI take-up is incomplete and there are steep income gradients: low-wage workers are less likely to claim and more likely to have their claim appealed than median-wage workers. We examine whether these relationships depend on factors relating to the worker or the employer.

[36] Even with five groups of firms, we do not have enough data to use narrow growth rate bins and so we use the following four coarse categories: [−0.40,−0.05), [−0.05,0.05), [0.05,0.40), and [0.40,1.0]. Using either more than five groups of firms or narrower growth rates bins generated some cases where the restrictions of the model failed. For example, separations rates did not increase as firms contracted. For the purposes of this exercise, we are only interested in parameters for eligible separates and so do not need the additional moment from the BAM data that allowed us to estimate various rates for the ineligible separators.

To do so, we decompose the variation in UI claims and appeals into worker and firm effects. We find that firm effects in both claiming and appeals are very dispersed. A standard deviation of the firm effects is at least a third of the sample mean for both, and the relative variance of firm effects to individual effects is larger for both of these outcomes than for wages. Consistent with deterrence effects we find that these are negatively correlated. Moreover, we find that well over half of the income gradients can be explained by firm effects.

Consistent with models of imperfect competition in the labor market, we show that high claims and low appeals firms are more desirable firms: they are both higher-paying and lower-separation. Similarly, high claims and low appeals firms are more likely to be unionized, consistent with the idea that unions facilitate access to UI.

We write-down and estimate a simple stylized model of UI take-up. We use the model to study the targeting properties of UI. We find that the dominant source of targeting error is that eligible workers do not apply. In the context of our model, some of this incomplete claiming is because of the deterrent effects of firm appealing, which is ultimately due to the fact that UI is experience rated. We show that decreases in experience rating would likely reduce the extent of targeting errors.

In summary, the paper highlights the a novel dimension of the role of firms in the labor market. Relatedly, the paper emphasizes a novel factor affecting the take-up of unemployment insurance.

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Table 1: Cross-tabulation of reason for separation given by the employer and by the claimant, Washington, 2005–2013

Panel A: Joint distribution of claims by reason for separation (cell counts)

	Employer reason for separation					
Claimant reason for separation	Lack of work	Voluntary quit	Discharge	Other	Not reported	Row sums
Lack of work	449	5,887	9,043	276	235,293	250,948
	(0.10)	(1.29)	(1.98)	(0.06)	(51.48)	(54.90)
Voluntary quit	70	84	42	12	44,187	44,395
	(0.02)	(0.02)	(0.01)	(0.00)	(9.67)	(9.71)
Discharge	247	135	164	5	110,512	111,063
	(0.05)	(0.03)	(0.04)	(0.00)	(24.18)	(24.30)
Other	366	182	97	53	12,180	12,878
	(0.08)	(0.04)	(0.02)	(0.01)	(2.66)	(2.82)
Not reported	0	0	0	0	37,791	37,791
	(0.00)	(0.00)	(0.00)	(0.00)	(8.27)	(8.27)
Column sums	1,132	6,288	9,346	346	439,963	457,075
	(0.25)	(1.38)	(2.04)	(0.08)	(96.26)	(100.00)

Notes : This panel shows the number of UI claims jointly classified by the reason for job separation given by the claimant and the employer. The "other" category includes reduced hours, leave of absence, partially employed, still employed, gross misconduct, labor dispute, and unknown. The sample is restricted to claims associated with "likely eligible" separations, defined as monetarily eligible claims associated with separations preceded by at least five quarters of employment with the same unique employer.

Calculations from Panel A:
Probability claimant did *not* report a reason for separation = 37,791/457,075 = 0.083.
Probability employer did report a reason for separation = (457,075 – 439,963)/457,075 = 17,791/457,075 = 0.037.
When the employer reported a reason, the probability the employer reported "voluntary quit" or "discharge" and the claimand reported "lack of work" = (5,887 + 9,043)/(457,075 – 439,963) = 14,930/17,112 = 0.87.

Panel B: Percentage of claims on which benefits were paid, by reason for separation

	Employer reason for separation					
Claimant reason for separation	Lack of work	Voluntary quit	Discharge	Other	Not reported	Row means
Lack of work	95.3	51.1	69.3	65.9	93.7	91.8
Voluntary quit	72.9	46.4	40.5	50.0	32.6	32.7
Discharge	85.4	54.1	64.6	100.0	63.8	63.8
Other	89.9	50.5	57.7	77.4	77.9	78.5
Not reported	n/a	n/a	n/a	n/a	72.7	72.7
Column means	90.0	51.1	68.9	67.6	77.8	77.3

Notes : This panel shows percentages of UI claims resulting in payment of benefits, for each joint classification category of reason for job separation given by the claimant and the employer. For example, the claimant received benefits in 51.1% of the cases for which the worker reported lack of work and employer reported voluntary quit as the reason for separation. Row and columns means are claim-weighted. See also the notes to Panel A.

Table 2: Summary statistics and UI claim rates for alternative samples

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Worker-quarter observations[1]		Monetarily eligible transitions[2]		Likely eligible separations of at least twice eligible workers[3]		UI claims among at least twice eligible workers[4]	
	All	Monetarily eligible in quarter	All	Likely eligible separations	Twice eligible separators	Leave-out connected set	Twice eligible claimants	Leave-out connected set
Claimed UI	0.020	0.023	0.288	0.453	0.474	0.505	1.000	1.000
	(0.141)	(0.150)	(0.453)	(0.498)	(0.499)	(0.500)	0.000	0.000
Claim challenged (conditional on claiming)	0.035	0.033	0.041	0.041	0.036	0.039	0.033	0.036
	(0.184)	(0.178)	(0.197)	(0.198)	(0.185)	(0.193)	(0.180)	(0.186)
Benefits received (conditional on appeal)	0.567	0.622	0.618	0.626	0.593	0.639	0.622	0.661
	(0.496)	(0.485)	(0.486)	(0.484)	(0.492)	(0.480)	(0.485)	(0.474)
Base-period earnings (in 2005 $)[5]	39291	51073	42470	38752	40179	40337	41103	40415
	(78026)	(50332)	(46024)	(39911)	(37091)	(40590)	(31239)	(41471)
Base-period work hours	1477	1885	1810	1837	1917	1862	1973	1904
	(793)	(457)	(516)	(545)	(559)	(556)	(516)	(529)
Base-period quarters	3.44	3.90	3.82	3.83	3.85	3.79	3.87	3.76
	(1.01)	(0.37)	(0.50)	(0.50)	(0.46)	(0.55)	(0.43)	(0.58)
Mean size of base-period employer	27	32	92	157	153	162	270	317
	(328)	(361)	(686)	(978)	(833)	(884)	(1277)	(1457)
Median size of base-period employer	5	6	18	28	44	48	76	98
Number of workers	5,925,293	3,779,604	2,350,011	884,430	71,037	62,117	20,767	16,641
Number of employers	286,285	226,705	186,009	118,311	16,962	16,737	7,171	6,160
Number of worker-quarters	80,787,086	58,486,190	3,193,088	1,010,961	142,074	160,708	20,767	39,623

1. The sample starts with 80.8 million worker-quarter observations in Washington from 2005:1 to 2013:4 in which the worker had the same employer (and only that employer) in the current and five previous quarters (column 1). (Employment in all five previous quarters is not required.) In 58.5 million of these quarterly observations, the worker had at least 680 work hours in either the previous quarters, or the first four of the previous five quarters, and hence would have been "monetarily" eligible for UI if s/he had separated in that quarter (column 2).

2. Column 3 shows summary statistics for the 3.2 million job transitions observed among the 58.5 million worker-quarters in column 2. Of these 3.2 million transitions, we drop those where (i) the worker transitioned to another employer in either the same or the following quarter and experienced a decrease in work hours of at most 15% in the quarter of transition or between the two quarters when the transition took place, and (ii) the separation was followed by five or more quarters with zero reported work hours (so it was an apparent labor force withdrawal). We refer to the remaining 1,010,961 transitions (column 4) as "likely eligible separations," and 45.3% of these resulted in UI claims.

3. Column 5 restricts the sample in column 4 to separations of workers who had two likely eligible separations during 2005:1 to 2013:4, but not within the same calendar year. These restrictions reduce the sample to 142,074 worker-quarter observations. Column 6 restricts the sample in column 4 to the largest leave-one-out connected set.

4. Column 7 restricts the sample in column 5 to workers who separated and claimed twice during the period 2005:1 to 2013:4, but not within the same calendar year. These restrictions reduce the sample to 20,767 worker-quarter observations. Column 8 restricts the sample in column 5 to the largest leave-one-out connected set.

5. Base period is the standard base period (i.e., the first four of the last five completed quarters).

Table 3: Switcher analysis of UI claims and appeals

Outcome variable	(1) ΔPr(Claimed UI)	(2) ΔPr(Claimed UI)	(3) ΔPr(Claim appealed)	(4) ΔPr(Claim appealed)
Predictors				
ΔFirm UI claim rate	0.816***	0.837***		
	(0.022)	(0.048)		
ΔFirm UI claim rate × Pr(ΔFirm UI claim rate > 0)		-0.038		
		(0.063)		
ΔFirm appeal rate			1.075***	0.904***
			(0.116)	(0.256)
ΔFirm appeal rate × Pr(ΔFirm appeal rate > 0)				0.277
				(0.354)
Constant	0.036***	0.039***	0.003	0.001
	(0.004)	(0.004)	(0.002)	(0.003)
Mean UI claim rate	0.474	0.474		
Mean appeal rate			0.0334	0.0334
Number of workers	71,037	71,037	20,767	20,767
Number of worker-quarters	142,074	142,074	41,534	41,534
Subsample	Workers who separated twice	Workers who separated twice	Workers who claimed twice	Workers who claimed twice
Adj. R-squared	0.0871	0.0871	0.00397	0.00396

Notes : The analysis sample in columns 1 and 2 consists of separations as defined in Table 2, column 5. The analysis sample in columns 3 and 4 consists of separations as defined in Table 2, column 7. Average firm take-up and appeal rates are computed as a leave-one-out firm-by-year averages and adjusted for measurement error using an approach described in Appendix C. Standard errors, clustered at the employer level, are in parentheses (*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$).

