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Unemployment Insurance Take-up Rates in an Equilibrium Search Model *

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Abstract

From 1989 – 2012, on average 23% of those eligible for unemployment insurance (UI) benefits in the US did not collect them. In a search model with matching frictions, private information associated with the UI non-collectors implies the market equilibrium is not Pareto optimal. The cause of the Pareto inefficiency is characterized along with the key features of collector vs. non-collector outcomes. Non-collectors transition to employment at a faster rate and a lower wage relative to the Pareto optimal arrival rates and wages. Quantitatively, this implies 1.71% welfare loss in consumption equivalent terms for the average worker, with a 3.85% loss conditional on non-collection. With an endogenous take-up rate, the unemployment rate and average duration of unemployment respond significantly slower to changes in the UI benefit level, relative to the standard model with a 100% take-up rate.

Keywords: unemployment insurance, take-up, calibration, matching frictions, search
JEL classification: E61, J32, J64, J65

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1 Introduction

The unemployed *not* collecting benefits they are eligible for may represent the most important issue in the U.S. unemployment insurance system. The existing literature on unemployment insurance (UI) has focused primarily on incentive problems, such as moral hazard, and recently on the effects of UI benefit extension programs (e.g. Nakajima (2012) or Hagedorn, Karahan, Manovskii, and Mitman (2013)). In the U.S., from $1989-2012$, UI fraud and benefit extensions amounted to 2.4% and 13% of total benefit expenditures on average, respectively.[1] According to our analysis, the "unclaimed" benefits from eligible unemployed not collecting their benefits are nearly double the *combined* expenditures on UI fraud and benefit extensions.

An accurate measure of the UI take-up rate is essential on several dimensions. First, changes in new UI claims represents an important and often used labor market and business cycle indicator (https://oui.doleta.gov/). Accurately accounting for changes in this measure requires an accurate measure of the UI take-up rate. Second, the efficacy of the UI system depends on how many workers actually collect benefits, so knowing the take-up rate is an important first step towards developing policies that improve the provision of UI benefits. Related, welfare analyses of the current U.S. system, Wang and Williamson (2002) is one example, need to take into account how many eligible unemployed actually collect benefits. Finally, an accurate measure of the UI take-up rate is essential to the study the effect of UI benefits on labor market outcomes. Any change in UI benefits alters not only the behavior and outcomes of UI collectors, but it may also impact how many collect benefits and the behavior and outcomes of the non-collectors. The analysis in this paper shows this to be an important consideration. Our contribution includes a calculation of the fraction of eligible unemployed collecting UI (hereafter "take-up rate"), an equilibrium model incorporating the take-up decision, and an exploration of the implications of unclaimed benefits.

While many U.S. labor market statistics are tabulated and readily available from the

[1] UI fraud includes issues such as concealed earnings, insufficient job search, job offer refusals, and quits, among others. See Fuller, Ravikumar, and Zhang (2015) for further details on the issue of UI fraud.

Bureau of Labor Statistics (BLS), there exists little information regarding the UI take-up rate. Building on the methodology of Blank and Card (1991), an estimate of the UI take-up rate is calculated from 1989 − 2012. The calculation uses the March supplement of the Current Population Survey (CPS) along with detailed eligibility criteria by U.S. state. Over the 1989 − 2012 time period, the take-up rate averaged 77%. Given these estimates of the take-up rate, the analysis then develops an equilibrium search model to explain the determinants and implications of this take-up rate.

The take-up decision is captured using a search model with matching frictions where risk-averse workers direct their search to the optimal wage and arrival rate combinations offered by risk-neutral firms (see Rogerson, Shimer, and Wright (2005) for an overview of a directed search environment and the related literature). Workers are heterogenous in their direct utility cost of collecting UI benefits. The work of Auray and Fuller (2018) examines cross-state differences in UI take-up to identify the nature of the costs of collecting UI benefits. Indeed, the authors find a significant role for UI collection costs in the determination of the UI take-up rate. In our analysis, these costs, along with past UI collections, are private information for the worker. This informational friction combined with the UI financing scheme imply the equilibrium is not Pareto optimal.

Specifically, we model the "experience rating" feature of UI taxes in the U.S., where firms finance UI benefits and the specific tax rate depends on how many UI benefits a firm's former employees collect. (see Feldstein (1976), Topel (1983), Albrecht and Vroman (1999), Wang and Williamson (2002), and Cahuc and Malherbet (2004), among others for analyses of experience rating). We demonstrate analytically how the private information implies that equilibrium is not Pareto optimal, taking as given the experience rating feature of the U.S. system. Moreover, we show that while UI collectors search as in the Pareto optimal case, non-collector search behavior is distorted.

In the model, firms maximize profits by offering different wages depending on whether or not the worker prefers to collect UI benefits in the event of a future separation. They know the distribution of workers across UI collection costs, but do not observe whether or not the worker has collected in the past. In general, this is not problematic for the firm. They simply offer wages that maximize each type of worker's expected lifetime utility given the expected queue lengths associated with each wage. This would imply a natural "separating" equilibrium. The natural separation arises from the effects of different consumption levels with risk-averse workers. All else equal, UI collectors enjoy higher consumption while unemployed relative to a UI non-collector. Thus, UI collectors search for jobs offering relatively high wages, but longer unemployment durations (*i.e.* slower job arrival rates). In contrast, UI non-collectors prefer to search for relatively low wage jobs with shorter average unemployment durations.

In an experience rated system, however, this natural separation is distorted when UI collection costs and histories are private information. With the UI tax accumulating only to those firms hiring a future UI collector, for an equivalent arrival rate, the UI non-collector has a higher wage than a collector. Thus, for some range of UI collection costs a collector may find it beneficial to collect benefits but search for the non-collector wage. Indeed, we show that this is true in equilibrium with private information.

We characterize how firms manage this incentive problem. In equilibrium, it implies that UI non-collector wages and arrival rates are distorted from the Pareto optimal levels. Relative to Pareto optimality, non-collectors have a lower wage and shorter unemployment duration. This distortion makes the non-collector job (wage and queue length) less appealing to a UI collector.

To understand the magnitude of this distortion, we use our estimates of the UI take-up rate to calibrate the model to U.S. data and quantify the welfare consequences. Given the observed take-up rate and level of experience rating, the non-collector distortion amounts to a welfare loss of 1.71% in consumption equivalent terms for the average worker. Conditional on being a non-collector, the welfare loss is 3.85%. The welfare loss is measured relative to the full information economy, which we also characterize analytically.

Interestingly, our analytical and quantitative results show the take-up rate is lower with full information relative to the economy with private information. Thus, to avoid paying the experience rated tax, firms prefer to dissuade some workers from collecting UI benefits by offering more appealing wages. When the idiosyncratic UI collection costs and collection histories are not observable by the firm, however, their ability to provide an attractive alternative to collecting UI benefits is reduced; as a result, the take-up rate remains higher in the private information economy.

The analysis also focuses on how incorporating the UI take-up decision affects the impact of UI benefits on equilibrium outcomes. That is, how does an increase in UI benefits affect moments such as the unemployment rate and average duration of unemployment? We find that allowing for an endogenous take-up rate has important implications. Specifically, while an increase in UI benefits does imply an increase in both the unemployment rate and average duration of unemployment, these two moments respond slower relative to a standard search model with a fixed 100% take-up rate. This occurs in part because the average duration of unemployment actually decreases for non-collectors when UI benefits increase.

Indeed, the effect of UI benefits on the search behavior of UI collectors and non-collectors represents an important aspect of our analysis. As discussed above, UI collectors prefer longer durations and higher wages relative to non-collectors. Acemoglu and Shimer (1999, 2000) present a related finding: as UI benefits increase, workers prefer to search for higher wage jobs arriving less frequently. They show how this feature may lead to UI benefits increasing productivity. We abstract from the productivity dimension, focusing instead on modeling the take-up decision and its implications. On this dimension, we explore a Pareto inefficiency in equilibrium outcomes not present in the models of Acemoglu and Shimer (1999, 2000).

The remainder of the paper proceeds as follows. In Section 2 we present information on the U.I. system in the U.S., our procedure for estimating the take-up rate, and present the results. Section 3 describes the model and equilibrium, and in Section 4 we analytically derive the key properties of equilibrium. Section 5 presents the calibration, policy experiments, and quantitative welfare results. Section 6 concludes.

2 Evidence on take-up rates

This section has two objectives: a description of the relevant features of the U.S. system and a description of our take-up rate estimation and exploration of its key features.

2.1 Unemployment Insurance System in the U.S.

There are two features of the U.S. UI system relevant for the analysis below. First, the U.S. system represents a federal-state partnership. In general the system is run almost entirely at the state level. Each state has autonomy to set its own benefit levels, and most importantly for this paper, to set their own eligibility criteria to qualify for UI benefits. Specifically, each state decides on benefit levels and a fixed potential duration for benefits. A "standard" U.S. state, for example, would provide benefits that are 50% of the previous weekly earnings that last for a maximum of 26 weeks. These 26 weeks of benefits are referred to as "Regular Program" benefits. In times of relatively high unemployment, states may offer "Extended Benefits" that extend the potential duration of benefits. Depending on the state and the unemployment rate, this may extend benefits by 13 or 20 additional weeks.

States must also set tax rates and finance their own UI programs. The federal portion of the federal-state partnership includes payment of state costs administering the UI system, and the management of a federal UI trust fund. The trust fund is used to provide loans to states who are temporarily unable to balance their UI budget. In addition, the federal UI trust fund pays part of any "Extended Benefits" that are offered to workers in a particular U.S. state. For example, in 2009 the Federal Government passed a law extending UI benefits to as many as 99 weeks in some states. These additional extended benefits were financed by the federal government.

The second important aspect of the U.S. UI system for our analysis has to do with the specifics of the financing. Unemployment benefits in the U.S. are financed by a tax levied on firms, and this tax is "experienced rated". Firms pay a tax rate that is positively correlated with their contribution to *insured* unemployment in their particular U.S. state. For example, a firm that has never separated from a worker who collects benefits pays a lower tax rate than a firm that has frequent layoffs who collect benefits. Note, for the firm's tax rate, it does not matter how frequently they separate from workers, but how frequently they separate from workers who collect benefits.

In addition, each state has a maximum and minimum tax rate. This implies that the U.S. system has "partial" experience rating. A firm at the maximum tax rate will not see its tax rate increase in response to an increase in its share of total UI expenditures. In this regard, firms at the maximum tax rate are subsidized. Similarly, a firm at the minimum tax rate may contribute to the UI fund while rarely sending an employee to unemployment who collects UI benefits. Indeed, this partial experience rating feature may have important impacts on labor market outcomes. For example, the work of Feldstein (1976) and Topel (1983) explore how this feature may influence firm layoff decisions. While we abstract here from the firm layoff decision, this previous work suggests important potential impacts from partial experience rating on this dimension.

2.2 Take-up rate estimates

While many statistics and data on the labor market are readily available for public use, there exists little information on take-up rates of unemployment insurance. To begin, there is data on the number of unemployed individuals, and there is data on the number and characteristics of those unemployed who are/have collected UI benefits. These unemployed individuals are referred to as "Insured Unemployed." Given there exists data on the number collecting UI benefits and the total number of unemployed, there also exists data on the ratio of insured unemployed to total unemployed. We refer to this ratio as the fraction of insured unemployment, or FIU. The particular tabulation of the FIU we utilize includes only those unemployed collecting *Regular Program* benefits. On average, from 1989-2012, 35% of the unemployed are collecting regular program benefits. While this provides some characterization of the take-up rate, the FIU does not control for eligibility. That is, many of the unemployed who are not counted as insured unemployed are in fact not eligible to collect benefits. To calculate the *take-up rate*, we first determine the fraction of unemployed individuals who are currently eligible to collect. We refer to the "Fraction of Eligible Unemployed" for UI benefits as FEU. The take-up rate is then take the ratio of FIU to FEU, which is the total number collecting benefits divided by the number of unemployed eligible for benefits.

The particular method we utilize is similar to Blank and Card (1991). Specifically, we start with FIU data tabulated by the U.S. Department of Labor, which can be found at: http://workforcesecurity.doleta.gov/. To determine the fraction of unemployed eligible for regular program benefits, we use data from the March Supplement of the CPS, along with the specific eligibility criteria of each state, for each year from $1989-2012$. Figure 1 displays the FIU, our estimate of the take-up rate, and a decomposition of the different eligibility criteria.

Since the FIU data are ready and tabulated, the key component of estimating the UI take-up rate is determining the FEU. Eligibility depends primarily on three factors, all of which are determined at the state level. The three factors are the (i) duration of unemployment, (ii) the nature of the separation, and (iii) monetary criteria. Below we detail the nature of the different eligibility criteria and how we evaluate these for individuals in the March CPS data.

2.3 Monetary Criteria

Monetary eligibility requirements represent the first criteria we discuss. These require an individual to have accumulated a sufficient amount of earnings or worked a minimum number of weeks in their previous employment before they became unemployed. These previous earnings are measured in a specified "base-period." The base-period differs across states. Many use a year, while others use two quarters. The base-period is used both to determine monetary eligibility and to calculate the specific benefit an individual is entitled to. Given the March CPS supplement only covers the total earnings of an individual in the previous year, similarly to Blank and Card (1991) we only use a one-year base period. To

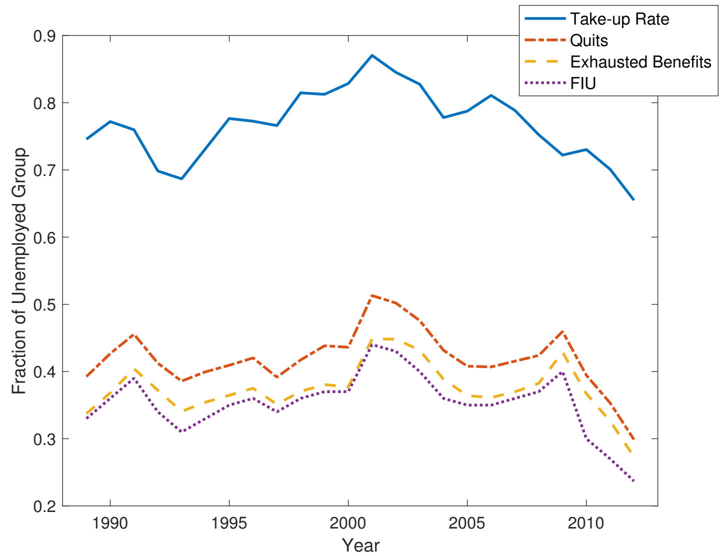


Figure 1: Take-up Rates by Eligibility Criteria Over Time

The bottom line labeled "FIU" is the ratio of insured unemployed to total unemployed. As the lines progress, unemployed individuals are eliminated from the denominator based on different eligibility criteria. Thus, the gap between lines illustrates roughly how many unemployed are ineligible for each criteria. A larger gap between lines indicates a larger number of unemployed ineligible for a certain criteria. "Exhaustions" removes to those ineligible because they exhausted their benefits and "Quits" removes those who are ineligible because they quit the job. The jump from the "Quits" line to the "Take-up Rate" line occurs when those unemployed who are ineligible because they do not meet the monetary requirements are removed. Thus, the "Take-up Rate" line plots the fraction of eligible unemployed collecting benefits.

estimate monetary eligibility, we use the earnings information contained in the March CPS, along with the state-level monetary eligibility requirements.

The monetary requirements vary significantly across states. There are several different varieties of monetary eligibility. Perhaps the most standard is to require base period earnings that exceed some multiple of the "weekly benefit amount." In the U.S. system, individuals must file for benefits each week they remain unemployed, and receive weekly UI income. The "weekly benefit amount" (WBA) is simply the individual's weekly UI income. The WBA an individual is entitled to is typically a fixed fraction of their previous weekly earnings. Thus, requiring total base period earnings that are a multiple of the individual's WBA forces them to have accumulated sufficient work history (or earnings). For example, in 1989, Colorado required base period earnings to exceed 40 times the WBA. In this case, an individual with a WBA of \$200 per week would have to have total base period earnings of at least \$8,000.

Other states simply set a fixed amount that must be earned in the base period. For example, in 1989, California required base period earnings of at least $\$1,200$. Finally, some states set a minimum number of weeks that must be worked in the base period. Michigan in 1989 represents an example of this, as they required 20 weeks of employment at a minimum of 30 times the state minimum hourly wage.

High Quarter Earnings (HQE) represents an important quantity for monetary eligibility in some states. This also represents a drawback to using the March CPS earnings information (Blank and Card (1991) also discuss these drawbacks). Since it only details earnings during the previous year, HQE cannot be determined. In some states, eligibility is based on earnings outside of the HQE. For example, in 1989, Georgia required base period earnings greater than 1.5 times the HQE. In such cases, we are unable to determine monetary eligibility. Using weeks worked represents one possible way to proxy for this type of eligibility. For example, in the case of Georgia above, we could require total weeks worked in the previous year to exceed 19.5 ($1.5 * 13$). This assumes constant earnings over the year, and simply requires the individual to have worked more than one quarter. We have implemented this alternative and it has a negligible impact on the fraction of unemployed eligible for benefits.

In general, the monetary criteria are the most heterogenous criteria of the three across the U.S. states. Appendix D provides a list of each U.S. state and their eligibility requirements in 2012. We now turn to the next eligibility criteria, the duration of unemployment.

2.4 Potential Duration of Benefits and Waiting Weeks

The duration of the unemployment spell directly impacts an individual's eligibility for UI benefits. First, in certain states, there exists a "waiting week(s)." A waiting week implies that a newly unemployed individual must wait at least 1 week before they can actually collect UI benefits. Second, as discussed above, UI benefits have a fixed potential duration. In the majority of states, regular program benefits have a potential duration of 26 weeks. Thus, if an individual collects benefits for 26 total weeks, but remains unemployed, they are no longer eligible to collect. Such an individual is said to have "Exhausted" their benefits. Since the

March CPS does not ask whether the individual is *currently* collecting UI benefits, or the duration collected, an exhaustion must be inferred. There do exist a few states with potential durations longer than the standard 26 weeks. Specifically, in the 1989-2012 timeframe we examine, Massachusetts and Washington have a maximum potential benefit duration of 30 weeks. Beginning in 2004, Montana has a maximum potential benefit duration of 28 weeks. Again, these potential durations refer to the *Regular Program* benefits, and thus exclude any extended benefit programs. Of course, being unemployed for longer than 26 weeks does not necessarily make an individual ineligible. The key issue is whether or not the individual exhausted their regular program benefits.

For example, suppose an individual becomes unemployed and at the time of the March CPS survey has been unemployed for 34 weeks. Further imagine this individual collects UI benefits, but does not apply for them until the 10th week of the unemployment spell. If any unemployment duration above 26 weeks is counted as an exhaustion, this individual will be counted as an Exhaustion and classified as ineligible for UI benefits. Notice, however, this individual has not actually exhausted benefits, as they have only collected 24 weeks worth. Moreover, as long as the individual still meets the aforementioned Monetary requirements for their previous earnings in a Base Period starting from the date they file, there no other restrictions on when in the unemployment spell the individual files. A worker could feasibly decide to file their first claim during the 27th week of the unemployment spell.

To control for this eligibility criteria, rather than rely only on the duration of the unemployment spell, we also use the information in the March CPS about whether an individual collected benefits in the previous year or not. If an individual is unemployed in March of a given year and has expired regular program benefits, then they have been unemployed for longer than 26 weeks (accounting for differences in Massachusetts, Washington, and Montana where applicable) and must have collected benefits in the previous year. Thus, we classify an individual as ineligible via Exhaustion if they have been unemployed longer than 26 weeks, *and* they collected UI benefits in the previous year. This treatment of Exhaustions represents a departure from the methodology of Blank and Card (1991). Blank and Card

(1991) classify individuals as ineligible via Exhaustions if they have been unemployed longer than 26 weeks, which suffers from the aforementioned issues. Below in Table 1 we compare our estimates with those obtained using the Blank and Card (1991) Exhaustion criteria. Finally, we also control for the waiting week criteria, where applicable.

2.5 Separation Criteria

The nature of the separation leading to the spell of unemployment represents the final element of eligibility criteria. Unemployment insurance is designed to provide temporary income to those workers who have lost their job *through no fault of their own*; i.e., an individual must be involuntarily unemployed to be eligible for UI benefits. This implies that individuals who entered unemployment because they quit or were fired for cause are ineligible for UI benefits. In certain years, Georgia is an exception and does allow job leavers (quits) to collect benefits, but they face an increased waiting period before being eligible. In the CPS data, we can eliminate quits; however, we cannot determine whether or not the individual was fired for cause. We also use information on an individual's industry to focus only on covered employment. As in Blank and Card (1991), we eliminate postal workers, federal public administration workers, and ex-service persons, as this group is not eligible to collect UI benefits.

Finally, there also exists the possibility of UI fraud: individuals who are ineligible for UI benefits still collect them. Indeed, UI fraud does occur in the U.S. system, with around 3% of UI benefits being collected fraudulently (see Fuller, Ravikumar, and Zhang (2015) for UI fraud facts and discussion). Thus, some of those in the numerator of the FIU are collecting UI benefits but are in fact ineligible. Ideally, we could either remove such cases from the numerator, or add them back in as "eligible" in the FEU. Unfortunately, the data does not exist to allow us to properly adjust for those committing UI fraud. This issue should not significantly affect the accuracy of our take-up rate estimates, however. While 3% of UI benefits are collected fraudulently, much of this obtains on the intensive, rather than extensive margin. That is, most UI fraud occurs as workers collect higher weekly benefit levels than they are entitled to, rather that workers collecting any amount who were not entitled to *any* UI benefits. The intensive margin of UI fraud does not create problems for the UI take-up rate, as these workers are eligible for some UI benefits.

2.6 Take-up Rates: Results

Figure 1 presents the results of out take-up rate calculations from 1989-2012. The solid line is our estimate of the UI take-up rate. Starting with the lowest line, the FIU, we progressively remove ineligible unemployed by each of the aforementioned criteria. Moving from the lowest line to the next one, we remove those individuals that are ineligible because they exhausted benefits. The next line removes those ineligible because of quits, meaning the last move from the third line to the highest line, the take-up rate, represents how many individuals are ineligible because they failed the monetary requirements.

We also present this information in Table 1. Here we provide the FIU for each year, the take-up rate in each year, and the fraction of unemployed who are ineligible. We then show what fraction of the ineligible unemployed are ineligible by each criteria. For example, in 1989, the FIU is 33%, and 56% of the unemployed are ineligible for UI benefits; this implies a take-up rate of 75%: $TUR = \frac{0.33}{1-0.56} = 0.75$. Of the 56% of unemployed ineligible, 71% are ineligible because they fail the monetary criteria, 25% from quits, and 4% from exhaustions. As expected, the exhaustion criteria has a cyclical contribution, with more individuals exhausting benefits during periods of high unemployment. For example, in 2010, 31% of those ineligible were due to exhausted benefits.

The final three columns of Table 1 show the take-up rate, fraction of unemployed ineligible, and the fraction of ineligible via exhaustions if we alternatively use the exhaustion criteria applied by Blank and Card (1991). Recall, they count any unemployed individuals with durations longer than 26 weeks as ineligible. As expected, this increases the number of unemployed ineligible, which in turn increases the estimated take-up rate. Of note is 2009, where we estimate a take-up rate of 118% under the Blank and Card (1991) methodology. During this period, the average duration of unemployment rate was well above normal, implying a large fraction of the unemployed are unemployed for longer than 26 weeks; as a result, a much larger fraction are deemed ineligible. It is important to note that the FIU used to compute the take-up rate includes only those collecting Regular Program benefits. In 2009 the U.S. Federal Government passed legislation that activated "Extended Benefits" covering workers from weeks 27 to as much as 99 weeks in certain states. Thus, the 118% take-up rate does not obtain because the FIU includes those on extended benefits, but rather from the improper accounting of exhaustions we detail above.

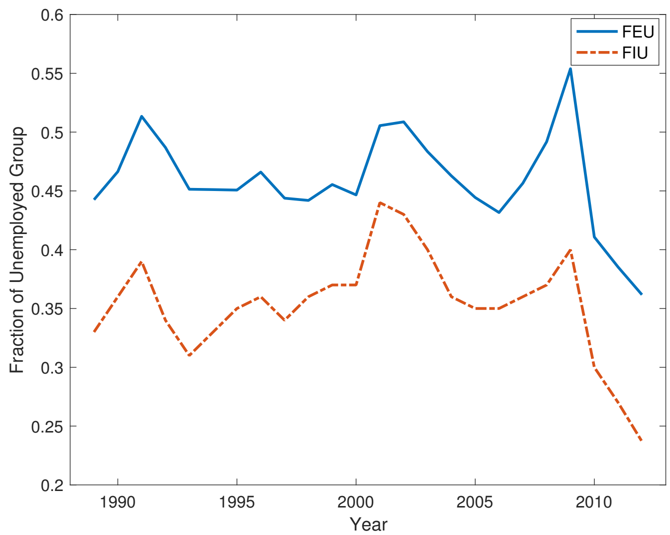


Figure 2: Fraction of Insured Unemployed (FIU) and Fraction of Eligible Unemployed (FEU)

Figure 2 plots the FIU and the FEU. When the two lines move closer together, the take-up rate increases, and it decreases when the lines diverge. The FEU displays a similar cyclical pattern to the FIU. Finally, we present a state-level breakdown of the take-up rate, FIU, FEU, and impact of eligibility criteria in Appendix C. This offers some insight into the variation across states in UI take-up rates.

Table 1: Take-up Rate and Ineligibility by Cause

Year	FIU	TUR	Inelig.	Mon.	Quits	Exhaust	TUR BCE	Inelig. BCE	Exhaust BCE
1989	0.330	0.746	0.558	0.714	0.246	0.039	0.800	0.588	0.174
1990	0.360	0.772	0.534	0.707	0.251	0.041	0.819	0.560	0.173
1991	0.390	0.760	0.487	0.705	0.224	0.072	0.806	0.516	0.215
1992	0.340	0.698	0.513	0.658	0.174	0.168	0.768	0.557	0.344
1993	0.310	0.687	0.549	0.642	0.193	0.164	0.755	0.590	0.352
1994	0.330	0.732	0.549	0.683	0.192	0.125	0.809	0.591	0.340
1995	0.350	0.777	0.549	0.736	0.191	0.073	0.830	0.592	0.323
1996	0.360	0.772	0.534	0.732	0.193	0.076	0.896	0.579	0.310
1997	0.340	0.766	0.556	0.763	0.179	0.058	0.835	0.598	0.266
1998	0.360	0.815	0.558	0.754	0.195	0.050	0.848	0.593	0.246
1999	0.370	0.813	0.545	0.714	0.235	0.051	0.889	0.575	0.209
2000	0.370	0.829	0.553	0.726	0.240	0.034	0.784	0.584	0.184
2001	0.440	0.870	0.495	0.712	0.251	0.037	0.934	0.528	0.201
2002	0.430	0.845	0.491	0.708	0.208	0.083	0.979	0.529	0.284
2003	0.400	0.827	0.517	0.692	0.167	0.142	0.965	0.561	0.350
2004	0.360	0.778	0.537	0.691	0.172	0.137	0.900	0.586	0.365
2005	0.350	0.788	0.556	0.745	0.186	0.070	0.887	0.600	0.316
2006	0.350	0.811	0.568	0.754	0.191	0.055	0.850	0.606	0.275
2007	0.360	0.789	0.543	0.755	0.197	0.049	0.802	0.588	0.283
2008	0.370	0.752	0.508	0.750	0.186	0.064	0.740	0.551	0.293
2009	0.400	0.722	0.446	0.709	0.140	0.150	1.179	0.500	0.451
2010	0.300	0.730	0.589	0.594	0.096	0.310	0.952	0.661	0.612
2011	0.270	0.701	0.615	0.617	0.103	0.280	0.885	0.685	0.611
2012	0.237	0.655	0.638	0.676	0.117	0.207	0.753	0.695	0.582
Average	0.353	0.768	0.541	0.706	0.189	0.106	0.861	0.584	0.323

This table presents the Fraction of Insured Unemployed (FIU), the Take-up Rate (TUR), the fraction of unemployed ineligible for UI ("Inelig."), and then breaks down the reasons for ineligibility. "Mon." corresponds to the Monetary criteria, "Quits" to Quits, and "Exhaust" to "Exhaustions." For example, in 1989, 56% of the unemployed were ineligible for UI benefits, implying that 44% were eligible. With a FIU of 33%, this gives the TUR of $\frac{0.33}{0.44} = 0.75$. Then, of those ineligible for benefit, 71.4% were ineligible because of Monetary criteria, 24.6% because of Quits, and 4% had exhausted benefits. Note, due to rounding errors, in some rows the three criteria may not sum precisely to 100%. The last three columns correspond to take-up rate (TUR BCE) estimates using the Blank and Card (1991) exhaustion criteria, as well as the fraction ineligible (Inelig. BCE) and fraction ineligible from exhaustion (Exhaust BCE) under this criteria. The last row in the table, labeled "Average," averages each column from 1989-2012.