Table 4: Variance decomposition of UI claims and appeal rates

Outcome	Pr(Claimed UI)		Pr(Claim appealed)		Pr(Claimed UI)		Pr(Claimed UI)		Pr(Claimed UI)	
	(1)		(2)		(3)		(4)		(5)	
Sample	Main sample		Main sample		Main sample + temporary layoffs		All monetarily eligible separators		Main sample + indicator for previous claim	
Panel A: Leave-one-out (KSS) estimates: main samples and alternative samples										
Total variance	0.250		0.0348		0.218		0.220		0.250	
Variance										
Worker effects	0.049	*0.196*	0.0012	*0.031*	0.062	*0.282*	0.049	*0.223*	0.194	*0.776*
Firm effects	0.022	*0.088*	0.0008	*0.024*	0.021	*0.095*	0.02	*0.091*	0.013	*0.052*
Cov(worker, firm)	0.001	*0.000*	0.0005	*0.013*	-0.0003	*-0.001*	-0.001	*-0.005*	0.008	*0.032*
Std. dev. firm effects	0.148		0.028		0.145		0.141		0.120	
N firms	16,737		6,160		16,737		16,737		16,737	
N worker-qtrs	160,708		39,623		275,673		918,686		160,708	
N movers	62,117		16,641		71,876		340,258		62,117	
Panel B: Plug-in estimates: main samples only										
Total variance	0.250		0.0348							
Variance										
Worker effects	0.169	*0.676*	0.029	*0.834*						
Firm effects	0.079	*0.316*	0.0195	*0.562*						
Cov(worker, firm)	-0.038	*-0.152*	-0.0121	*-0.347*						
Std. dev. firm effects	0.281		0.140							
N firms	16,737		6,160							
N worker-qtrs	160,708		39,623							
N movers	62,117		16,641							

Notes : The main samples consist of separations as defined in Table 2, columns 6 (for claims) and 8 (for appeals). Panel A shows variances, covariances, and standard deviations of firm effects corrected using the KSS correction. Panel B shows the variances, covariances, and standard deviations using the "plug-in" estimates of effects. The first two columns in Panel A row estimates the model in equation (2) using the main samples. The third column in Panel A row estimates the model in equation (2) by using the sample in Table 2, column 6 and adding any claim not associated with a separation (which we refer to as temporary layoffs). The fourth column in Panel A row estimates the model in equation (2) using the sample of all monetarily eligible separators from Table 2, column 3. The fifth column in Panel A row estimates the model in equation (2) using the main sample but additionally control for whether the worker had previously claimed UI.

Table 5: UI claims and appeals by earnings decile: worker-level probabilities and firm effects

Outcome variable	(1) Pr(Claimed UI)	(2) Firm claim effect	(3) Firm claim effect	(4) Pr(Claim appealed)	(5) Firm appeal effect	(6) Firm appeal effect
Deciles of base-period hourly earnings						
Decile 2	0.067	0.037	0.039	0.007	0.006	0.007
	(0.010)	(0.022)	(0.006)	(0.003)	(0.006)	(0.007)
Decile 3	0.126	0.073	0.070	0.002	0.004	-0.003
	(0.011)	(0.024)	(0.007)	(0.003)	(0.007)	(0.007)
Decile 4	0.178	0.11	0.099	-0.004	-0.003	-0.002
	(0.013)	(0.027)	(0.007)	(0.003)	(0.007)	(0.007)
Decile 5	0.197	0.117	0.109	-0.008	-0.006	-0.007
	(0.012)	(0.026)	(0.008)	(0.003)	(0.007)	(0.007)
Decile 6	0.198	0.12	0.114	-0.009	-0.006	-0.009
	(0.011)	(0.025)	(0.008)	(0.003)	(0.007)	(0.008)
Decile 7	0.186	0.121	0.123	-0.016	-0.007	-0.009
	(0.012)	(0.025)	(0.009)	(0.003)	(0.008)	(0.008)
Decile 8	0.165	0.133	0.133	-0.02	-0.012	-0.015
	(0.013)	(0.025)	(0.009)	(0.003)	(0.008)	(0.009)
Decile 9	0.108	0.126	0.138	-0.021	-0.014	-0.014
	(0.014)	(0.025)	(0.010)	(0.003)	(0.008)	(0.009)
Decile 10	0.014	0.131	0.133	-0.02	-0.016	-0.013
	(0.014)	(0.025)	(0.011)	(0.003)	(0.009)	(0.010)
Sample	Baseline	Baseline	Leave-one-out connected set	Baseline	Baseline	Leave-one-out connected set
Standard errors	Robust	Robust	KSS-corrected	Robust	Robust	KSS-corrected

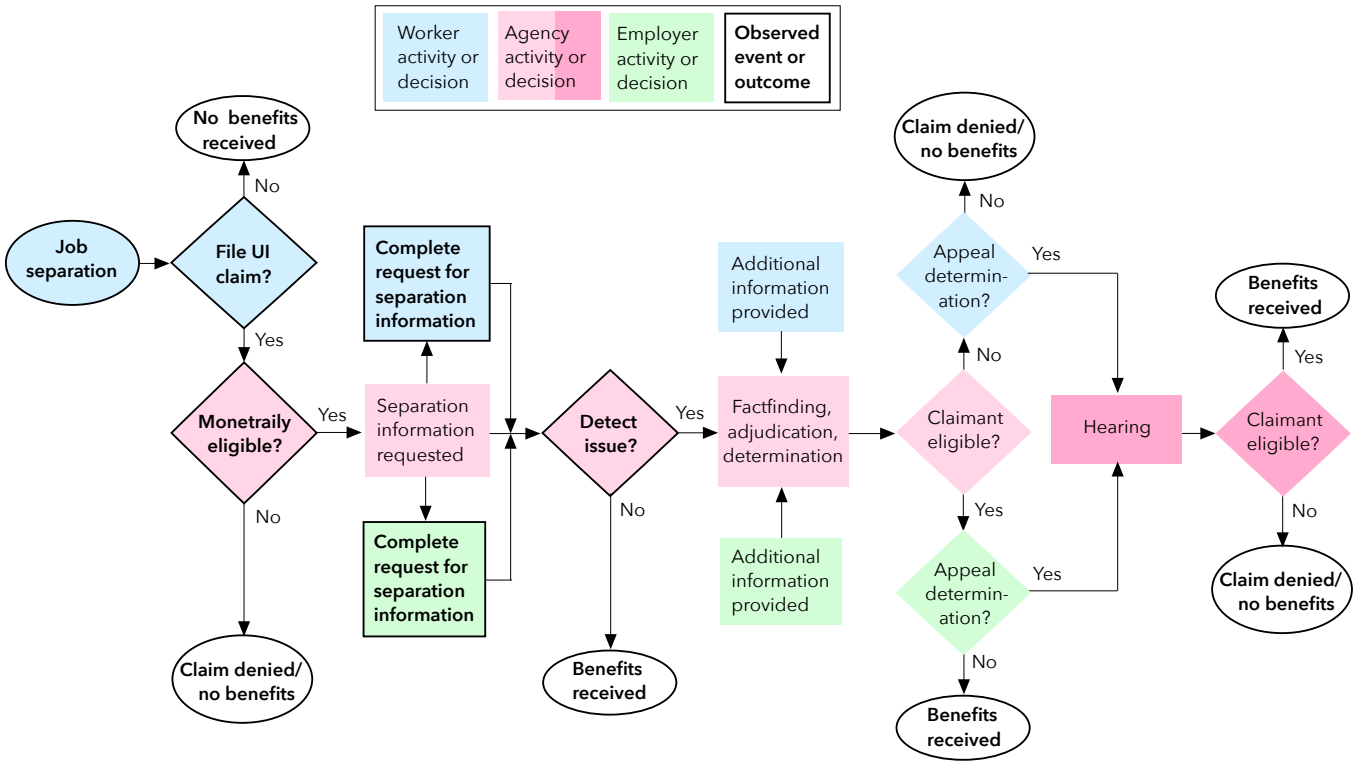
Notes: The baseline analysis sample in column 1 and 2 consists of separations as defined in Table 2, column 4. Column 3 consists of observations in the leave-one-out connected set from Table 2, column 6. Columns 4 and 5 show the baseline sample restricted to worker-quarter observations where a UI claim is observed and column 6 shows consists of observations in the leave-one-out connected set.The outcome variable in column 1 equals one if the separation resulted in a UI claim and zero otherwise. The outcome variable in columns 2 and 3 is the firm claim effect estimated using the Abowd, Kramarz, and Margolis (AKM, 1999) approach. The outcome variable in column 4 equals one if the UI claim resulted in an appeal and zero otherwise. The outcome variable in columns 4 and 5 is the firm appeal effect estimated using the AKM model. Deciles are the indicators for deciles of base-period hourly earnings computed using workers in Table 2, column 1. Standard errors are in parentheses: columns 3 and 6 show standard errors corrected using the approach described in KSS, while all the other columns shows standard errors clustered by employer.

Table 6: Model estimates and effects of reducing experience rating by ten percent

	Baseline estimates		Experience rating reduced 10%	
	Eligibles (e = 1)	Ineligibles (e = 0)	Eligibles (e = 1)	Ineligibles (e = 0)
Estimated rates				
Claim rate (C_e)	0.575	0.164	0.592	0.169
Appeal rate | claim (p_e)	0.026	0.122	0.023	0.105
Receipt rate | appeal (r_e)	0.792	0.368	0.792	0.368
Targeting errors				
Type IA (eligible, no claim)	0.281		0.270	
Type IB (eligible, claim, no receipt)	0.002		0.002	
Type II (ineligible, receive)	0.052		0.054	
Total	0.334		0.325	

Notes : The proportion of the sample eligible in steady state, $g = 0$, (σ) is 0.661. The implied elasticity of appeal with respect to experience rating ($1 / (\zeta - 1)$) is 1.38.