2.7 Reasons for Non-collection

The estimates above imply that from $1989 - 2012$, on average 23% of those eligible for UI benefits did not collect them. One may ask what are the reasons for non-collection? Given the eligibility criteria discussed above, there clearly exist some costs to applying for UI benefits and thus verifying eligibility. The exact nature of these costs and the exact reason(s) for non-collection has not been determined or well-documented in the literature. Anderson and Meyer (1997) cite some survey results offering possible reasons for non-collection, but no particular reason dominates. Reasons displayed in Anderson and Meyer (1997) include uncertain eligibility, too much hassle/work to apply, too much like charity, expect to be recalled soon, or other reasons. There is some evidence that collection costs affect the take-up of Food Stamp benefits (now referred to as SNAP in the U.S.). For example, Brien and Swann (1997) and Bitler, Currie, and Scholz (2003) examine take-up of SNAP benefits and both find that the transaction costs and state-level program administration differences play a significant role in determining the take-up rate. While this is not necessarily reflective of the costs in the UI system, it is suggestive that such costs play a role.

Of course, an individual does not collect UI benefits if they believe the net benefit to doing so is negative. In our model below, we model this as a per-period utility cost of collecting UI benefits. While the survey cited in Anderson and Meyer (1997) does not provide solid evidence of collection costs or their nature, Auray and Fuller (2018) explore possible micro-foundations for these utility costs associated with participating in the UI system. Auray and Fuller (2018) indeed find evidence indicating an important role of collection costs in the take-up decision. Specifically Auray and Fuller (2018) focus on two types of UI collection costs: (i) fixed administrative costs and (ii) costs associated with firm eligibility challenges. We discuss the nature of each here briefly.

Auray and Fuller (2018) find that the majority of UI collection costs are fixed administrative costs. What are examples of such costs? These would be represented by the specifics of the UI application process. Each week, a UI collector must re-file their application to receive benefits for the following week. In each application, the worker must demonstrate their continued eligibility. While eligibility differs across states, providing evidence of job-search activities is one example of these costs. In most states workers must be actively searching for work while collecting UI benefits, and some states require workers to periodically provide evidence of job search contacts made. In some cases, workers are periodically required to visit the UI office and undergo an "eligibility review." While these costs certainly vary across states, data to quantify this impact is generally not available. Indeed, Auray and Fuller (2018) use a structural search model to identify the role of such costs in the UI take-up decision.

The costs associated with firm challenges is the other cost Auray and Fuller (2018) finds evidence of. Again, when a worker files a UI application, the UI authority contacts the worker's previous firm to verify the worker's previous income and the nature of the separation. In some cases, the firm may dispute the information on the worker's claim. These challenges can eventually make it to the court system. Clearly this back and forth of the worker providing their eligibility information and then potentially having this information re-verified poses costs to the applicant (and the firm). This represents another example of possible UI collection costs. Regardless of their specific form, Auray and Fuller (2018) indeed find that differences in these UI collection costs across U.S. states helps explain the variation in UI take-up rates across states, and implies an important role for the utility costs we model below.

2.8 Examining Changes Over Time

Figure 1 and Table 1 show there does exist some variation in the U.S. take-up rate over time. The general pattern looks as if there is an upward trend from 1989-2002, with a downward trend thereafter. It is useful to ask what factors may be contributing to these patterns. Functionally, the take-up rate changes because either the FIU and/or the FEU changes. While changes in the FIU are somewhat more difficult to explain without individual-level data, we can examine some possible factors changing the FEU.

The FEU changes if either the eligibility rules change, or the composition of the unemployed change. To examine the effect of changes in eligibility rules, we perform the following experiment. We fix eligibility rules in each state as written in 1989. Changes are made to monetary criteria to adjust for inflation where relevant. For example, in 1989, Vermont's monetary criteria require earnings of at least \$1000; we update the \$1000 according to the rate of inflation since 1989. Given the 1989 Eligibility Rules, we re-estimate the FEU and calculate the resulting take-up rate. This gives an alternative take-up rate that would have obtained had there been no changes in eligibility. Table 2 presents the results. The first col-

Table 2: Changes in Take-up Rates and Eligibility Over Time

Year	FIU	FEU	TUR	FEU 1989 Rules	TUR 1989 Rules	1989 - Orig. Rules
1989	0.33	0.44	0.75	0.44	0.75	0.000
1990	0.36	0.47	0.77	0.44	0.81	0.042
1991	0.39	0.51	0.76	0.46	0.85	0.086
1992	0.34	0.49	0.70	0.51	0.67	-0.032
1993	0.31	0.45	0.69	0.48	0.64	-0.044
1994	0.33	0.45	0.73	0.45	0.74	0.010
1995	0.35	0.45	0.78	0.45	0.78	0.005
1996	0.36	0.47	0.77	0.46	0.78	0.005
1997	0.34	0.44	0.77	0.44	0.77	0.005
1998	0.36	0.44	0.81	0.44	0.82	0.001
1999	0.37	0.46	0.81	0.46	0.81	-0.004
2000	0.37	0.45	0.83	0.44	0.83	0.006
2001	0.44	0.51	0.87	0.51	0.87	-0.004
2002	0.43	0.51	0.85	0.51	0.85	0.001
2003	0.4	0.48	0.83	0.49	0.82	-0.011
2004	0.36	0.46	0.78	0.47	0.77	-0.005
2005	0.35	0.44	0.79	0.46	0.76	-0.024
2006	0.35	0.43	0.81	0.45	0.78	-0.029
2007	0.36	0.46	0.79	0.47	0.77	-0.017
2008	0.37	0.49	0.75	0.50	0.74	-0.013
2009	0.4	0.55	0.72	0.56	0.72	-0.005
2010	0.3	0.41	0.73	0.42	0.72	-0.008
2011	0.27	0.39	0.70	0.39	0.69	-0.016
2012	0.24	0.36	0.65	0.39	0.61	-0.041

This table examines the impact of changes in eligibility rules since 1989 on the UI take-up rate. The first column presents the Fraction of Insured Unemployed, FIU, and the second the Fraction of Eligible Unemployed (FEU) under the actual eligibility rules for each year. The third column then displays the take-up rate (TUR) based on these two ratios, which is our original estimate of the take-up rate. The column labeled "FEU 1989 Rules" calculates the FEU assuming that eligibility is determined by the 1989 rules, updating for inflation where relevant. The resulting take-up rate from these alternative eligibility rules for each year is presented in the column labeled "TUR 1989 Rules." In the final column we simply calculate the difference between the TUR 1989 Rules and the TUR (under original eligibility rules).

umn displays the FIU, the second column shows the FEU under the actual eligibility rules in each year, with the third column ("TUR") displaying the original TUR. Then in the next two columns we present the alternative "FEU 1989 Rules" and the corresponding take-up rate, "TUR 1989 Rules." The last column takes the difference between the alternative TUR, "TUR 1989 Rules," and the actual TUR.

There are several results worth discussing. First, outside of a few years (1990 and 1991 for example), the overall differences in the take-up rates remains relatively small, often less than 1 percentage point. Second, consider the general increase in take-up rates from 1989-2002. For the majority of years in this period, the alternative take-up rate, TUR 1989 Rules, is higher than the original take-up rate. This implies that eligibility rules on average became more restrictive in this period, as the take-up rate would have been higher had the rules remained unchanged. This suggests that the increase in take-up rates during this period was not the result of easier eligibility criteria. It may have been because a larger portion of the unemployed were eligible (i.e. composition of unemployed change), or simply that more people preferred to collect UI benefits all else equal.

Finally, consider the general decrease in take-up rates from 2002-2012. Over this period the opposite pattern emerges: the TUR 1989 Rules lies below the actual take-up rate. Thus, the take-up rate would have been lower had the 1989 rules remained in place, indicating that since 2002 eligibility rules have become more lenient. The case of 2012 represents a good example. In 2012 under actual eligibility rules the take-up rate is 0.65, while it is only 0.61 if we had 1989 eligibility rules. In Appendix C we also provide a break down of these differences across the different U.S. states. Outside of a few states, most states did not display large differences driven by changes in eligibility rules, and some states displayed almost no difference.

3 Model

The economy consists of a unit-measure of infinitely-lived, risk-averse workers, and a large measure of risk-neutral firms. Time is continuous and goes on forever, and both workers and firms discount the future at rate $r > 0$. Workers have preferences over consumption, with flow utility given by $h(c)$, where c represents consumption. Firms are composed of a single job, either filled or vacant. Vacant firms are free to enter and pay a flow cost, $\gamma > 0$, to advertise a vacancy. Vacant firms produce no output. The flow output of a firm with a filled job is given by y. There are several components of the model to specify. We begin by describing the key features of how UI is modeled.

3.1 Unemployment Insurance

As discussed in Section 2.7, we assume that applying for UI benefits and verifying eligibility imply a flow utility cost to workers who collect UI. Furthermore, we assume that this flow utility cost is additively separable and occurs each period the worker collects UI benefits.[2] This mirrors the feature of the U.S. system where workers must re-apply for ben-

[2] Assuming a one-time, upfront cost of collecting UI benefits represents the alternative. Either assumption, per-period flow cost or one-time upfront cost deliver the same results, since we assume the cost is the same each period during the worker's lifetime.

efits each week they are unemployed. Workers are heterogenous with respect to their costs of collecting UI benefits, which is denoted by ε. Workers have the same value of ε for their lifetimes; i.e. ε is permanent. Thus, the worker faces the same costs of collecting UI benefits each unemployment spell they face.

Let $F(\varepsilon)$ denote the distribution of workers over ε. If a worker collects UI benefits, they receive flow consumption b which only expires if the worker transitions to employment, and incur their cost of collecting benefits, ε. Assuming that UI benefits do not expire does not affect our results but simplifies the analysis allowing for more transparent results. If the worker decides not to collect UI benefits while unemployed, they receive flow consumption d, where $b > d$. Thus, each period of unemployment a UI-collector with collection cost ε receives flow utility of $h(b) - \varepsilon$ while a non-collector receives $h(d)$.

Unemployment benefits are financed by lump-sum taxes levied on firms. These taxes are experienced rated in the following manner. If a firm separates from a worker who collects UI benefits, the firm pays a flow cost of τ. The value of τ determines the marginal cost to a firm of sending a worker to insured unemployment.

In addition, we assume that the worker's UI collection cost, ε, is private information, known only to the worker. Moreover, the firm does not observe whether or not the worker collected UI in the past. Since ε is permanent, knowledge of UI collection history would enable the firm to infer ε. The firm does know the distribution of ε, $F(\varepsilon)$.

As discussed in Section 2.1, in the existing U.S. UI system, when a worker files a UI claim the firm is notified to verify the worker's eligibility. Thus, the worker's previous firm knows their UI collection status. Future firms, however, do not have access to this information. In the U.S. system, the state UI office cannot share information about UI collectors with any firms (other than the separating firm to verify eligibility). Therefore, the assumption of private information regarding past UI collections represents the state of current U.S. law.

Given this information structure, we have an environment with both moral hazard and adverse selection. Moral hazard arises as firms are unable to observe/control workers' actions regarding what jobs to search for. Adverse selection arises from the different types of workers', with types hidden from firms. The Pareto inefficiency we describe below hinges on the adverse selection problem. Indeed, the moral hazard problem is always present in directed search models. In our model, if workers' types were observable, the firm could reject applications from certain types. Although the moral hazard problem still exists, it does not affect the Pareto optimality of equilibrium. This type of moral hazard problem would matter for determining the optimal level of UI benefits, for example.

Notice, we assume that all workers are UI eligible. We analyze the take-up decision, which applies only to those who are UI eligible. Indeed, while some unemployed are not eligible for UI benefits, adding this dimension to the model complicates the analysis, but does not provide any additional insights to the question at hand. In addition, we also similarly exclude the possibility of UI fraud, where workers ineligible for UI benefits still collect them. While excluding these features from our analysis creates a gap between the model and the data versions of the take-up rate, the additional tractability and analytical insights are worth this trade-off.

3.2 Wages and Matching

We assume directed search. Firms post wages and workers direct their search to the wage maximizing their expected lifetime utility (see Moen (1997) or Acemoglu and Shimer (1999) for a similar formulation of the environment).

There exists a matching function, denoted $m(u, \mathrm{v})$, describing the number of matches formed between the v vacancies and u unemployed workers. We assume standard properties, *i.e.* m is continuous, strictly increasing, strictly concave (with respect to each of its arguments), and exhibits constant returns to scale. Furthermore, $m(0, \cdot) = m(\cdot, 0) = 0$ and $m(\infty, \cdot) = m(\cdot, \infty) = \infty$. Let $q = \frac{u}{\mathrm{v}}$ denote the "queue" length.

Given this matching technology, a vacancy is filled with Poisson arrival rate $m(\frac{u}{\mathrm{v}}, 1)$. Similarly, an unemployed worker finds a job according to a Poisson process with arrival rate $m(1, \frac{\mathrm{v}}{u})$. Let $\alpha_E(q) = m(\frac{u}{\mathrm{v}}, 1)$ and $\alpha_W(q) = m(1, \frac{\mathrm{v}}{u})$ denote the vacancy filling and job finding rates, respectively. Filled jobs receive negative idiosyncratic productivity shocks rendering the match unprofitable with a Poisson arrival rate λ.

3.3 Value Functions

We begin by describing the firm's and worker's value functions for a general wage function, w. After defining the equilibrium concept we then show that wages are a function of ε, and describe how the market naturally separates UI collectors and non-collectors.

3.3.1 Firms

Denote the value of a vacancy and the value of a matched firm by V and J, respectively. For any given w,

$$rV = -\gamma + \alpha_E[q(w)]\,[J - V] \tag{1}$$

According to Equation (1), the firm pays the flow cost γ to open the vacancy, and at rate $\alpha_E[q(w)]$ the firm fills the vacancy. For the value of a filled vacancy, J, denote the expected probability a worker collects UI benefits if separated (or the expected proportion of workers collecting) by p. Then,

$$rJ = y - w + \lambda\,[-p\tau + (V - J)] \tag{2}$$

That is, the firm earns flow profits $y - w$. At rate λ the job is destroyed, and whether or not the firm pays the experience rated tax, τ, depends on if the worker collects UI benefits or not. Since the firm's expects a worker collects with probability p, $p\tau$ is the expected flow cost of experience rated taxes, which the firm pays upon separation. Given free entry, $V = 0$, we have,

$$J = \frac{y - w}{r + \lambda} - \lambda p\tau \tag{3}$$

Plugging Equation (3) into Equation (1) under free entry and solving for w yields,

$$w = y - \frac{\gamma(r+\lambda)}{\alpha_E\Big(q(w)\Big)} - \lambda p \tau \tag{4}$$

Equation (4) represents the zero-profit curve (alternatively iso-profit curve), describing the relationship between w and q for the firm.

3.3.2 Workers

Unemployed workers can be in two possible states depending on whether or not they collect unemployment benefits. Denote unemployed collecting UI by $i = U$ and not-collecting by $i = N$. The worker decides which unemployment state to enter the instant a separation occurs, when the worker transitions from employment to unemployment.

Let $U(\varepsilon)$ denote the expected value of searching for a job with wage and expected queue length combination $\big(w, q(w)\big)$ for an unemployed worker collecting UI with cost of collecting ε. Similarly, let N denote the lifetime utility for the worker if not collecting UI, and E the lifetime utility of employment. Given this, the value functions are given by:

$$rU(\varepsilon) = h(b) - \varepsilon + \alpha_W(q(w))\,[E - U(\varepsilon)] \tag{5}$$

$$rN = h(d) + \alpha_W(q(w))\,[E - N] \tag{6}$$

$$rE = h(w) + \lambda\,(\max\{U(\varepsilon), N\} - E) \tag{7}$$

Equation (5) implies that an unemployed worker collecting benefits receives instantaneous flow utility $h(b)$ from unemployment compensation, and with arrival rate $\alpha_W(q(w))$ the worker matches with a firm and transitions to employment. Equation (6) has a similar interpretation for an unemployed worker not collecting. Finally, equation (7) states that an employed worker receives instantaneous flow utility $h(w)$ and with Poisson arrival rate λ, the job dissolves. If the job dissolves, the worker decides whether or not to collect unemployment benefits. Notice, since the costs of collecting are permanent, in the steady state, if a worker prefers to collect UI benefits once, he always prefers to.

It is useful to have closed form solutions for $U(\varepsilon)$ and N in the analysis below. Towards this end, using Equations (5) to (7) to solve for $U(\varepsilon)$ and N, respectively, gives,

$$rU(\varepsilon) = \left(\frac{1}{r+\lambda+\alpha_W\big(q(w)\big)}\right)\left((r+\lambda)(h(b)-\varepsilon)+\alpha_W\big(q(w)\big)h\big(w\big)\right) \tag{8}$$

$$rN = \left(\frac{1}{r+\lambda+\alpha_W\big(q(w)\big)}\right)\left((r+\lambda)h(d)+\alpha_W\big(q(w)\big)h(w)\right) \tag{9}$$

To ensure that worker's indifference curves in (q, w) space are strictly convex requires the following assumption:

Assumption 1 *The matching function satisfies:*

$$2\Big[\alpha'_W(q)\Big]^2\alpha_W(q) > \alpha''_W(q)\Big[\alpha_W(q)\Big]^2 \tag{10}$$

This assumption represents a sufficient condition for the worker's indifference curve (in (q, w) space) to be strictly convex. It is generally true for large enough q, and was satisfied in the relevant range for all of the numerical examples computed in Section 5. Another way to view this assumption is as a sufficient condition for the value functions $U(q)$ and $N(q)$ to be strictly concave in q.

3.3.3 Definition of Equilibrium

In this section we define equilibrium for the economy described above. Unemployed workers direct their search to the posted wages that maximize their expected lifetime utility. Firms determine the wage that maximizes profits, subject to a zero-profit condition in equilibrium. An allocation is defined as a set $\left\{\mathbb{W}, Q, \mathbf{U}, \mathbf{E}, \mathbf{N}, \mathcal{T}\right\}$. This consists of a set of wages, $\mathbb{W}$, a queue length associated with each wage $Q(w)$, indirect utilities, $\mathbf{E}, \mathbf{U}, \mathbf{N}$ for workers in each possible employment state, and a take-up decision rule, $\mathcal{T}$. An equilibrium is then defined as follows:

Definition 1 *An equilibrium is an allocation* $\left\{\mathbb{W}, Q, \mathbf{U}, \mathbf{E}, \mathbf{N}, \mathcal{T}\right\}$ *such that:*

1. ***Profit maximization***: *for all w and all ε,*

$$y - w - \frac{\gamma(r+\lambda)}{\alpha_E[q(w)]} - \lambda p\tau \geq 0 \tag{11}$$

   with equality if $w \in \mathbb{W}$,

2. ***Optimal job application***: *for all w and all ε,*

$$\mathbf{U}(\varepsilon) \geq U(w, Q(w), \varepsilon) \tag{12}$$
$$\mathbf{N} \geq N(w, Q(w)) \tag{13}$$

   for $Q(w) > 0$, where

$$\mathbf{U}(\varepsilon) = \sup_{w' \in \mathbb{W}} U(w', Q(w'), \varepsilon) \tag{14}$$
$$\mathbf{N} = \sup_{w' \in \mathbb{W}} N(w', Q(w')) \tag{15}$$

3. ***Optimal Take-up***: *A worker $i \in \mathcal{T}$ if and only if $\mathbf{N} \leq \mathbf{U}(\varepsilon)$*

4. ***Consistency***: *The firm's expected p in Equation (11) is consistent with $\mathcal{T}$.*

This represents a standard definition of equilibrium in a directed search environment, adjusted for the take-up decision. Profit maximization states that firms choose the w that maximizes profits, taking the expected queue length, q, and expected proportion of UI collectors, p as given. Free entry ensures that firms earn zero profits in equilibrium. Optimal application requires that unemployed workers direct their search to the wage offering the highest expected lifetime utility. Note, it is possible that search behavior remains different for UI collectors and non-collectors; equilibrium is a *set* of wages, and workers direct their search appropriately within that set. The Optimal Take-up condition specifies the set of workers that find it optimal to collect UI benefits upon separation. Finally, this optimal take-up condition must be consistent with the firm's expected p; if more or less workers collect UI benefits than the firm expects, either profit maximization or the zero profit condition are violated.

3.3.4 Endogenous market segmentation

Showing that equilibrium involves endogenous separation on two dimensions represents the next step. Specifically, we show that markets endogenously separate (i) between UI collectors and non-collectors and (ii) along ε for UI collectors. Towards this end, consider the following result:

Lemma 1 *For any active equilibrium (i.e. $Q(w) > 0$), there exists a unique ε^* such that $\mathbf{U}(\varepsilon) \geq \mathbf{N}$, for all $\varepsilon \leq \varepsilon^*$ and $\mathbf{N} > \mathbf{U}(\varepsilon)$ for all $\varepsilon > \varepsilon^*$.*

Lemma 1 establishes a unique cut-off value for the costs of collecting UI benefits, denoted ε^*. If a worker's ε is below this cut-off, they prefer to collect UI benefits if separated. Given the importance of UI collection costs for our analysis, which is underscored by Lemma 1, we would like to briefly discuss our assumption that workers are unable to save. Workers simply consume their entire flow income each period and do not have access to a technology that allows them to transfer this income across periods. Generating unclaimed UI benefits is a first requirement of our model given the question we study. This requires heterogeneity in the net benefits of collecting UI. We generate this heterogeneity with differences in UI collection costs. If workers were allowed to save, this generates a second source of heterogeneity that would certainly impact the UI take-up decision.

Savings would have two primary impacts on the model. First, this additional source of heterogeneity would have to be reflected in the wages posted by firms, since workers with different levels of savings would have different values of searching and employment. Second, savings could increase or decrease the importance of ε, depending the on the worker. For example, consider a worker with a relatively large amount of accumulated assets. This implies the worker has resources outside of UI benefits with which to smooth consumption during a spell of unemployment. This implies, all else equal, this worker would have a lower cut-off value of ε^*, potentially reducing the role of UI collection costs in the take-up decision. On the other hand, consider a worker with negative accumulated savings (borrower). In contrast, this worker must rely exclusively on UI benefits to smooth consumption during the spell of unemployment. This results in a larger cut-off, ε^*, magnifying the role of UI collection costs. Thus, the full impact of savings would depend on the distribution of liquid savings among the unemployed. In general these examples illustrate that incorporating savings into a similar model represents an important direction for future research on UI take-up rates.

The existence of a unique cut-off ε^* in Lemma 1 is true of any equilibrium, which creates two "types" of workers the firm encounters. Moreover, which type of worker the firm encounters affects the profits earned; a worker with $\varepsilon \leq \varepsilon^*$ collects UI benefits if separated, implying the firm pays a higher flow cost upon separation, τ. Thus, the expected proportion of workers collecting benefits, p, is either $p = 1$ for $\varepsilon \leq \varepsilon^*$ or $p = 0$ for all $\varepsilon > \varepsilon^*$. Next we show that any equilibrium involves endogenous separation along this cut-off, ε^*, and also involves a wage function, $w(\varepsilon)$ for $\varepsilon \leq \varepsilon^*$.

Proposition 1 *Any equilibrium allocation,* $\left\{\mathbb{W}, \mathbb{Q}, \mathbf{U}, \mathbf{E}, \mathbf{N}, \mathcal{T}\right\}$*, involves a wage function,* $w(\varepsilon)$*, with* $w_U(\varepsilon)$ *for* $\varepsilon \leq \varepsilon^*$ *and* w_N *for* $\varepsilon > \varepsilon^*$*.*

Given this endogenous separation, firms post two different types of wages, $w_U(\varepsilon)$ targeted to UI collectors and w_N to non-collectors, which in turn implies potentially different queue lengths, which we denote by $q_U(\varepsilon)$ and q_N for UI collectors and non-collectors, respectively.

Notice that equilibrium rules out any "pooling" contracts. That is, by definition of equilibrium, it will always be optimal for firms to offer different wage contracts to different workers. This separation itself, however, is not the direct cause of unclaimed UI benefits. For example, imagine an economy where a law requires any firm opening a vacancy to offer the same wage. While it is unclear how this wage would be determined in a directed search equilibrium, even in this extreme case of full "pooling" contracts the UI take-up rate will be less than 100%. This obtains simply from the heterogeneity in ε which guarantees that some fraction of workers will have costs of collecting that cause them to prefer not collecting UI benefits. Thus, the differences between collector and non-collector outcomes we characterize below are more consequences of unclaimed UI benefits than direct causes of them.

3.3.5 Labor market flows and stocks

Our description of equilibrium also requires the flow equations associated with the measures of workers in the different employment and unemployment states. Denote the number of unemployed workers collecting UI benefits for each ε by $n_U^u(\varepsilon)$, and the number of unemployed not collecting UI by n_N^u. Similarly, let $n_U^E(\varepsilon)$ denote the number of employed workers in state $i = U$ (*i.e.* will collect UI if separated) and n_N^E the number of employed workers in state $i = N$ (*i.e.* will not collect UI if separated).

To obtain a steady state equilibrium, for each ε the flows of workers into and out of employment must be equal. Since the market segments along ε, with $\varepsilon \leq \varepsilon^*$ collecting UI benefits and all others not, we can characterize these equilibrium flow equations as:

$$\lambda n_U^E(\varepsilon) = \alpha_W[q_U(\varepsilon)]n_U^u(\varepsilon) \tag{16}$$

$$f(\varepsilon) = n_U^E(\varepsilon) + n_U^u(\varepsilon) \tag{17}$$

Equation (16) states that for UI collectors, the flow of workers in and out of employment is equal and equation (17) ensures that the total measure of workers across the two employment states adds up to the population fraction, or $f(\varepsilon)$. Similarly, for $\varepsilon > \varepsilon^*$:

$$\lambda n_N^E = \alpha_W(q_N)n_N^u \tag{18}$$

$$1 - F(\varepsilon^*) = n_N^E + n_N^u \tag{19}$$

Given these flow equations, further denote the total number of employed (unemployed) with $\varepsilon \leq \varepsilon^*$ by $N_U^j = \int_0^{\varepsilon^*} n_U^j(\varepsilon)d\varepsilon, j = E, u$. Further let $N_N^j \equiv n_N^j, j = E, u$. Then, for $\varepsilon \leq \varepsilon^*$, equations (16) and (17) give

$$N_U^u = \int_0^{\varepsilon^*} \frac{f(\varepsilon)\lambda}{\lambda + \alpha_W[q_U(\varepsilon)]} d\varepsilon \tag{20}$$

Similarly we have:

$$N_N^u = \frac{[1 - F(\varepsilon)]\lambda}{\lambda + \alpha_W(q_N)} \tag{21}$$

Thus, the unemployment rate for this economy is given by $u = N_U^u + N_N^u$. The take-up rate is the fraction of eligible unemployed who collect UI benefits. Since we assume all workers remain eligible for UI benefits, this is given by:

$$\text{TUR} = \frac{N_U^u}{u} \tag{22}$$

Equation (22) helps illustrate important equilibrium relationships determining the UI take-up rate. The take-up rate depends on ε^* and $q_U(\varepsilon)$ which are determined endogenously in equilibrium, as well as exogenous factors such as λ (the separation rate) and the distribution $F(\varepsilon)$. Thus, the firm interactions we characterize below that determine the equilibrium objects ε^* and $q_U(\varepsilon)$ are essential to understand the determination of the UI take-up rate.