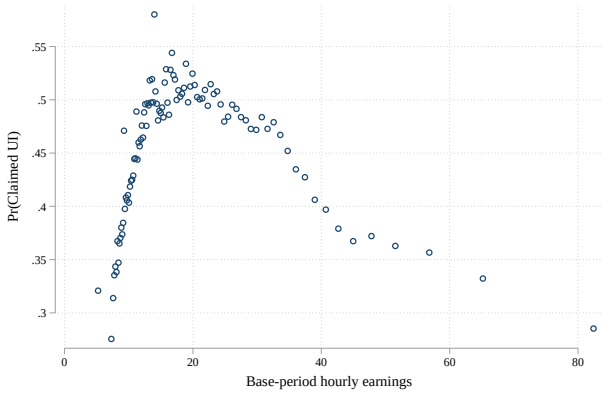
Figure 1: Flowchart summarizing the claiming, determination, and appeals process



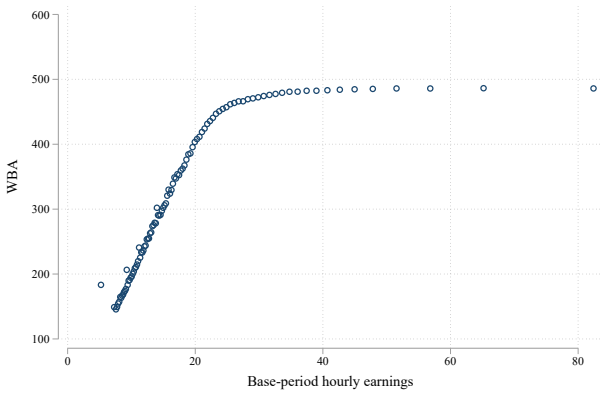
Notes: This flowchart illustrates the process of claiming and determining eligibility for UI benefits. Events and decisions we observe in the data are shown in bold. Following job separation, a worker decides whether to claim benefits, and if she does, the UI agency determines whether the claimant is monetarily eligible (i.e., has an adequate work history to qualify). If the claimant is monetarily eligible, the agency requests information about the worker's conditions of separation from both the worker and the employer(s). If the agency detects a separation issue (for example, due to conflicting reasons for separation conflict), the agency requests further information in order to adjudicate the issue and make a formal eligibility determination. The outcome of this determination can be appealed by either the worker of the employer, and the appeal will be heard by an administrative law judge, who makes a final eligibility determination.

Figure 2: Worker-level UI outcomes versus base-period hourly earnings

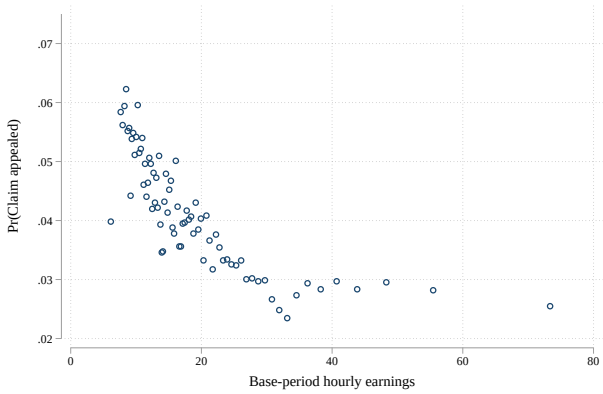
(a) UI claims



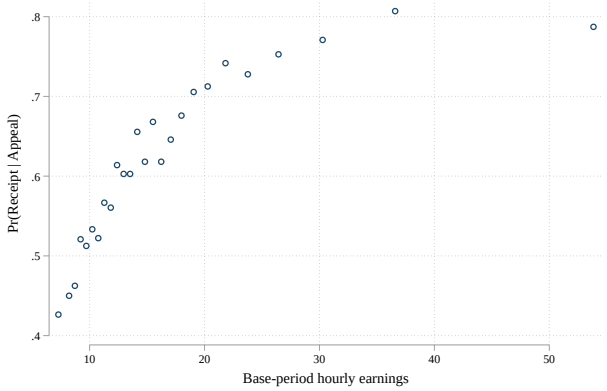
(b) Weekly benefit amount



(c) Claim appealed



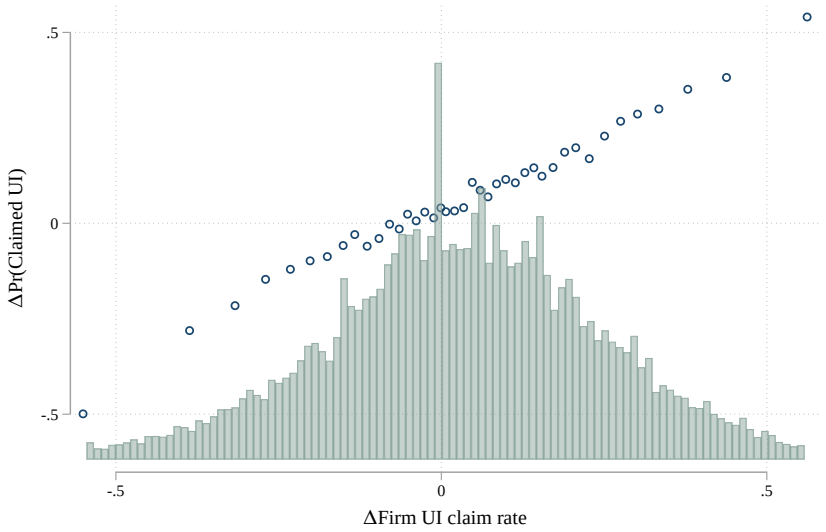
(d) Receipt rate, conditional on appeal



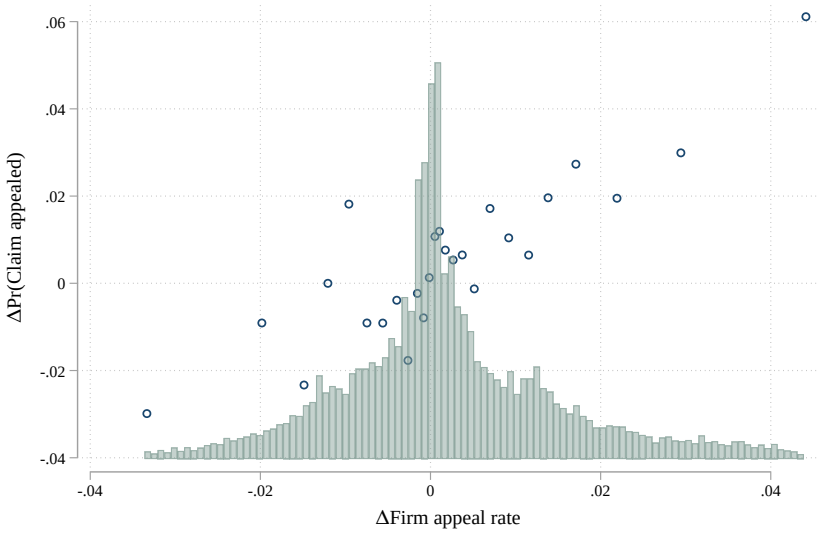
Notes: The panels of this figure shows scatter plots of UI claim rate, appeal rate, receipt rate (conditional on appeal), and the weekly benefit amount as a function of base-period hourly earnings for the sample in Table 2, column 4.

Figure 3: Switcher analyses of UI claims and appeals

(a) UI claims



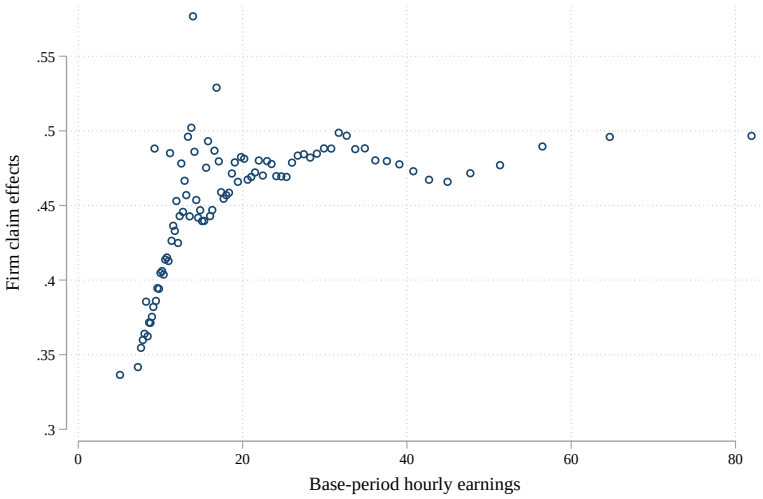
(b) UI appeals



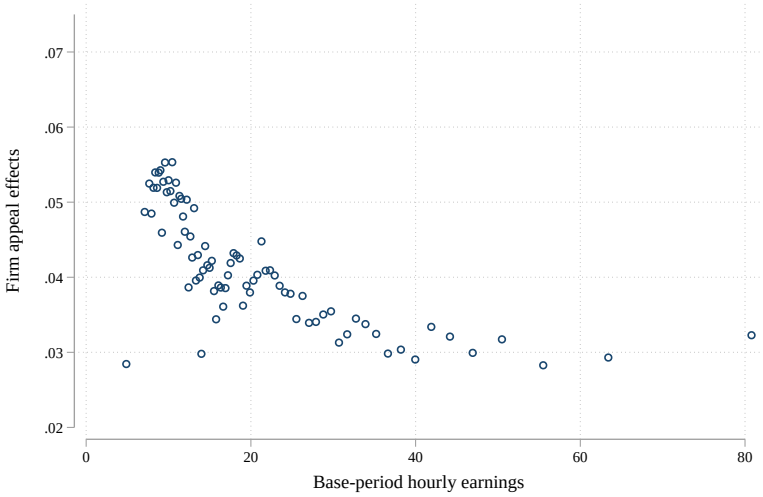
Notes: The figure shows a switcher analysis in (a) claims and (b) appeals. The sample in Panel (a) consists of separators in Table 2, column 5. The sample in Panel (b) consists of the claimants in Table 2, column 7. The top figure shows the change in the probability that a worker claims UI against the change in the firm-level UI claim rate. The bottom figure shows the change in the probability of the worker having their UI claim appealed for workers who separate and claim twice against the change in the firm-level UI appeal rate. See Table 3, column 1 and 3 for the associated regression estimates. Both the firm-level rates are computed as leave-one-out firm-year averages shrunken using the procedure described in Appendix B. The histograms in the background show the distribution of the change in the firm-level UI claims and appeal rate. The number of points in the scatterplots are based on the cubed root of the sample size.