4 Properties of Equilibrium

This section characterizes the key properties of equilibrium in the economy described above. We begin with the case of full information. Although the quantitative exercise uses the model with private information, the full information economy provides a useful benchmark to help understand the departure from Pareto optimality caused by unclaimed UI benefits.

4.1 Full Information

In the full information economy, we assume firms observe a worker's value of ε, and they can throw away applications at no cost. Thus, if a firm expects to hire a non-collector ($\varepsilon > \varepsilon^*$), but receives an application from a worker with $\varepsilon \leq \varepsilon^*$, they may disregard the application. This prevents UI collectors from applying to the wages posted for non-collectors and vice versa.

Proposition 2 *Assume that firms observe ε. If $\left\{\mathbb{W}, Q, \mathbf{U}, \mathbf{E}, \mathbf{N}, \mathcal{T}\right\}$ is an active equilibrium allocation, then any $w_U(\varepsilon) \in \mathbb{W}$, $w_N \in \mathbb{W}$, $q_U(\varepsilon) = Q\big(w_U(\varepsilon)\big)$, and $q_N = Q(w_N)$ must solve:*

$$\mathbf{U}(\varepsilon) = \max_{w_U(\varepsilon), q_U(\varepsilon)} \left(\frac{1}{r\big(r + \lambda + \alpha_W\big(q_U(\varepsilon)\big)\big)}\right)\left((r+\lambda)(h(b) - \varepsilon) + \alpha_W\big(q_U(\varepsilon)\big)h\big(w_U(\varepsilon)\big)\right) \tag{23}$$

$$s.t. \quad w_U(\varepsilon) = y - \frac{\gamma(r+\lambda)}{\alpha_E\Big(q(w_U(\varepsilon))\Big)} - \lambda\tau \tag{24}$$

$$\mathbf{N} = \max_{w_N, q_N} \left(\frac{1}{r(r + \lambda + \alpha_W(q_N))}\right)\Big((r+\lambda)h(d) + \alpha_W(q_N)h(w_N)\Big) \tag{25}$$

$$s.t. \quad w_N = y - \frac{\gamma(r+\lambda)}{\alpha_E\Big(q(w_N)\Big)} \tag{26}$$

Proposition 2 represents a standard formalization of equilibrium. Firms post equilibrium wages that maximize worker's utility, subject to the zero profit condition. In the case of full information, equilibrium is Pareto optimal. Figure 3 shows this equilibrium graphically. The equilibrium values of (q, w) occur at the point where the worker's indifference curve is tangent to the zero-profit curve in (q, w) space. This ensures both optimal application and profit-maximization. Since firms hiring UI collectors pay an experience rated tax with certainty at separation (i.e. $p = 1$), their zero profit curve is shifted down by τ. Next we characterize some important features of the full information allocation, starting with how search behavior is affected by ε.

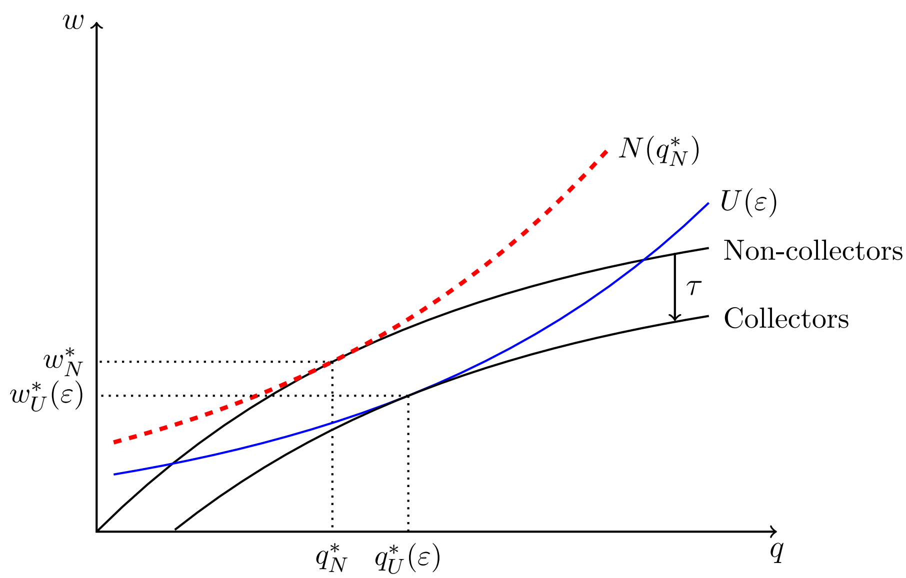


Figure 3: Determination of Equilibrium, Perfect Information

The graph shows the determination of $\big(q_U(\varepsilon), w_U(\varepsilon)\big), \varepsilon \leq \varepsilon^*$ and $\big(q_N^*, w_N^*\big)$ when there is full information. Wages offered by firms occur where the worker's indifference curve intersects the appropriate zero-profit curve. Since firms hiring UI collectors pay higher UI taxes, their zero-profit curve is shifted down by the tax, τ.

Lemma 2 *The job arrival rate $\alpha_W[q_U(\varepsilon)]$ is increasing in ε and the wage $w_U(\varepsilon)$ is decreasing in ε.*

Lemma 2 describes how the equilibrium allocations to UI collectors depend on the direct utility cost of collecting benefits. Intuitively, as ε increases, net benefit provided by UI is reduced which acts similarly to a decrease in UI benefits. Hence, the worker prefers to trade-off lower wages for a faster job arrival rate. This represents a similar result to the effect of increasing UI benefits characterized by Acemoglu and Shimer (1999), who show that an economy with higher UI benefits has longer durations and higher wages. Figure 4 displays the effect of ε on UI collector queue lengths and wages in equilibrium. As ε decreases, this "flattens" the worker's indifference curve, moving the point of tangency to the right. Note, this result also applies in the private information economy analyzed below, but we only state it once here.

Proposition 3 *In the full information equilibrium, the following is true:*

(i.) $\varepsilon^* < h(b) - h(d)$,

(ii.) $q_U^*(\varepsilon) > q_N^*, \forall \varepsilon \leq \varepsilon^*$

Proposition 3 illustrates some interesting features of the full information equilibrium. First, the value of ε^*, the point where the worker prefers to collect UI benefits for any $\varepsilon \leq \varepsilon^*$, has implications for the UI take-up rate. Recalling Equations (20) to (22), the take-up rate is generally increasing with ε^*. Below we compare the full information equilibrium to the case with asymmetric information and find that take-up rates are actually higher in the asymmetric information economy.

Second, according to property (ii), UI collectors have longer unemployment durations, on average, relative to non-collectors. This follows from Lemma 2 (see Figure 4), where we show the queue length is inversely related to ε. Notice, a UI non-collector is equivalent (in flow utility) to a worker with $\varepsilon = h(b) - h(d)$. Since $\varepsilon^* < h(b) - h(d)$, all UI collectors lie below this point, and from Lemma 2, must have a higher queue length and longer average duration of unemployment. This is intuitive: UI non-collectors have lower flow utility in unemployment relative to a collector, and as a result they prefer shorter unemployment durations.

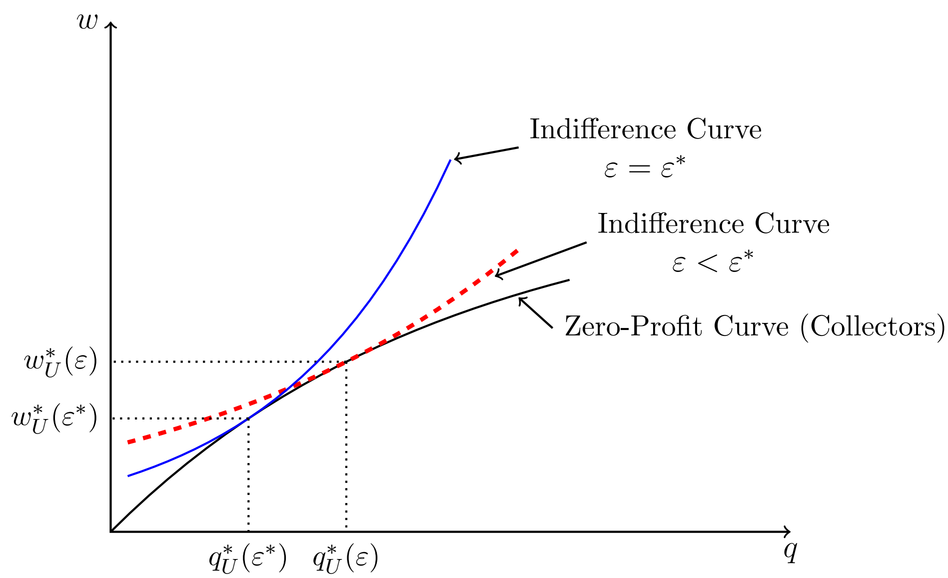


Figure 4: Effect of UI collection costs

The graph shows the determination of $(q_U(\varepsilon), w_U(\varepsilon)), \varepsilon \leq \varepsilon^*$. As ε decreases, the UI collector's indifference curve gets "flatter," as the net gain from UI benefits increases. This pushes the queue length and wage higher. These UI collectors are willing to wait longer for higher wage jobs.

4.2 Private Information

In this section we examine the baseline case where ε is unobservable. That is, we now have both a moral hazard and an adverse selection problem. Specifically, since ε and previous UI collection status is unobservable by a firm, there is no way to prevent a current UI collector from searching for the non-collector wage. Why may a UI collector prefer this option? This occurs because of the experience rated tax. The tax, τ, implies that for a given queue length q, $w_U(\varepsilon) < w_N$ (follows from Equation (4)). Since under full information, non-collector jobs arrive faster than UI collector jobs, this introduces the possibility that a UI collector could search for a higher wage job that arrives faster, strictly dominating it. Define $\tilde{U}(\varepsilon)$ as the expected lifetime utility for a UI collector who deviates and searches for the non-collector job. This is given by,

$$\tilde{U}(\varepsilon) = \frac{1}{r(r+\lambda+\alpha_W(q_N))}\left[(r+\lambda)(h(b)-\varepsilon)+\alpha_W(q_N)h(w_N)\right] \tag{27}$$

In Equation (27), the worker receives the flow utility from collecting UI benefits, $h(b)-\varepsilon$, but searches for the (q_N, w_N) job, with employment at wage w_N arriving at rate $\alpha_W(q_N)$.

In order for the wage function (and associated queue lengths) $w_U(\varepsilon)$ and w_N to be viable in equilibrium, they must satisfy the constraint that:

$$U(\varepsilon) \geq \tilde{U}(\varepsilon), \text{ for all } \varepsilon \leq \varepsilon^*$$

If this constraint is violated, a UI collector prefers to search for the non-collector job, and q_N and firm profits are no longer consistent (since the firm opening a "non-collector" job will pay taxes when those workers separate and collect UI benefits). To maintain an equilibrium allocation, the non-collector allocation must be altered to satisfy this constraint.[3] Since ε is

[3]Potentially, one may consider altering the UI collector jobs, $(q_U(\varepsilon), w_U(\varepsilon))$ to ensure the constraint is satisfied; however, this remains infeasible. This is true because the firm posting $w_U(\varepsilon))$ has no control over a worker's utility when they deviate. That is, this firm does not control w_N (and thus q_N) and therefore can only alter the utility a worker receives from applying to their job. Since $w_U(\varepsilon)$ already maximizes a type ε worker's utility, no other possible $w_U(\varepsilon)$ can increase $U(\varepsilon)$ to satisfy the constraint. As a result, w_N must be altered.

unobservable, the possibility of workers pretending to be higher or lower ε types and searching for other UI collector wages is in one sense another dimension of incentive compatibility. These types of deviations are prevented by the Optimal Application condition of a directed search equilibrium that forces firms to offer wages maximizing each type of worker's expected lifetime utility. We present this constraint formally below.

We now analyze the equilibrium with private information. First, consider the determination of equilibrium analogous to Proposition 2:

Proposition 4 *Assume that ε is unobservable. If $\left\{\mathbb{W}, Q, \mathbf{U}, \mathbf{E}, \mathbf{N}, \mathcal{T}\right\}$ is an active equilibrium allocation, then any $w_U(\varepsilon) \in \mathbb{W}$, $w_N \in \mathbb{W}$, $q_U(\varepsilon) = Q\big(w_U(\varepsilon)\big)$, and $q_N = Q(w_N)$ must solve:*

$$\mathbf{U}(\varepsilon) = \max_{w_U(\varepsilon), q_U(\varepsilon)} \left(\frac{1}{r\big(r + \lambda + \alpha_W\big(q_U(\varepsilon)\big)\big)}\right)\left((r+\lambda)(h(b) - \varepsilon) + \alpha_W\big(q_U(\varepsilon)\big)h\big(w_U(\varepsilon)\big)\right) \tag{28}$$

$$s.t. \quad w_U(\varepsilon) = y - \frac{\gamma(r+\lambda)}{\alpha_E\Big(q\big(w_U(\varepsilon)\big)\Big)} - \lambda\tau \tag{29}$$

$$\mathbf{N} = \max_{w_N, q_N} \left(\frac{1}{r(r + \lambda + \alpha_W(q_N))}\right)\left((r+\lambda)h(d) + \alpha_W(q_N)h(w_N)\right) \tag{30}$$

$$s.t. \quad w_N = y - \frac{\gamma(r+\lambda)}{\alpha_E\Big(q(w_N)\Big)} \; and, \tag{31}$$

$$U(\varepsilon) \geq \tilde{U}(\varepsilon), \; for\; all\, \varepsilon \leq \varepsilon^* \tag{32}$$

Notice, the formulation of equilibrium is similar to the baseline case with the exception of Equation (32), which represents the "incentive constraint" for firms in the non-collecting market. The addition of this incentive constraint, however, alters key aspects of equilibrium, including its Pareto optimality. Denote by w_N^* and q_N^* the solution to the non-collector problem under full information given by Equations (25) and (26). Further, let $\tilde{w}_N$ and $\tilde{q}_N$ denote the solution to the non-collector problem with private information given by Equations (30) to (32). The equilibrium under private information then has the following properties:

Proposition 5 *In the private information equilibrium, the following is true:*

(i). $\varepsilon^* = h(b) - h(d)$.

(ii). $\tilde{q}_N \neq q_N^*$ *and the equilibrium is not Pareto optimal.*

Compare (i) of Proposition 5 to (i) of Proposition 3: ε^* is higher with private information relative to full information. From Equations (20) to (22), a higher value of ε^* implies a higher take-up rate, all else equal. Thus, the private information economy has a higher take-up rate relative to full information. Recall, this difference stems from both the differences in ε^*, and differences in other key endogenous variables such as $\alpha_W(q_U(\varepsilon))$. We explore this feature in more detail in Section 5.

Next, according to (ii) of Proposition 5, equilibrium is not Pareto optimal under private information. Why are non-collectors pushed away from the Pareto optimal wage and queue length achieved in the full information equilibrium? To understand this, define $\hat{\varepsilon}$ such that $\hat{\varepsilon} = h(b) - h(d)$. This is the value of ε where a UI collector and non-collector have the same flow utility in unemployment. Thus, for a UI collector with $\varepsilon = \hat{\varepsilon}$, $\tilde{U}(\varepsilon) = \mathbf{N}$; that is, this UI collector can always achieve the same level of utility as a non-collector. Since the Pareto optimal equilibrium under full information is such that $\mathbf{N}(q_N^*) > \mathbf{U}(\hat{\varepsilon})$, the constraint in Equation (32) is violated. Satisfying the constraint thus pushes the non-collector wage and queue length away from this Pareto optimal benchmark. The next result characterizes this distortion further.

Corollary 1 *For $\tau > 0$, there are two possible equilibrium values of $\tilde{q}_N$ satisfying $\tilde{q}_N^L < q_N^* < \tilde{q}_N^H$. Moreover, $\tilde{q}_N^L < q_U(\varepsilon)$ and $w_N(\tilde{q}_N^L) < w_U(\varepsilon)$ for all $\varepsilon \leq \varepsilon^*$ implying that non-collectors have a shorter unemployment duration and lower wage than UI collectors.*

Figure 5 shows the determination of equilibrium in the private information economy. Recall, an equilibrium has two essential features: optimal application and profit maximization. Thus, to satisfy the incentive constraint, in equilibrium non-collecting firms must offer a wage such that the UI collector indifference curve at $\varepsilon = \varepsilon^*$ intersects the non-collector zero-profit curve. At this wage and expected queue length, a UI collector is indifferent between searching for the non-collector vs. collector job. From Figure 5, it is clear that a strictly concave zero-profit function and strictly convex indifference curve imply that with private information, there exists two potential equilibrium values of $\tilde{w}_N$. This is true because the indifference curve described by $N\big(\tilde{q}_N(\tilde{w}_N)\big) = U(\varepsilon^*)$ intersects the non-collector zero-profit curve twice.

While indeed there exist two possible $\tilde{q}_N$'s, our empirical analysis below rules out $\tilde{q}_N^H$. Specifically, under $\tilde{q}_N^H$, the job-arrival rate for UI collectors exceeds that of non-collectors. This is contrary to the empirical evidence on the effects of UI benefits, all of which suggest a UI collector has a longer average duration of unemployment relative to a non-collector (for example see Katz and Meyer (1990) or Braun, Engelhardt, Griffy, and Rupert (2016)). Having characterized the key properties of the equilibrium with endogenous take-up rates, we now turn towards quantifying these implications.

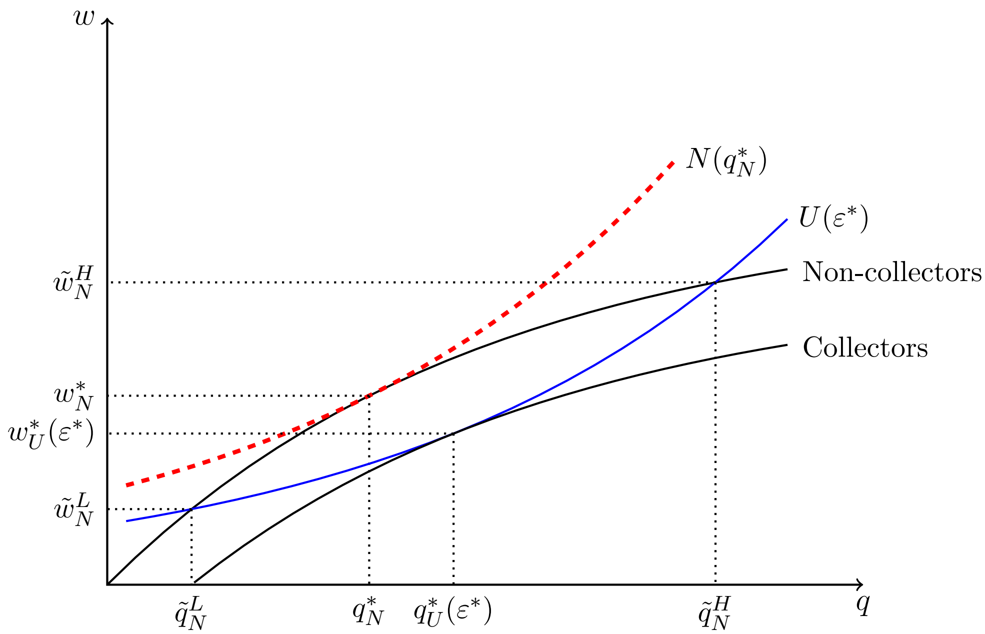


Figure 5: Determination of Equilibrium, Private Information

The graph shows the determination of $\left(q_U(\varepsilon), w_U(\varepsilon)\right), \varepsilon \leq \varepsilon^*$ and $\left(\tilde{q}_N, \tilde{w}_N\right)$ when ε is private information. Since a UI collector can search for $\left(q_N^*, w_N^*\right)$, and receives higher utility doing so, $\left(q_N^*, w_N^*\right)$ is not a feasible equilibrium for non-collectors. To solve this incentive problem, firms offer a $\left(\tilde{q}_N, \tilde{w}_N\right)$ where the UI collectors indifference curve intersects the non-collector zero-profit curve. Given a strictly convex indifference curve, there thus exist two possible equilibrium values, $\tilde{q}_N^L$ and $\tilde{q}_N^H$.

5 Quantitative analysis

In this section, we present a quantitative analysis of the aforementioned model and equilibrium. Our calibration focuses on the time period from $1989 - 2012$.

5.1 Calibration

We now calibrate the private information economy presented in Section 3. This model leaves the following parameters to be determined: r, b, d, λ, γ, $F(\varepsilon)$, τ , and functional forms for the matching function, m, and the utility function, h.

The time period is set to one month, so a per-annum risk-free interest rate of 4% implies

$r = 0.0033$. The utility function is given by

$$h(c) = \frac{c^{1-\phi} - 1}{1 - \phi} \tag{33}$$

For the coefficient of relative risk aversion, ϕ, we use a value of 1.0, which falls within the range considered in the existing macroeconomics literature (see Gomme and Lkhagvasuren (2013) for a discussion of this literature and evidence on the value of ϕ).

The distribution $F(\varepsilon)$ is assumed to be exponential. Specifically, $f(\varepsilon) = \frac{1}{\mu_\varepsilon} \exp\left(-\frac{\varepsilon}{\mu_\varepsilon}\right)$, so that $F(\varepsilon) = 1 - \exp\left(-\frac{\varepsilon}{\mu_\varepsilon}\right)$. We normalize the value $\mu_\varepsilon = 1$.

For the matching function, m, we use the standard constant returns to scale form given by $m(u, \mathrm{v}) = u^\eta \mathrm{v}^{1-\eta}$. As in Fredriksson and Holmund (2001), we use a value of 0.5 for η.

The job separation rate is set to match the average unemployment rate from $1989-2012$, which is 6.0%. This implies a value of $\lambda = 0.0157$. This value of λ is consistent with Shimer (2005), who finds a quarterly job separation rate of 0.035. The value of γ (vacancy creation costs) is set to match the observed average unemployment duration from $1989-2012$. According to the BLS tabulations from the CPS, the average unemployment duration from $1989-2012$ was 18.1 weeks, or 4.53 months, implying $\gamma = 22.14$. An alternative calibration strategy is to fix λ at the rate in Shimer (2005) and let the unemployment rate differ from the average in the data.

We parameterize the UI system setting $b = 0.444$ (the value of output, y is normalized to $y = 1$), consistent with an average replacement rate of 0.50. The replacement rate is calculated as b divided by the average wage for UI collectors, $\frac{b}{\bar{w_U}}$. The average wage for

UI collectors is $\bar{w_U} = \int_0^{\varepsilon^*} w_U(\varepsilon)\phi_E(\varepsilon)d\varepsilon$, where $\phi_E(\varepsilon) = \frac{n_U^E(\varepsilon)}{N_U^E}$. For the minimum level of consumption (among UI non-collectors), we set d to match the observed take-up rate. Recall from Proposition 5, the equilibrium value of ε^*, a key determinant of the take-up rate (from Equation (22)), is determined by $h(b) - h(d)$. For the $1989 - 2012$ period, the take-up rate averaged 77%, requiring $d = 0.1661$. Again it is worth noting that since we do not model the UI eligibility process, all workers in the model remain UI eligible implying a "gap" between the model and data take-up rates.

Finally, the value of τ is set to match data on experience rating in the U.S. system. Topel (1983) examines the specific experience rating system in a number of states finding an average marginal cost of a separation to a firm of approximately 80% of the implied UI expenditures. In the model, the average worker who collects UI induces benefit expenditures equal to the UI benefit, b, times the average duration of unemployment (since benefits do not expire). We set τ to be 80% of this average benefit expenditure, implying $\tau = 1.609$.

Table 3 lists the parameters and their values, and Table 4 presents the results from our calibration showing the key moments in the model and data.

5.2 Results

Figures 6(a) and 6(b) show the key properties of equilibrium established in Section 4. To begin, consider how equilibrium queue lengths and wages behave for UI collectors. As in Lemma 2, wages are decreasing in ε while arrival rates are increasing in ε. Recall, as ε increases, the net gain from collecting UI benefits decreases so workers prefer to search for lower wage jobs that arrive faster.

Table 3: Parameters

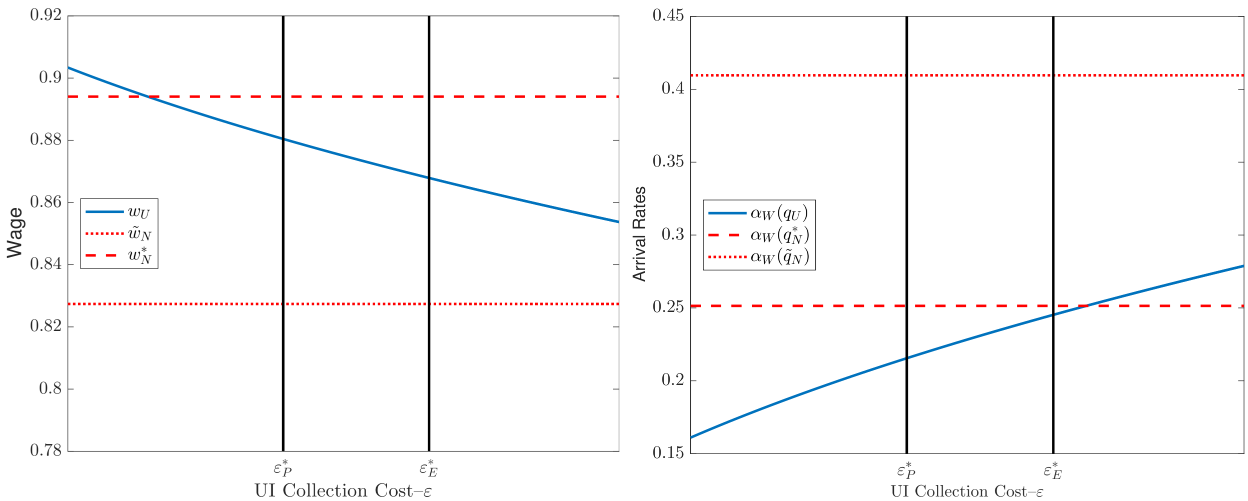
r	0.0033	Discount rate
ϕ	1.0	Coefficient of relative risk aversion
η	0.5	Elasticity of matching function
λ	0.0157	Job separation rate
b	0.444	Replacement rate, UI, non-binding
d	0.1661	Minimum consumption rate
γ	22.14	Vacancy cost
τ	1.609	Experience rating parameter
μ_ε	1	Parameter of $F(y)$

Table 4: Calibration Results

Moment	Model	Data
Unemployment rate	6.0%	6.0%
Unemployment duration	4.53	4.53
Take-up rate	0.77	0.77

Figures 6(a) and 6(b) also display the relationship between UI collector and non-collector wages and queue lengths. As indicated in Corollary 1, UI non-collectors have shorter unemployment durations than UI collectors and they have lower wages relative to UI collectors. This is consistent with the intuition above for the change in UI collector search behavior with ε. Recall, at $\varepsilon = \varepsilon^*$, $h(b) - \varepsilon^* = h(d)$. Since the net benefit of collecting is higher than $h(d)$ for all UI collectors, non-collectors prefer lower wage jobs arriving faster.

Proposition 5 also shows that non-collector wages and queue lengths are distorted from the Pareto optimal levels. Figures 6(a) and 6(b) display the effect of the information asymmetries on non-collector search behavior. In Figure 6(a), the non-collector wage under private information, $\tilde{w}_N$ remains below the Pareto optimal full information benchmark, w_N^*. With



(a) Wages (b) Arrival Rates

Figure 6: Wages and Arrival Rates Comparison

This Figure shows features of the equilibrium outcomes for UI collectors and non-collectors, under both full and private information. The left figure plots equilibrium wages for UI collectors under full and private information, as a function of ε. It also displays the non-collector wage, denoted $\tilde{w}_N$ for the private information equilibrium and w_N^* for the full information equilibrium. The right figure plots the respective arrival rates. The vertical lines occur at the cut-off value for ε, labeled ε_P^* and ε_E^* for the full information and private information economies, respectively.

respect to queue lengths, Figure 6(b) displays that when ε is private information, job arrival rates for non-collectors are lower than the Pareto optimal benchmark under full information. These features have implications for several important moments in the model, which Table 5 displays and compares.