Figure 4: Firm effects in claims and appeals vs. worker-level earnings

(a) Firm effects in claims and worker-level earnings

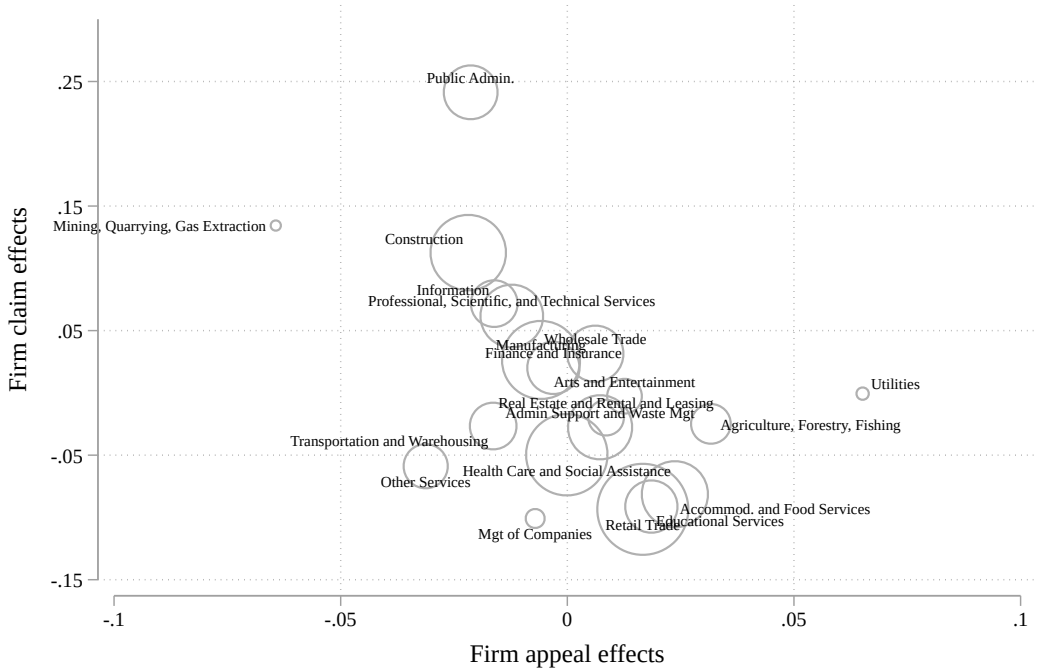


(b) Firm effects in appeals and worker-level earnings



Notes: The top panel of the figure shows a scatterplot of estimated firm effects (FE) in claims against worker-level base-period hourly earnings. The sample consists of Table 2, column (4) observations. The bottom panel shows a scatterplot of estimated firm appeal effects against worker-level base-period hourly earnings. The firm effects in claims and appeals are estimated using equation (1) and have been demeaned and rescaled by the average value of the relevant outcomes. The number of points in the scatterplots are based on the cubed root of the sample size.

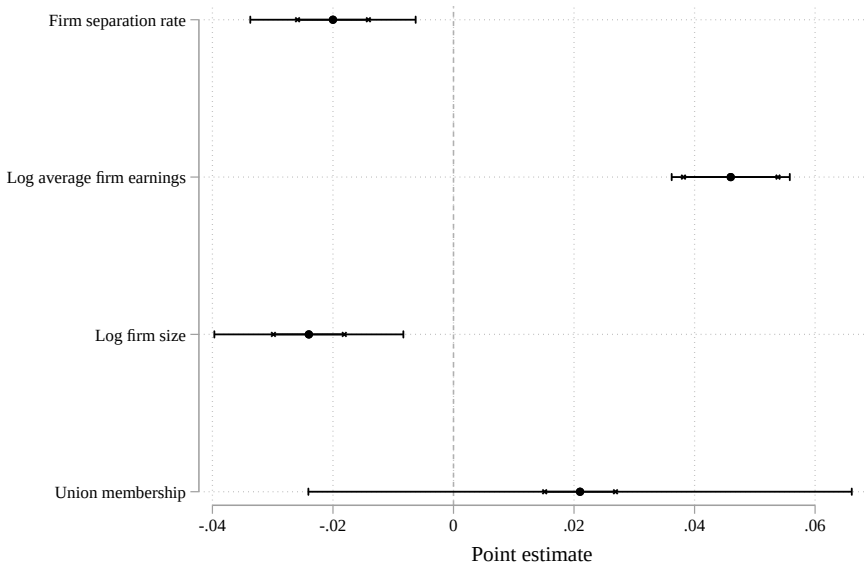
Figure 5: Firm effects in claims and appeals, by industry sector



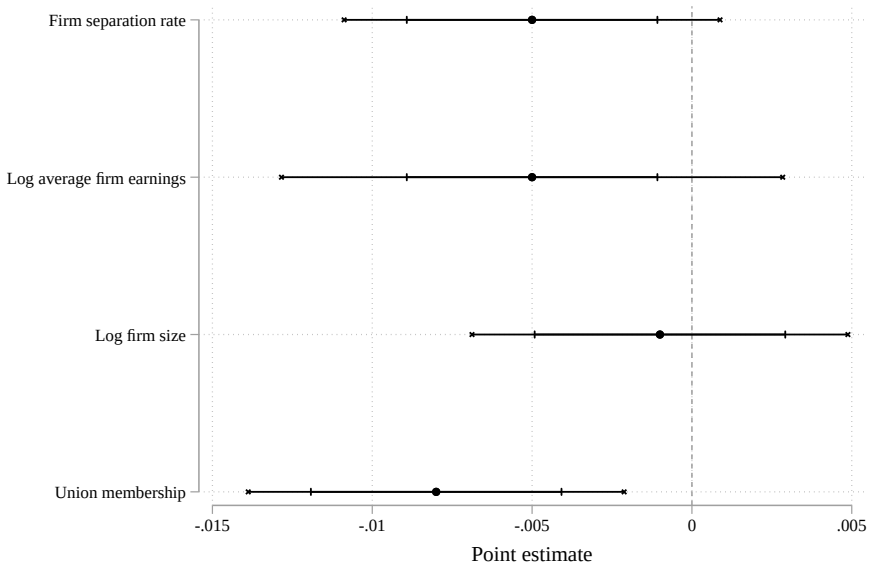
Notes: The figure plots the sector averages of firm effects in claims against the sector averages of firm effects in appeals. The size of each dot is proportional to the number of separators in that sector, defined according to Table 2, column (4).

Figure 6: Firm-level correlates of firm effects in claims and appeals

(a) Correlates of firm effects in claims



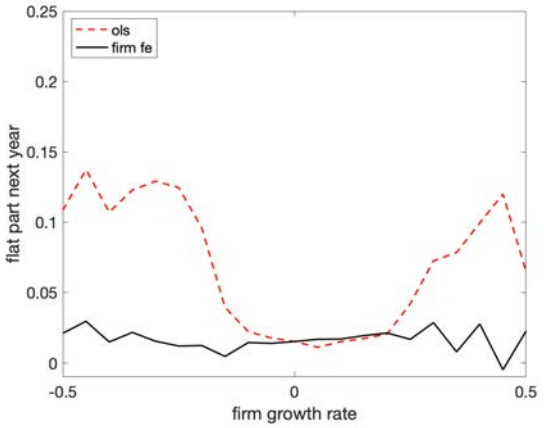
(b) Correlates of firm effects in appeals



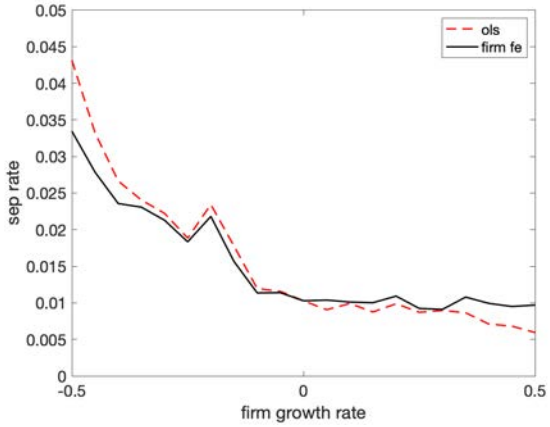
Notes: The top panel shows coefficients (dots) and associated 95-percent confidence intervals (CI) (bars) from separate univariate regressions of estimated firm effect in claims on various correlates. Each correlate has been transformed into a z-score, allowing the coefficients to be interpreted as changes in the outcome resulting from one standard deviation change in the correlate. The bottom panel shows the corresponding coefficients and confidence intervals from univariate regressions of firm appeal effects on correlates. The horizontal range bars are CIs based on KSS-corrected standard errors (×-markers) or based on CIs clustered by firm or, in the case on sector union membership rate, by sector (the |-markers). The firm separation rate is computed using the separation defined in Table 1, column (3). Unionization is calculated as a sector average using Washington State full-time workers in the 2005-2013 CPS Monthly Outgoing Rotation Groups.

Figure 7: Firm growth rate and UI outcomes

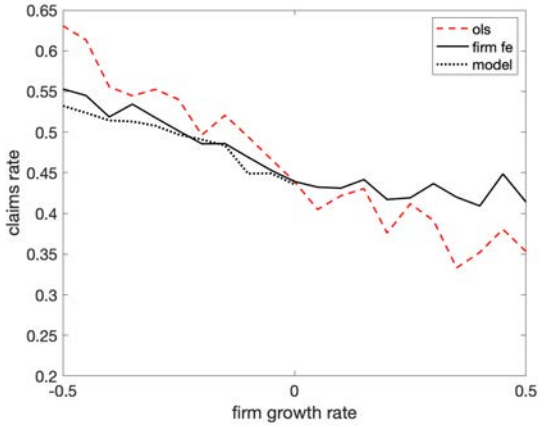
(a) Probability of being on the "flat" part of the experience rating schedule next year



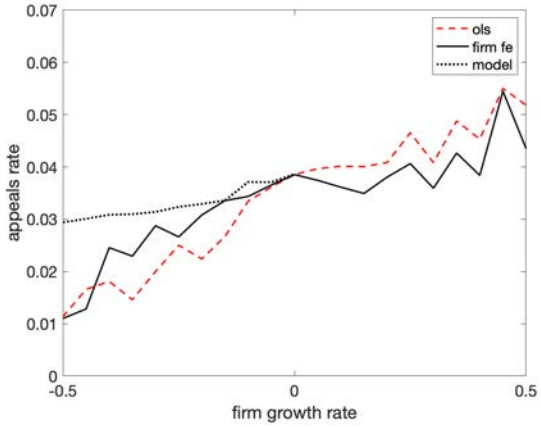
(b) Separation rate



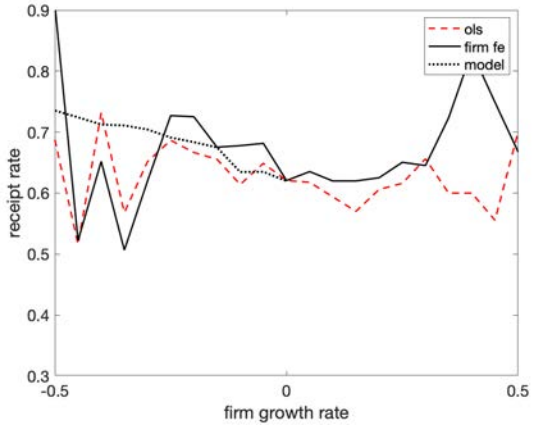
(c) UI claim rate



(d) Appeal rate



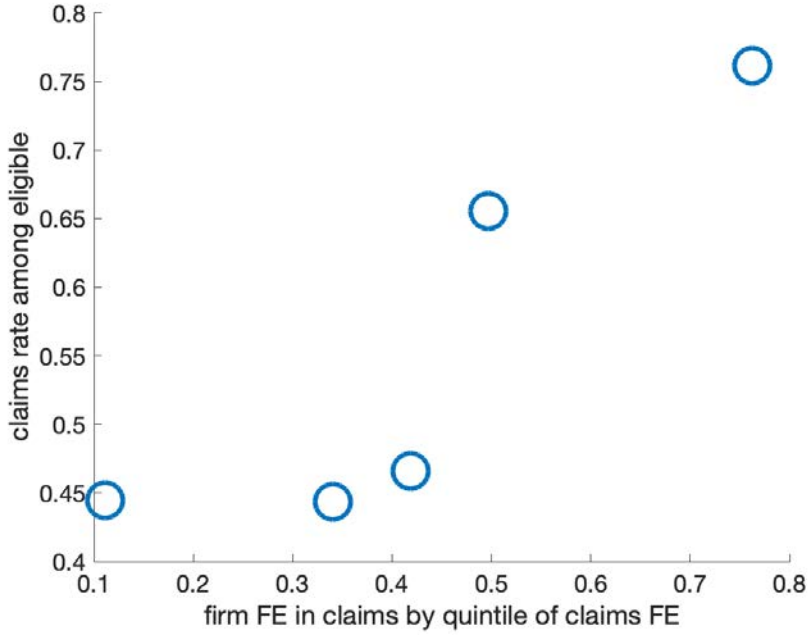
(e) Receipt rate (conditional on appeal)



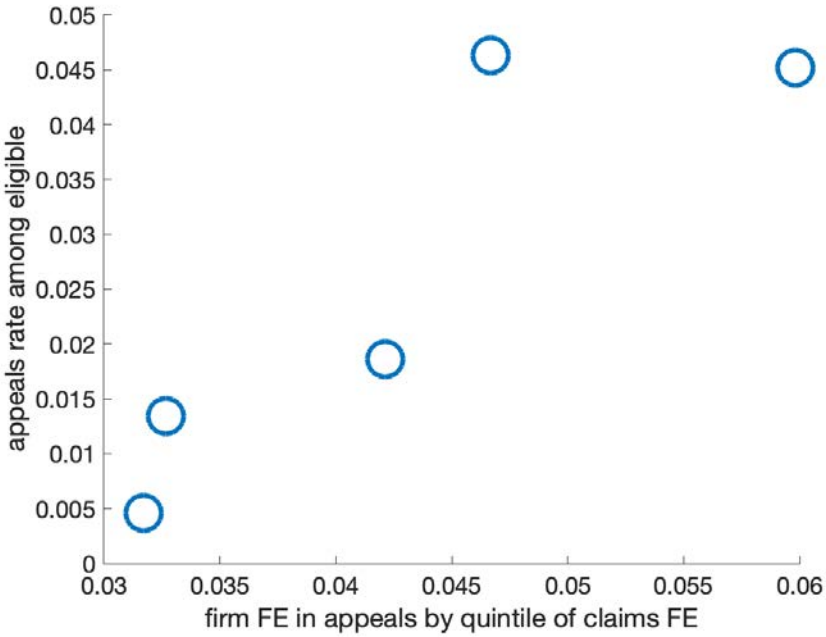
Notes: The analysis sample consists of separations in Table 2, column (4). The firm growth rate is defined as the difference in total annual firm hours and is grouped using forty 5 percentage-point bins. Each panel plots the coefficients resulting from a regression of the variable listed on the vertical axis against the growth-rate bin dummies. The dashed lines (OLS) show coefficients without controlling for firm effects. The solid lines show coefficients from a regression controlling for firm effects. The dotted lines show numerical results from the theoretical framework. See Table A1 for the regression coefficients.

Figure 8: Validation of firm effects

(a) Validation of firm effects in claiming



(b) Validation of firm effects in appeal



Notes: The top panel of the figure shows a scatterplot of estimated firm effects in claiming against claim rates among eligible separators. The bottom panel a scatterplot of estimated firm appeal effects agains appeal rates among eligible separators.

A Other results

Table A1: Firm-UI outcomes and firm growth rate

Outcome variable	Pr(flat part in $t+1$)		Pr(Separation)			Pr(Claimed UI)			Pr(Claim appealed)			Pr(Receipt | Appeal)	
Model	OLS	Firm FE	OLS	Firm FE	Worker & Firm FE	OLS	Firm FE	Worker & Firm FE	OLS	Firm FE	Worker & Firm FE	OLS	Firm FE
5 p.p. firm-growth bins*													
-0.5	0.109	0.031	0.043	0.033	0.054	0.631	0.550	0.555	0.011	0.011	0.016	0.688	0.880
-0.45	0.137	0.039	0.033	0.027	0.030	0.613	0.542	0.540	0.017	0.013	0.036	0.516	0.494
-0.4	0.107	0.024	0.027	0.023	0.030	0.556	0.516	0.565	0.018	0.025	0.017	0.732	0.624
-0.35	0.123	0.031	0.024	0.023	0.025	0.545	0.532	0.521	0.015	0.023	-0.009	0.568	0.479
-0.3	0.129	0.025	0.022	0.021	0.022	0.553	0.515	0.537	0.020	0.029	0.055	0.652	0.592
-0.25	0.125	0.021	0.019	0.018	0.019	0.540	0.499	0.554	0.025	0.027	0.014	0.687	0.699
-0.2	0.096	0.022	0.023	0.021	0.021	0.497	0.483	0.530	0.022	0.031	0.011	0.667	0.697
-0.15	0.040	0.014	0.018	0.015	0.017	0.521	0.483	0.527	0.027	0.034	0.020	0.655	0.647
-0.1	0.022	0.024	0.012	0.011	0.011	0.494	0.466	0.492	0.033	0.035	0.031	0.614	0.650
-0.05	0.018	0.023	0.012	0.011	0.011	0.467	0.450	0.454	0.036	0.037	0.031	0.649	0.654
0 (-4.99% to 0%)	0.015	0.025	0.010	0.010	0.010	0.439	0.436	0.456	0.039	0.039	0.032	0.621	0.593
Observations	244,697	244,697	488,703	488,703	55,838	488,703	488,703	55,838	218,534	218,534	13,097	7,738	7,738

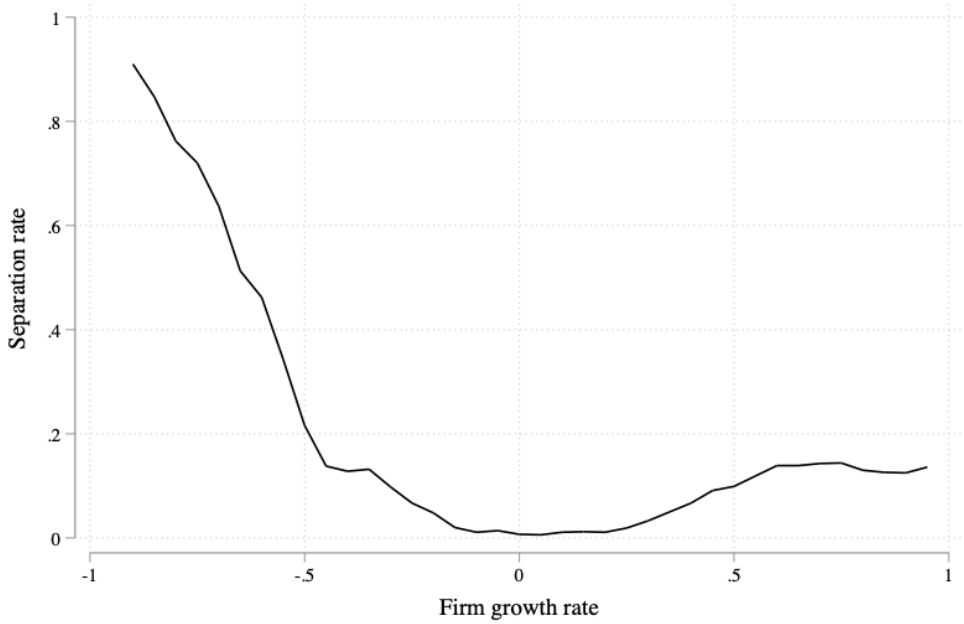
Notes: The analysis sample is based on column Table 2, column 4. The outcome Pr(flat part in $t+1$) is defined as the probability that the firm is on the flat part of the experience-rating schedule next year. To compute the separation rate, we use firm size in the denominator. Each outcome variable is regressed on 40 dummies indicating 5 percentage-point quarter-to-quarter changes in firm growth, defined as percentage change in total annual hours at the firm. For each outcome variable, the first column presents estimates obtained without controlling for firm fixed effects (OLS). The second column presents estimates (scaled by the sample average) obtained after controlling for firm fixed effects (Firm FE). For all outcomes (other than Pr(flat part in $t+1$) and Pr(Receipt | Appeal) for which there is not enough variation) the table also shows estimates controlling for firm and worker effects (Worker & Firm FE), scaled by the sample average. The table only presents coefficients from -50 percent to 0 percent growth.