Consider first the effects of this distortion on the average duration of unemployment and the wage for non-collectors. According to Table 5, the distortion in the equilibrium with information asymmetries reduces non-collectors' average duration of unemployment from 3.98 months to 2.44 months. Thus, non-collectors move to employment over one and half months (6.14 weeks) *sooner* than what is optimal. Moreover, the non-collector wage is distorted below its Pareto optimal level by 8.1%; 0.894 under full information and 0.827 in

Table 5: Full Information vs. Private Information

Moment	Full Info	Private Info
Average Duration, UI Collectors	5.42	5.15
Average Duration, UI Non-collectors	3.98	2.44
Average Duration (overall)	4.72	4.53
Average Wage, UI Collectors	0.89	0.89
Wage, UI Non-collectors	0.89	0.83
Unemployment rate	6.73%	6.00%
Take-up Rate	51%	77%

For UI collectors, the unemployment duration and wage vary with ε. The table reports the respective averages across ε. Specifically, $\bar{w_U} = \int_0^{\varepsilon^*} w_U(\varepsilon)\phi_E(\varepsilon)d\varepsilon$ and DUR $= \int_0^{\varepsilon^*} \frac{1}{\alpha_W[q_U(\varepsilon)]}\phi_U(\varepsilon)d\varepsilon$, where $\phi_i(\varepsilon) = \frac{n_U^i(\varepsilon)}{N_U^i}$.

the private information equilibrium.

The empirical literature on UI benefits has found that UI non-collectors have shorter unemployment durations relative to an equivalent collector. In our model, part of the difference in unemployment durations between collectors and non-collectors is not Pareto optimal. Non-collectors are better off with a longer average duration of unemployment and higher wage than what occurs in equilibrium under private information.

Table 5 also shows a difference in the average unemployment duration and average wage for UI collectors between the two economies, with shorter durations and lower wages in the private information economy (0.892) relative to full information (0.894). This may appear surprising given that $w_U(\varepsilon)$ and $q_U(\varepsilon)$ solve the same problem under full and private information (i.e. Equations (23) to (24) and Equations (28) to (29) are the same problem). The averages differ, however, since the cut-off value of UI collection costs, ε^* differs between the two economies. Recall from Propositions 3 and 5, $\varepsilon_P^* < \varepsilon_E^*$, where ε_P^* and ε_E^* denote the cut-off values for the full information economy and the private information equilibrium, respectively. From Figures 6(a) and 6(b), wages increase and arrival rates decrease as ε decreases from ε^*. Since the full information equilibrium has a lower cut-off, $\varepsilon_P^* < \varepsilon_E^*$, this implies a higher average wage and longer average duration of unemployment among the UI collectors.

As discussed in Section 4, this difference in ε^* also has implications for the UI take-up rate. Indeed, as displayed in Table 5, the take-up rate is lower in the full information Pareto optimal equilibrium, 51%, relative to the private information economy, 77%. This represents an interesting feature of the model. If firms can observe workers' UI collection costs, then they can effectively dissuade some fraction of workers from collecting UI benefits. Since hiring non-collectors lowers the experience rated tax firms face, the non-collector market is attractive to firms. Moreover, with full information, the market is able to provide some "natural" insurance to non-collectors in the form of shorter unemployment durations. By not having to pay the UI tax, these firms can also offer a much higher wage under full information. These features make the non-collector wage more appealing, reducing the UI take-up rate. That is, private information increases the UI take-up rate by reducing firms' options for non-collector wages; however, this higher take-up rate is not Pareto optimal.

5.3 Welfare

To this point, we have analytically demonstrated that the market equilibrium under private information is not Pareto optimal. Quantifying how far this equilibrium remains from the Pareto frontier represents an important question for developing UI policies that move use closer to that frontier. Large welfare costs from the distortion imposed by unclaimed benefits suggests there is much room for UI policies to improve equilibrium outcomes. To measure the welfare cost of the Pareto inefficiency characterized above, we first look at non-collector welfare. Our welfare criterion is the standard consumption equivalent exercise. Letting H^* and $\tilde{H}$ denote expected lifetime utility in the full information and private information equilibria, respectively, we characterize the percent consumption equivalent change $\triangle$ satisfying:

$$H^* = \tilde{H} + \frac{1}{r}h(1+\triangle)$$

Since we assume $h(c) = \log(c)$, this implies that

$$\triangle = \exp\Big[r(H^* - \tilde{H})\Big] - 1 \tag{34}$$

Table 6 presents the key welfare results. The first three rows indicate the welfare gain for non-collectors moving from the private information to full information equilibrium. For example, an unemployed non-collector has expected lifetime utility of N^* in the full information equilibrium and $\tilde{N}$ under the private information one. The % consumption equivalent welfare gains for N presented in Table 6 use N^* and $\tilde{N}$ in Equation (34). Similarly, the W_N row corresponds to the welfare gain for employed non-collectors. The"Avg. NC" row corresponds to the welfare gain, conditional on being a non-collector: $H = \dfrac{n_N N + n_N^E W_N}{n_N + n_N^E}$; i.e. the expected welfare for a non-collector. Finally, the last row labeled "Total Welfare" corresponds to the average welfare of all workers in the economy, or:

$$H = \int_0^{\varepsilon^*} \Big[n_u^E(\varepsilon)E_u(\varepsilon) + n_u^U(\varepsilon)U(\varepsilon)\Big]d\varepsilon + N_N^E E_N + N_N^U N \tag{35}$$

The middle column of Table 6 corresponds to the baseline parameterization with $\mu = 1.0$.

Table 6: % Consumption Equivalent Welfare Change

	$\mu = 0.5$	$\mu = 1.0$	$\mu = 1.5$
N	2.99	3.08	3.20
W_N	3.72	3.93	4.16
Avg. NC	3.65	3.85	4.08
Total Welfare	1.92	1.71	1.73

In the baseline parameterization, the welfare costs of the distortion are large: an average non-collector has a 3.85% welfare gain moving to the Pareto optimal economy, and overall the average worker has a 1.71% welfare gain moving to the Pareto optimal economy. Recall, for a given ε, $U(\varepsilon)$ and $E_U(\varepsilon)$ remain unchanged moving from the private information to the Pareto optimal economy. There are some welfare changes among UI collectors, however, as the value of ε^* and unemployment rate for UI collectors both change across economies.

The first and third columns of Table 6 presents some robustness checks with respect to the normalization of μ. Here we change the value of μ (the mean of the distribution of ε, $F(\varepsilon)$), and recalibrate λ, γ, b, d, and τ to maintain the initial moment targets. The largest and most relevant changes are to d. As μ decreases, d must increase in order to hit the target take-up rate, and vice versa. Appendix A discusses further details and additional robustness checks. In general, changing the value of μ has a relatively small effect on the welfare cost of the distortion.

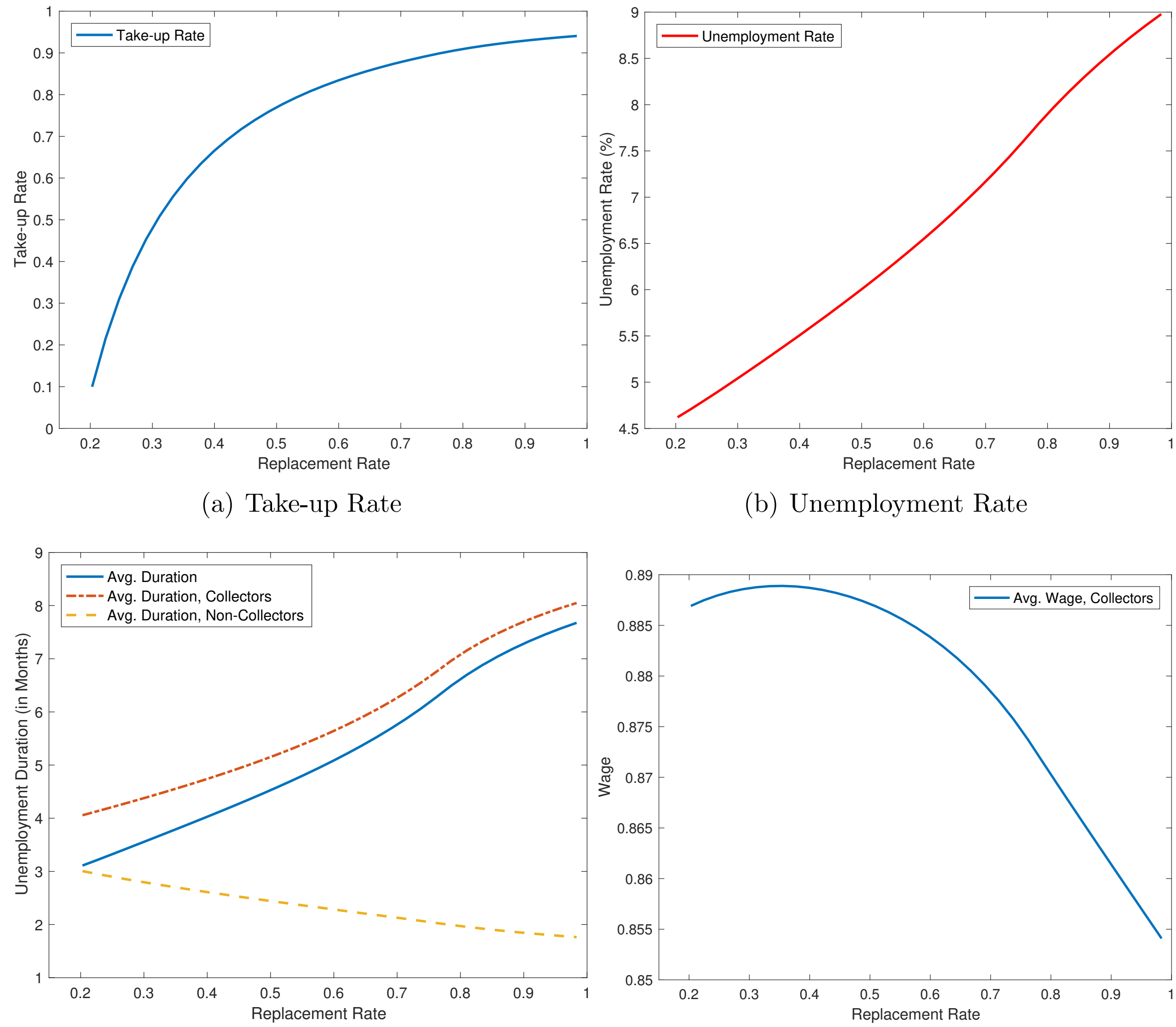
5.4 Effects of UI Benefits

In this section we consider the equilibrium impact of changing the level of unemployment benefits. The economy displays several interesting features when UI benefits increase. In the experiments below, we increase the UI replacement rate while setting τ to maintain the initial level of experience rating. That is, we maintain $\dfrac{\tau}{b * DUR_U} = 0.80$ as the replacement rate changes.

Figures 7(a) to 7(d) display the effects of an increase in b on the key equilibrium outcomes. First consider Figure 7(a). The take-up rate is increasing and concave in the UI replacement rate. Take-up increases from a low of 9.97% to a maximum of 94.06% as the replacement rate changes from 20% to 98%. Next, in Figure 7(b), the unemployment rate and average duration of unemployment are also increasing in the UI replacement rate. While indeed both moments increase with the replacement rate, they do so relatively slowly. A replacement rate of almost 100% is associated with an unemployment rate of 8.98%. Typically the unemployment rate and duration explode as the replacement rate approaches 100%. To understand the significance of these results, we compare them to a simple economy with a fixed 100% take-up rate.

Consider a standard directed search model with no UI collection costs (*i.e.* $\varepsilon = 0$ for all workers) and assume that all unemployed workers collect UI benefits. Thus, the take-up rate is fixed at 100%. We simulated the economy under different replacement rates and report the results in Figures 8(a) to 8(b). In these simulations, we maintain the same parametrization as the baseline case (with the exception that $\varepsilon = 0$).

Figure 8(a) and Figure 8(b) plot the response of the unemployment rate and average duration of unemployment, respectively. As one typically expects, as the replacement rate approaches 100%, both of the aforementioned moments begin to explode. At a replacement



(a) Take-up Rate

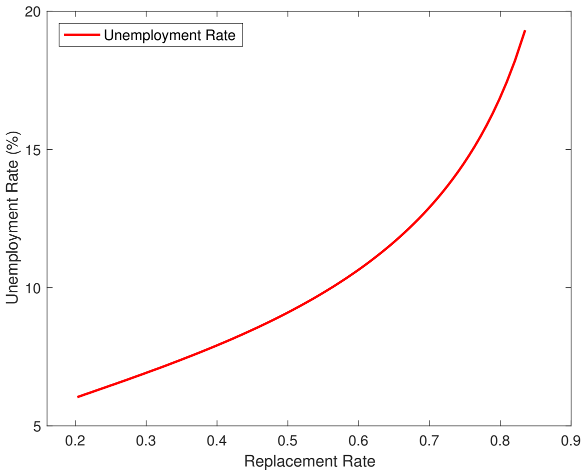
(b) Unemployment Rate

(c) Unemployment Durations

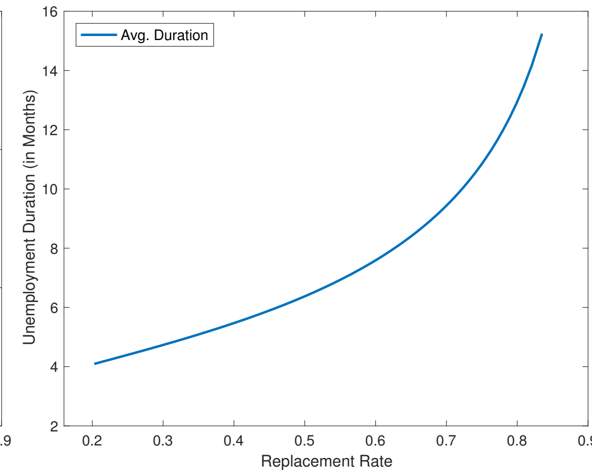
(d) Wages

Figure 7: Effects of UI Benefits

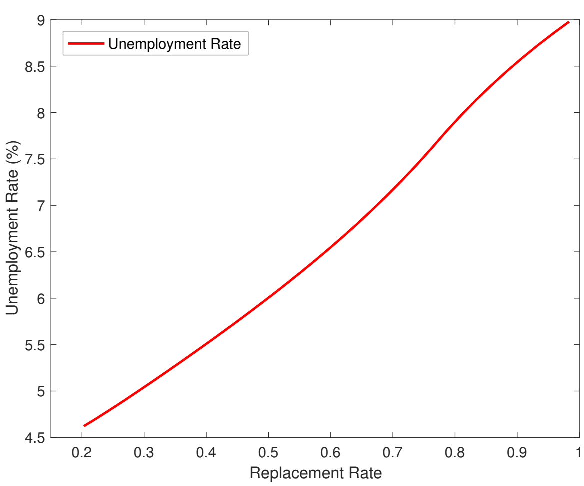
This figure plots the effects of UI benefits on equilibrium outcomes. The top two graphs plot the Take-up and Unemployment rates, respectively. The bottom-left graph plots the effect of b on unemployment durations. It plots the overall average unemployment duration, as well as for collectors and non-collectors separately. Similarly, the bottom-right graph plots wages for collectors and non-collectors. In all figures, the horizontal axis corresponds to the average replacement ratio for that particular b, or $\frac{b}{\bar{w_U}}$, where $\bar{w_U} = \int_0^{\varepsilon^*} w_U(\varepsilon)\phi_E(\varepsilon)d\varepsilon$ is the average wage for UI collectors.