Table A2: Moments used to estimate the model

Moment	Value	Source
Sep_0	0.012	Figure 7
Sep_{-15}	0.026	Figure 7
$Claim_0$	0.419	Figure 7
$Claim_{-15}$	0.514	Figure 7
$Pr(appeal)_0$	0.051	Figure 7
$Pr(appeal)_{-15}$	0.034	Figure 7
$Pr(rec)_0$	0.619	Figure 7
$Pr(rec)_{-15}$	0.702	Figure 7
$Pr(Ineligible\|claim)$	0.127	BAM

Notes: The values used to estimate the model are based on coefficients reported in Table A1; see estimates for -0.15 and 0 growth rates. Because the constant in the fixed effect regressions is not identified, we renormalize the values so that in the fixed effect regression the values match OLS estimates at 0.

Figure A1: Quarter-to-quarter separation rate as a function of firm-growth rate, any separation



Notes: The line shows the quarter-to-quarter separation rate based on work hours with primary employer. The numerator is the number of separations defined as observations where a worker has a different primary employer in quarter $t+1$ than in t or has no hours in $t+1$. The denominator is the total number of observations with positive hours in t. Firm growth rate is defined as the year-to-year change in total firm hours. The sample includes all worker-quarter observations of primary employment in the Washington administrative wage records, 2001–2014.

B Shrinking firm-level rates

First, we define notation. Let there be N_j separators from firm j and C_j workers who claim UI (here, C_j is a level, whereas elsewhere it is a rate). Then a natural estimate of the claim rate is $\hat{c}_j = \frac{C_j}{N_j}$. This estimate will be over-dispersed. We assume that the true claim rate follows a beta distribution: $c \sim \mathcal{B}(\alpha, \beta)$. Then, the probability of the observed data given c follows a binomial distribution (i.e, $Pr(C_j|c, N_j) = \binom{N_j}{C_j} c^{C_j}(1-c)^{N_j - C_j}$). Because we are ultimately interested in making statements about the labor market as perceived by workers, we weight observations by the number of separators, $\omega_j = \frac{N_j}{\sum_j N_j}$. Letting $\theta = \{\alpha, \beta\}$ denote our parameter vector, and $\mathcal{O}$ denote the matrix of data (the j^{th} row is (N_j, C_j)), we are interested in the following maximization problem:

$$\begin{aligned} \max_{\theta} \mathbb{P}\{\mathcal{O}|\theta\} &= \max_{\theta} \Pi_j \omega_j \mathbb{P}\{\mathcal{O}_j|\theta\} \\ &= \max_{\theta} \Pi_j \omega_j \bigg(\int_{c=0}^{1} \mathbb{P}\{\mathcal{O}_j|c\} \times \mathbb{P}\{c|\theta\} dc \bigg), \end{aligned} \tag{A1}$$

where $\mathbb{P}\{c|\theta\}$ is the probability density function (PDF) of the beta distribution and $\mathbb{P}\{\mathcal{O}_j|c\}$ is the probability mass function (PMF) of the binomial distribution. Casting the problem in this way takes small samples into account: even if a firm has a true claim rate that is in the interior of the support, say, 0.2, there is some probability (given by the binomial probability mass function) that we instead observe a claim rate of 0 or 1. More generally, the binomial PMF captures the over-dispersion that we expect given that we do not observe infinite samples for each firm. We numerically maximize this expression.[37]

This maximization problem gives us estimates of the beta distribution parameters $\hat{\theta} = \{\hat{\alpha}, \hat{\beta}\}$. We then use these parameters to compute the posterior mean of the firm-level claim rate, which takes into account the sample size:

$$\hat{c}_j^{EB} = \frac{C_j + \hat{\alpha}}{N_j + \hat{\alpha} + \hat{\beta}}, \tag{A2}$$

where the super-script indicates empirical Bayes.

[37] We approximate the integral with 99 points, which in Monte Carlo experiments was sufficient for stability.

C Elasticities in Anderson and Meyer (2000)

Table 4 of reports the mean of monthly claims in Washington State from 1972-1984 of 0.0304. The quarterly separation issue denials/quarterly claims in the same period and state is 0.0521.

We use these levels to convert the estimates in Table 5 and Table 6 of implied elasticities of claims with respect to separation issue denials, which is the closest conceptually to a measure of claims with respect to challenges (Table 5 compares to all other states and DC; table 6 compares to Oregon and Idaho). Each of these tables has 3 columns corresponding to no controls, state times log US unemployment rate, and state times log state unemployment rate.

	(1)	(2)	(3)
Table 5 (50 states, DC)	-0.277	-0.279	-0.183
Table 6 (Oregon and Idaho)	-0.149	-0.237	-0.128
Controls	None	State $\times$ ln(US UR)	State $\times$ ln (state UR)

D Omitted proofs

Result 1

Proof. For a worker with eligibility status e, the firm payoff function is:

$$-p_{e,j}r_e\tau - p_{e,j}(1-r_e)\times 0 - (1-p_{e,j})\tau - \eta_j p_{e,j}^{\zeta}. \tag{A3}$$

Taking the first order condition with respect to $p_{e,j}$ we get:

$$(1-r_e)\tau = \eta_j\zeta p_{e,j}^{\zeta-1} \tag{A4}$$

$$\frac{(1-r_e)\tau}{\eta_j\zeta} = p_{e,j}^{\zeta-1} \tag{A5}$$

$$\left(\frac{(1-r_e)\tau}{\eta_j\zeta}\right)^{\frac{1}{\zeta-1}} = p_{e,j}^{*}. \tag{A6}$$

The restriction that $\zeta > 1$ ensures that the second order condition holds. □

Result 2

Proof. A worker of eligibility type e who draws χ and separates from a firm of type j has the following payoff from applying:

$$p_{e,j}^{*}r_e u(b) + p_{e,j}^{*}(1-r_e)u(d) + (1-p_{e,j}^{*})u(b) - \chi. \tag{A7}$$

The first term captures the event that the worker claims, the firm appeals, and the worker ends up collecting. The second term captures the event of the firm appealing and the worker not collecting. The third term captures the firm not appealing. The final term records the cost to the worker of applying.

The payoff from not applying is $u(d)$. Therefore, the cutoff type for applying for eligibility type e at firm j is given by:

$$p_{e,j}^{*}r_e u(b) + p_{e,j}^{*}(1-r_e)u(d) + (1-p_{e,j}^{*})u(b) - \chi_{e,j}^{*} = u(d) \tag{A8}$$

$$(1-(1-r_e)p_{e,j}^{*})(u(b)-u(d)) = \chi_{e,j}^{*}. \tag{A9}$$

□

Result 3

Consider a firm's decision to layoff workers. Because δ share of workers separate in the absence of a firm level shock, if a firm enters the period with $E_{j,-1}$ workers, then it has only $(1-\delta)E_{j,-1}$ to decide whether or not to lay a worker off. The expected cost of laying off an eligible worker is:

$$C_{1,j}\tau[p^*_{1,j}r_1 + (1-p^*_{1,j})] = C_{1,j}\tau[1-(1-r_1)p^*_{1,j}]. \tag{A10}$$

This equation says: there is some probability $C_{1,j}$ that an eligible worker applies, the worker collects either if the firm challenges and the worker collects anyway, or if the firm does not challenge, and finally the firm pays τ if the worker applies and collects. Hence, the shadow cost of the marginal worker is not w, but is instead $w - C_{1,j}\tau[p^*_{1,j}r_1 + (1-p^*_{1,j})]$ because by retaining the worker the firm does not pay the implicit firing cost.

Hence, there are three regions of optimal decisions.

If z_j is such that

$$\left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}} > (1-\delta)E_{j,t-1}$$

then the firm hires and $E^*_{j,t} = \left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}}$.

If z_j is such that

$$\left(\frac{\alpha z_j}{w - C_{1,j}\tau[p^*_{1,j}r_1 + (1-p^*_{1,j})]}\right)^{\frac{1}{1-\alpha}} > (1-\delta)E_{j,t-1} > \left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}}$$

then the firm neither hires nor fires and $E^*_{j,t} = (1-\delta)E_{j,t-1}$.

If z_j is such that

$$(1-\delta)E_{j,t-1} > \left(\frac{\alpha z_j}{w - C_{1,j}\tau[p^*_{1,j}r_1 + (1-p^*_{1,j})]}\right)^{\frac{1}{1-\alpha}} > \left(\frac{\alpha z_j}{w}\right)^{\frac{1}{1-\alpha}}$$

then the firm lays workers off and $E^*_{j,t} = \left(\frac{\alpha z_j}{w - A_{1,j}\tau[p^*_{1,j}r_1 + (1-p^*_{1,j})]}\right)^{\frac{1}{1-\alpha}}$.

Define the layoff rate

$$l(z_t, \eta_j) = \max\{1 + \delta - \frac{E(z_t, \eta_j)}{E_{j,-i}}, 0\}.$$

This says that the firm only lays workers off if it wants to contract by more than δ percent.

Result 4

Part 1. For the first part:

$$p^*_{e,j} = \left(\frac{(1-r_e)\tau}{\eta_j \zeta}\right)^{\frac{1}{\zeta-1}} \tag{A11}$$

$$\frac{\partial p^*_{e,j}}{\partial \tau}\frac{\tau}{p^*_{e,j}} = \frac{1}{\zeta - 1} > 0. \tag{A12}$$

Part 2. For the second part:

$$\chi^*_{e,j} = (1-(1-r_e)p^*_{e,j})(u(b)-u(d)) \tag{A13}$$

$$\frac{\partial \chi^*_{e,j}}{\partial \tau} = -(1-r_e)(u(b)-u(d))\frac{\partial p^*_{e,j}}{\partial \tau} < 0, \tag{A14}$$

since $(1-r_e)(u(b)-u(d)) > 0$ and $\frac{\partial p^*_{e,j}}{\partial \tau} > 0$.

Since $C_{e,j} = \mathcal{P}_e(\chi^*_{e,j})$, decreasing the cutoff type that applies decreases the application rate.

Part 3. For the third part:

$$\frac{\partial C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]}{\partial \tau} = \underbrace{C_{1,j}[1-p^*_{1,j}(1-r_1)]}_{>0} + \underbrace{\frac{C_{1,j}}{\partial \tau}\tau[1-p^*_{1,j}(1-r_1)]}_{<0} + \underbrace{C_{1,j}\tau[1-\frac{\partial p^*_{1,j}}{\partial \tau}(1-r_1)]}_{<0}. \tag{A15}$$

In elasticities:

$$\frac{\partial C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]}{\partial \tau}\frac{\tau}{C_{1,j}\tau[1-p^*_{1,j}(1-r_1)]} = \underbrace{1}_{>0} + \underbrace{\frac{\partial A_{1,j}}{\partial \tau}\frac{\tau}{C_{1,j}}}_{<0} + \underbrace{\frac{\partial[1-p^*_{1,j}(1-r_1)]}{\partial \tau}\frac{\tau}{[1-p^*_{1,j}(1-r_1)]}}_{<0}. \tag{A16}$$

The first term is the direct effect, and the second and third terms are the indirect effects (the application rate, and the probability of receiving UI conditional on applying and being eligible). There is nothing in the theory that restricts the magnitudes of the indirect effects and thus the overall sign is ambiguous.

E Details on estimating the model

E.1 Firm-averaged parameters for eligible workers

At firm growth rate $g = 0$ the claim rate can be expressed as a simple weighted average of the claim rate of eligible workers (C_1) and of ineligible workers (C_0), weighted by $\sigma = \Pr(e = 1)$, the share of eligible workers. At $g < 0$, we assume that all separators are eligible and so the claim rate can be expressed as a weighted average of claim rates of the "excess" separators (all eligible) at point g and of the remaining share of ineligible separators. Specifically:

$$cl_0 = \sigma C_1 + (1 - \sigma)C_0 \tag{A17}$$

$$cl_g = \frac{sep_g - sep_0}{sep_g} C_1 + \frac{sep_0}{sep_g} cl_0. \tag{A18}$$

This gives rise to one equation in one unknown. Hence:

$$C_1 = \frac{sep_g}{sep_g - sep_0} \left(cl_g - \frac{sep_0}{sep_g} cl_0 \right). \tag{A19}$$

Similarly, for the probability of appeal at 0 and at g gives rise to one equation in one unknown:

$$pa_0 = p_0 \frac{(1 - \sigma)C_0}{(1 - \sigma)A_0 + \sigma C_1} + p_1 \frac{\sigma C_1}{(1 - \sigma)C_0 + \sigma C_1} \tag{A20}$$

$$pa_0 = p_0 \frac{(1 - \sigma)C_0}{cl_0} + p_1 \frac{\sigma C_1}{cl_0} \tag{A21}$$

$$pa_g = pa_0 \frac{sep_0 cl_0}{sep_g cl_g} + \frac{sep_g cl_g - sep_0 cl_0}{sep_g cl_g} p_1 \tag{A22}$$

$$p_1 = (pa_g - pa_0 \frac{sep_0 cl_0}{sep_g cl_g}) \frac{sep_g cl_g}{sep_g cl_g - sep_0 cl_0}. \tag{A23}$$

Finally, for the probability of receiving UI conditional on applying and being challenged:

$$rec_0 = \frac{p_0(1 - \sigma)C_0}{p_0(1 - \sigma)C_0 + p_1 \sigma C_1} r_0 + r_1 \frac{p_1 \sigma C_1}{p_0(1 - \sigma)C_0 + p_1 \sigma C_1} \tag{A24}$$

$$rec_g = \frac{sep_0 cl_0 pa_0}{sep_g cl_g pa_g} rec_0 + \frac{sep_g cl_g pa_g - sep_0 cl_0 pa_0}{sep_g cl_g pa_g} r_1 \tag{A25}$$

$$r_1 = \frac{sep_g cl_g pa_g}{sep_g cl_g pa_g - sep_0 cl_0 pa_0} (rec_g - \frac{sep_0 cl_0 pa_0}{sep_g cl_g pa_g} rec_0). \tag{A26}$$

E.2 Firm-averaged parameters for the ineligible

To compute the parameters related to the ineligible population, we use the additional moment from the BAM data that the share of ineligible workers among dollars paid out is 12.7 percent, which we assume refers to firms with zero growth rate, $g = 0$. We further assume that the dollars paid out to the eligible and ineligible are identical.

The mass of ineligible workers who collect is given by:

$$(1-\sigma)C_0 p_0 r_0 + (1-\sigma)C_0(1-p_0) = (1-\sigma)C_0(1-(p_0(1-r_0))). \tag{A27}$$

The first term says that a worker applies, is challenged and collects. The second terms says that a worker applies and is not challenged (and so collects). Analogous expressions apply to the eligible. Hence, the share of ineligible workers among those who collect UI is given by:

$$inelig_0 = \frac{(1-\sigma)C_0(1-(p_0(1-r_0)))}{(1-\sigma)C_0(1-(p_0(1-r_0))) + \sigma C_1(1-p_1+p_1 r_1)}. \tag{A28}$$

We now have four equations ((A17), (A20), (A24), and (A28)) in four unknowns (σ, C_0, p_0 and r_0).

We first rearrange (A17), (A20), and (A24):

$$C_0 = \frac{cl_0 - \sigma C_1}{1-\sigma} \tag{A29}$$

$$p_0 = \frac{pa_0 - p_1 \frac{\sigma C_1}{(1-\sigma)C_0+\sigma C_1}}{\frac{(1-\sigma)C_0}{(1-\sigma)A_0+\sigma A_1}} = \frac{pa_0((1-\sigma)C_0+\sigma C_1) - p_1\sigma C_1}{(1-\sigma)C_0} \tag{A30}$$

$$r_0 = \frac{rec_0 - r_1 \frac{p_1\sigma C_1}{p_0(1-\sigma)C_0+p_1\sigma C_1}}{\frac{p_0(1-\sigma)C_0}{p_0(1-\sigma)A_0+p_1\sigma C_1}} = \frac{rec_0(p_0(1-\sigma)C_0+p_1\sigma C_1) - r_1 p_1 \sigma C_1}{p_0(1-\sigma)C_0}. \tag{A31}$$

We combine equation (A30) and (A31) to write:

$$p_0(1-r_0) = \frac{pa_0((1-\sigma)C_0+\sigma C_1)-p_1\sigma C_1}{(1-\sigma)C_0}\left(1-\frac{rec_0(p_0(1-\sigma)C_0+p_1\sigma C_1)-r_1p_1\sigma C_1}{p_0(1-\sigma)A_0}\right) \tag{A32}$$

$$= \frac{pa_0((1-\sigma)C_0+\sigma A_1)-p_1\sigma C_1}{(1-\sigma)A_0}\left(\frac{(1-rec_0)p_0(1-\sigma)C_0-(rec_0-r_1)p_1\sigma C_1}{p_0(1-\sigma)C_0}\right) \tag{A33}$$

$$= \frac{pa_0((1-\sigma)C_0+\sigma C_1)-p_1\sigma C_1}{(1-\sigma)C_0}\left(\frac{(1-rec_0)(1-\sigma)C_0-(rec_0-r_1)\frac{p_1(1-\sigma)C_0}{pa_0((1-\sigma)C_0+\sigma C_1)-p_1\sigma C_1}\sigma C_1}{(1-\sigma)C_0}\right) \tag{A34}$$

$$= \frac{pa_0((1-\sigma)C_0+\sigma C_1)-p_1\sigma C_1}{(1-\sigma)C_0}\left(\frac{(1-rec_0)-(rec_0-r_1)\frac{p_1}{pa_0((1-\sigma)C_0+\sigma C_1)-p_1\sigma C_1}\sigma C_1}{1}\right). \tag{A35}$$

Now we substitute in for (A29):

$$p_0(1-r_0) = \frac{pa_0cl_0-p_1\sigma C_1}{cl_0-\sigma C_1}\left(\frac{(1-rec_0)-(rec_0-r_1)\frac{p_1}{pa_0cl_0-p_1\sigma C_1}\sigma C_1}{1}\right) \tag{A36}$$

$$= \frac{(1-rec_0)(pa_0cl_0-p_1\sigma C_1)-(rec_0-r_1)p_1\sigma C_1}{cl_0-\sigma C_1} \tag{A37}$$

$$= \frac{(1-rec_0)pa_0cl_0-(1-r_1)p_1\sigma C_1}{cl_0-\sigma C_1} \tag{A38}$$

$$1-p_0(1-r_0) = \frac{cl_0-\sigma C_1-(1-rec_0)pa_0cl_0+(1-r_1)p_1\sigma C_1}{cl_0-\sigma C_1}. \tag{A39}$$

Now substitute (A29) and (A39) into equation (A28) to have:

$$inelig_0 = \frac{cl_0-\sigma C_1-(1-rec_0)pa_0cl_0+(1-r_1)p_1\sigma C_1}{cl_0-\sigma C_1-(1-rec_0)pa_0cl_0+(1-r_1)p_1\sigma C_1+\sigma C_1(1-p_1+p_1r_1)} \tag{A40}$$

$$= \frac{cl_0-\sigma C_1-(1-rec_0)pa_0cl_0+(1-r_1)p_1\sigma C_1}{cl_0-(1-rec_0)pa_0cl_0}. \tag{A41}$$

Now we simplify to solve for σ in closed form:

$$inelig_0 \left(cl_0 - (1 - rec_0)pa_0cl_0\right) = cl_0 - \sigma C_1 - (1 - rec_0)pa_0cl_0 + (1 - r_1)p_1\sigma C_1 \tag{A42}$$

$$\frac{(1 - inelig_0)\left(cl_0 - (1 - rec_0)pa_0cl_0\right)}{C_1(1 - (1 - r_1)p_1)} = \sigma. \tag{A43}$$

Given σ, we solve for $\{C_0, p_0, r_0\}$ using equations (A29)-(A31).

E.3 Elasticity of appeals with respect to experience rating

Suppose firm j has weight $\omega_{j,1}$ among eligible applicants, then:

$$\begin{aligned} p_1^* &= \sum_j \omega_{1,j} \left(\frac{(1 - r_1)\tau}{\eta_j \zeta}\right)^{\frac{1}{\zeta - 1}} \\ &= \left(\frac{(1 - r_1)\tau}{\zeta}\right)^{\frac{1}{\zeta - 1}} \sum_j \omega_{1,j} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}}. \end{aligned} \tag{A44}$$

Suppose firm j has weight $\omega_{j,0}j$ among ineligible applicants. Then for p_0:

$$p_0^* = \left(\frac{(1 - r_0)\tau}{\zeta}\right)^{\frac{1}{\zeta - 1}} \sum_j \omega_{0,j} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}}. \tag{A45}$$

Note that $r_1 > r_0 \implies p_1 < p_0$. An eligible worker ($e = 1$) is more experience-rated than an ineligible worker ($e = 0$).

Finally, dividing the two p^*s and rearranging leads to,

$$\frac{\hat{p}_1}{\hat{p}_0} = \left(\frac{1 - r_1}{1 - r_0}\right)^{\frac{1}{\zeta - 1}} \frac{\sum_j \omega_{j,1} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}}}{\sum_j \omega_{0,j} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}}} \tag{A46}$$

$$\frac{1}{\zeta - 1} = \frac{\ln {}^{p_1}/_{p_0} - \ln \left(\frac{\sum_j \omega_{1,j} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}}}{\sum_j \omega_{0,j} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}}}\right)}{\ln {}^{1 - r_1}/_{1 - r_0}} \tag{A47}$$

$$\frac{1}{\zeta - 1} \approx \frac{\ln {}^{p_1}/_{p_0}}{\ln {}^{1 - r_1}/_{1 - r_0}}, \tag{A48}$$

where this approximation is exact if $\sum_j \omega_{1,j} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}} = \sum_j \omega_{0,1} \left(\frac{1}{\eta_j}\right)^{\frac{1}{\zeta - 1}}$, which is true if the

share of eligible and ineligible separators is the same at all firms ($\omega_{1,j} = \omega_{0,j}$). Thus, given $\{\hat{p}_1, \hat{p}_0, \hat{r}_1, \hat{r}_0\}$ we can get an estimate of $1/\zeta - 1$.

E.4 Model fit

We fit the model using two points of firm growth: firm growth around 0, and a negative growth rate, $g = -0.15$. To assess the fit of the model, we ask how the model fits the data at growth rates that we did not use. To do so, we take as given the separation rates by firm growth rate, and then compute the resulting model predictions for the UI claim rate, challenge rate, and receipt rate.

$$cl_g = \frac{sep_g - sep_0}{sep_g} C_1 + \frac{sep_0}{sep_g}(\sigma C_1 + (1-\sigma)C_0). \tag{A49}$$

$$pa_g = pa_0 \frac{sep_0 cl_0}{sep_g cl_g} + \frac{sep_g cl_g - sep_0 cl_0}{sep_g cl_g} p_1. \tag{A50}$$

Finally, for the probability of receiving UI conditional on claiming and being challenged:

$$rec_g = \frac{sep_0 cl_0 pa_0}{sep_g cl_g pa_g} rec_0 + \frac{sep_g cl_g pa_g - sep_0 cl_0 pa_0}{sep_g cl_g pa_g} r_1. \tag{A51}$$

E.5 Details on counterfactuals

For a 10 percent decrease in experience rating, we use our estimates of ζ to compute the firm-specific changes in challenge probabilities.

We can write:

$$\begin{aligned} p_e^* &= \sum_j \omega_{e,j} \left(\frac{(1-r_1)\tau}{\eta_j \zeta} \right)^{\frac{1}{\zeta-1}} = \left(\frac{(1-r_1)\tau}{\zeta} \right)^{\frac{1}{\zeta-1}} \sum_j \omega_{e,j} \left(\frac{1}{\eta_j} \right)^{\frac{1}{\zeta-1}} \\ &= \tau^{\frac{1}{\zeta-1}} \left(\frac{(1-r_1)}{\zeta} \right)^{\frac{1}{\zeta-1}} \sum_j \omega_{e,j} \left(\frac{1}{\eta_j} \right)^{\frac{1}{\zeta-1}}. \end{aligned} \tag{A52}$$

Then we replace τ with 0.9τ to solve for the counterfactual p_e^*.

To compute the change in application rates implied by the change in appeal probability, we use the cross-sectional elasticity of application rates to appeals.

F The role of firm take-up rate in determining the benefit ratio

The model in Section 4 predicts that there are two sources of variation in the benefit ratio facing a firm: the layoff rate and the take-up rate, which in the model is a function of the appeal rate.

Result A1. *The benefit ratio at firm j is:*

$$br_j = b\frac{\frac{l(z_t,\eta_j)+\delta\sigma}{l(z_t,\eta_j)+\delta}A_{1,j}[p^*_{1,j}r_1 + (1-p^*_{1,j}] + \frac{\delta(1-\sigma)}{l(z_t,\eta_j)+\delta}A_{0,j}[p^*_{0,j}r_0 + (1-p^*_{0,j}]}{w},$$

where $l(z_t,\eta_j) \equiv abs\left(\max\{\delta + 1 - \frac{E(z_t,\eta_j)}{E_{j,-i}}, 0\}\right)$ *is firm j's layoff rate. Hence, the firm's benefit ratio is increasing in the firm layoff rate and decreasing in the firm's probability of appeal.*

Below, we show that variation in the firm take-up rate is as important in determining the firm's benefit ratio as the firm separation rate, where the latter has been typically viewed as the firm's decision variable when researchers have analyzed UI financing reforms.

Benefit ratio formula used by Washington State can be written as:

$$\text{Benefit ratio in year } t = \frac{\text{Sum of benefits charged over last four years}}{\text{Sum of taxable wages over last four years}}, \tag{A53}$$

where "taxable wages" is the base to which the tax rate is applied. We expand the right-hand side of equation for the benefit ratio of a firm j as follows:

$$\begin{aligned}\text{Benefit ratio} &= \frac{\text{Benefits charged}}{\text{Number of employees}} \Big/ \frac{\text{Taxable wages}}{\text{Number of employees}} \\ &= \underbrace{\frac{\text{Number of separators}}{\text{Number of employees}}}_{\text{separation rate}} \times \underbrace{\Pr(\text{claiming}|\text{separating})}_{\text{claim rate}} \\ &\quad \underbrace{\times \underbrace{\Pr(\text{receiving}|\text{claiming})}_{\text{beneficiary rate}} \times \underbrace{\frac{\text{Mean benefit paid}}{\frac{\text{Taxable wages}}{\text{Number of employees}}}}_{\text{replacement rate}}}_{\text{realized replacement rate}}.\end{aligned} \tag{A54}$$

That is, we write the benefit ratio as the product of the separation rate, the claim rate, and the realized replacement rate. In practice, we first compute averages number of separators, take-up rate, beneficiary rate, and mean benefits paid in the last four years. We then divide

the terms by the average number of a firm's employees in the last four years. We compute these benefit ratios for each firm observed in 2009.

Upon seeing equation (A54), a typical inclination would be to take logs and report a linear variance decomposition. In this context, however, this step is unappealing because the benefit ratio in levels — not logs — is the object of interest. Instead, we apply the following "nonlinear" decomposition. We compute "simulated" benefit ratios by in turn replacing the separation rate, the claim rate, and the realized replacement rate by their sample averages (as well as combinations of each of these three terms) and then recomputing the variance of the benefit ratio. We then compute the variance of the observed benefit ratio as well as the variance of these "simulated" benefit ratios. By dividing the simulated variance by the observed variance, we obtain an estimate of the contribution of each term.

As an example, define the "claim-rate constant" benefit ratio as $\text{BR}(\bar{claims})$ and the true benefit ratio as BR. Then, $1 - \frac{\text{var}(\text{BR}(\bar{claims}))}{\text{var}(BR)}$, represents the share of the variance explained by the claim rate. This calculation quantifies what share of the variance of the benefit ratio each component explains.

Table A3 shows the shares explained for all three individual terms and their combinations. Because this decomposition is nonlinear, the components do not sum to one. The results show that the claim rate explains slightly more of the variance in the benefit ratio than the separation rate (86 percent vs. 84 percent). Second, when combined with the realized replacement rate, the claim rate explains more of the variance than the separation rate.

Therefore, a key finding is that the claim rate is at least as important as the separation rate in explaining the variation in the benefit ratio across firms. This stands in contrast to most of the literature on experience rating, which typically assumes that the only decision variable of the firm is the separation rate (Brechling, 1981; Topel, 1983; Topel, 1984; and Ratner, 2013).[38] Our results highlight that the variation in take-up across firms is a quantitatively important margin determining the benefit ratio, and as a result, the experience-rated tax rate.

[38] Auray, Fuller, and Lkhagvasuren (2019) and Auray and Fuller (2020) are exceptions.

Table A3: Decomposition of the benefit ratio

Variance of benefit ratio	1.000
Variance components of benefit ratio explained by variation in:	
Separation rate	0.844
Claim rate	0.860
Realized replacement rate	0.622
Separation rate and claim rate	0.987
Sep. rate and realized replacement rate	0.885
Claim rate and realized replacement rate	0.973
Number of firms	5,327

Notes: A firm's benefit ratio is computed as the product of the four-year averages of the separation rates, claims rates, and realized replacement rates (as described in the text) for year 2009 (hence, values are based on four prior years' values 2005–2008). Each rates' share of variance is computed by replacing the firm's observed rate by the sample average. Therefore, each number in the table shows the share of the variance in the benefit ratio that would be reduced if the rate corresponding to a given bar was made equal across all firms.