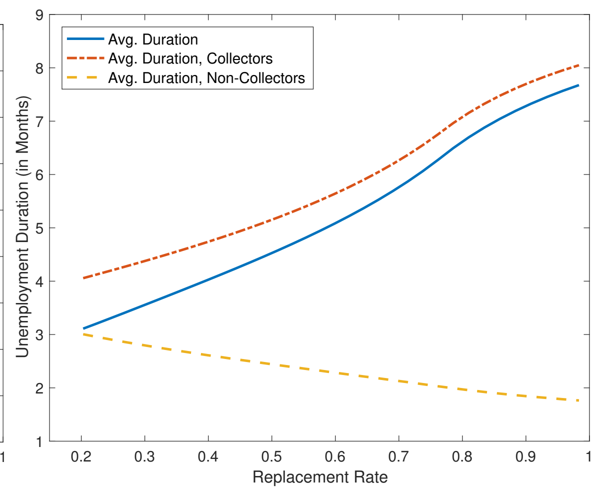
(a) Unemployment Rate



(b) Unemployment Durations



(c) Unemployment Rate: Baseline Model



(d) Unemployment Durations: Baseline Model

Figure 8: Effects of UI Benefits: 100% Take-up Model

This figure plots the effects of UI benefits on equilibrium outcomes for a standard model with 100% take-up. The top two graphs plot the responses of the Unemployment Rate and Average Unemployment Duration for the 100% take-up rate economy, respectively. For comparison, the bottom-left graph plots the effect of b on the Unemployment Rate in the baseline economy, and the bottom-right graph plots Unemployment Durations in the baseline economy. In the top two figures, the horizontal axis corresponds to the average replacement ratio for that particular b, or $\frac{b}{w_U}$. The bottom two have the average replacement rate, which is $\frac{b}{\bar{w_U}}$, where $\bar{w_U} = \displaystyle\int_0^{\varepsilon^*} w_U(\varepsilon)\phi_E(\varepsilon)d\varepsilon$ is the average wage for UI collectors.

rate of 83.5% the unemployment rate is 19.32% and the average unemployment duration is 15.24 months. This is a significantly faster response relative to our baseline model, which is plotted in Figure 8(c) and Figure 8(d), respectively. Indeed, the endogenous take-up rate represents the key difference between the two models.

The difference in responses of the unemployment rate and average duration of unemployment to UI benefits derives in part from the following. As UI benefits increase, the average duration of unemployment for UI collectors indeed increases; however, it *decreases* for UI non-collectors. This occurs because of the informational frictions that bind the non-collector wage to a UI collector's utility at $\varepsilon = \varepsilon^*$. In the Pareto optimal equilibrium with full information, the non-collector queue length is unaffected by the level of UI benefits. In addition, the take-up rate increases at a decreasing rate with UI benefits. Put together, the average duration of unemployment (economy-wide), which is the average between collectors and non-collectors), eventually levels off similarly to the take-up rate.

6 Conclusion

We estimate the UI take-up rate for the U.S. economy from $1989 - 2012$. An equilibrium directed search model is developed to explain this empirical fact and explore its implications for the provision of UI benefits. Modeling the take-up decision leads to an informational friction that creates an distortion in non-collector outcomes causing the equilibrium to be Pareto inefficient.

The model equilibrium we examine predicts that UI collectors have longer unemployment durations than non-collectors. Part of this difference is Pareto inefficient, as non-collectors transition to employment faster than the optimal rate. After calibrating the model, we explore several counterfactual policy experiments. We find that the distortion imposed by the presence of non-collectors amounts to a welfare cost of 1.71%. Finally, we also show that incorporating the take-up decision matters when examining the effects of UI benefits on equilibrium outcomes. The analysis indicates that the unemployment rate and average duration of unemployment respond slower to changes in UI benefits than the standard search model with a fixed 100% take-up rate.

It is also interesting to note that our model may have important implications for the efficiency of experience rated taxes. Many have previously studied the effects of experience rating on the labor market. Examples include Feldstein (1976), Topel (1983), Albrecht and Vroman (1999), Wang and Williamson (2002), and Cahuc and Malherbet (2004), among many others. We do not explore the overall effects of experience rating in this paper, but rather take that feature as given and examine the implications of unclaimed UI benefits. Our results do indicate that a full exploration of experience rating, accounting for the unclaimed benefits aspect, represents an interesting direction for future research. Indeed, current work in progress explores the full implications of experience rating allowing for both endogenous separations and unclaimed UI benefits.

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A Robustness Checks

This section performs robustness checks with respect to the normalization of μ in the calibration procedure. As μ changes, d must change to maintain a take-up rate of 77% in the baseline private information economy. Of course the other calibrated parameters also adjust to hit their respective targets, but the changes to d represent those with the largest implications for the results. Table 7 presents the results of this robustness exercise. The third column, labeled TUR presents the take-up rate in the full information economy; the take-up rate in the private information economy by design remains at 77%.

Table 7: Changing μ and d

μ	d	TUR	$\tilde{w}_N$	w_N^*	$\frac{1}{\alpha_W(\tilde{q}_N)}$	$\frac{1}{\alpha_W(q_N^*)}$	Tot. wel.	N wel.	E_N	Avg. NC
0.50	0.27	0.29	0.86	0.92	2.49	4.32	1.92	2.99	3.72	3.65
0.60	0.25	0.37	0.85	0.91	2.47	4.23	1.84	3.01	3.76	3.69
0.70	0.23	0.42	0.84	0.91	2.45	4.15	1.80	3.04	3.82	3.75
0.80	0.20	0.47	0.84	0.90	2.46	4.09	1.74	3.03	3.83	3.76
0.90	0.19	0.49	0.83	0.90	2.45	4.03	1.73	3.05	3.88	3.80
1.00	**0.17**	**0.51**	**0.83**	**0.89**	**2.44**	**3.98**	**1.72**	**3.08**	**3.93**	**3.86**
1.10	0.15	0.53	0.82	0.89	2.43	3.92	1.71	3.10	3.98	3.90
1.20	0.14	0.54	0.82	0.89	2.42	3.88	1.72	3.13	4.02	3.94
1.30	0.12	0.56	0.81	0.88	2.42	3.84	1.72	3.15	4.07	3.98
1.40	0.11	0.57	0.81	0.88	2.41	3.79	1.72	3.17	4.11	4.02
1.50	0.10	0.58	0.80	0.87	2.40	3.75	1.73	3.20	4.17	4.08

The table presents from left to right: the mean parameter of $F(\varepsilon)$, non-collector flow utility (d) necessary to maintain a 77% UI take-up rate in the private info economy, the take-up rate in the full info economy (TUR), non-collector wage in private information economy ($tildew_N$), non-collector wage in the full info economy, w_N^*, average duration for non-collectors in each economy, the total welfare gain, the welfare gain for unemployed non-collectors, and the average welfare gain conditional on being a non-collector. The row in bold ($\mu = 1.0$) corresponds to the baseline parametrization.

In general, changing the value of μ has relatively small effects on the welfare cost of private information. The largest change is the take-up rate in the full information economy, which goes to a low of 29% for a relatively low value of μ. The welfare gain for non-collectors is also increasing with the value of μ, although the changes are relatively small.

B Proofs

The following Lemma is used in the Proof of Lemma 1.

Lemma 3 *The value function, $U(\varepsilon)$ is strictly decreasing in ε; i.e.* $\dfrac{\partial U(\varepsilon)}{\partial \varepsilon} < 0$.

Proof: This follows immediately from Equation (8) and the envelope theorem. ■

Proof of Lemma 1:

Proof: To prove Lemma 1, define the function $\Gamma(\varepsilon) = U(\varepsilon) - N$. Let $w \in \mathbb{W}$ and $q = Q(w)$ be an equilibrium wage and associated queue length, with $q > 0$. Consider first $\Gamma(0)$. Since $b > d$, we have:

$$\mathbf{N} = \sup_{w'} \left(\frac{1}{r(r + \lambda + \alpha_W(q(w')))} \right) \Big((r + \lambda)h(d) + \alpha_W\big(q(w')\big)h(w') \Big) <$$
$$\sup_{w'} \left(\frac{1}{r(r + \lambda + \alpha_W(q(w')))} \right) \Big((r + \lambda)h(b) + \alpha_W\big(q(w')\big)h(w') \Big) = \mathbf{U}(0)$$

which implies that $\Gamma(0) > 0$. Next consider $\lim_{\varepsilon\to\infty} \Gamma(\varepsilon)$. Notice, from Lemma 3, $U(\varepsilon)$ is decreasing in ε. Specifically, $\lim_{\varepsilon\to\infty} U(\varepsilon) = -\infty$; therefore, there exists some $\underline{\varepsilon}$ such that $\Gamma(\underline{\varepsilon}) < 0$. From Lemma 3, $\Gamma(\varepsilon)$ is strictly decreasing (and continuous); therefore, there exists a unique ε^* such that $U(\varepsilon^*) = N$. ■

The following Lemma is useful in the proof of Proposition 1.

Lemma 4 *Any equilibrium $w \in \mathbb{W}$ and $q(w) = Q(w)$ must satisfy: $B(w) + C(q) = 0$ for all $\varepsilon \leq \varepsilon^*$, where*

$$B(w) = \frac{\alpha_W\big[q(w)\big]h'(w)}{r\Theta} \tag{36}$$

$$C(q) = \frac{\alpha'_W(q)q'(w)(r+\lambda)\big[h(w) - (h(b) - \varepsilon)\big]}{r\Theta^2} \tag{37}$$

and $\Theta = (r + \lambda + \alpha_W[q(w)])$.

Proof: For $w \in \mathbb{W}$ and $q(w) = Q(w)$ to be equilibrium wages and queue lengths, they must satisfy Equation (12); that is, they must be optimal for a UI collector. Thus, there does not exist another w' such that the worker has higher lifetime expected utility. Suppose instead that $B(w) + C(q) \neq 0$, and take the case where $B(w) + C(q) > 0$. This is without loss of generality, as the $B(w) + C(q) < 0$ follows by reversing the direction of the proof. Now, suppose we increase w by any small amount. Let $q'(w)$ denote the associated increase in q required to remain on the firm's zero-profit curve in Equation (24) (or Equation (29)). The increase in w increases an unemployed worker's utility by $\dfrac{\partial U(\varepsilon)}{\partial w} = \dfrac{r\alpha_W(q)h'(w)}{r(r+\lambda+\alpha_W(q))} = B(w)$. When q increases by $q'(w)$, utility changes by:

$$\begin{aligned}
\frac{\partial U(\varepsilon)}{\partial q}q'(w) &= q'(w)\Big[\frac{\alpha'_W(q)h(w)\big(r(r+\lambda+\alpha_W(q))\big) - \big((r+\lambda)(h(b)-\varepsilon) + \alpha_W(q)\big)r\alpha'_W(q)}{r^2(r+\lambda+\alpha_W(q))^2}\Big] \\
&= q'\Big[\frac{r(r+\lambda)\alpha'_W(q)h(w) - r(r+\lambda)\alpha'_W(q)(h(b)-\varepsilon)}{r^2(r+\lambda+\alpha_W(q))^2}\Big] \\
&= \frac{\alpha'_W(q)q'(w)(r+\lambda)\big[h(w) - (h(b)-\varepsilon)\big]}{r(r+\lambda+\alpha_W(q))^2} = C(q)
\end{aligned}$$

Thus, the worker's utility changes by $B(w) + C(q)$. Recall, $B(w) + C(q) > 0$ so this increases $U(\varepsilon)$. Since the changes maintained profit maximization, this is a contradiction to $w \in \mathbb{W}$

and $q(w) = Q(w)$ as an equilibrium wage and queue length. ■

For the remaining proofs, it is useful to work with the worker's indifference curve. This is derived using Equation (8). Specifically, for any level of utility $\bar{U}$, an unemployed UI collector's indifference curve is given by:

$$\mathcal{W}(q) = h^{-1}\Big\{\frac{1}{\alpha_W(q)}\Big[r\bar{U}(r+\lambda+\alpha_W(q)) - (r+\lambda)\big[h(b)-\varepsilon\big]\Big]\Big\} \tag{38}$$

To ease the notation, define $T(q)$ as:

$$T(q) = \frac{1}{\alpha_W(q)}\Big[r\bar{U}(r+\lambda+\alpha_W(q)) - (r+\lambda)\big[h(b)-\varepsilon\big]\Big] \tag{39}$$

Given this, we have

$$\frac{\partial \mathcal{W}(q)}{\partial q} = \frac{T'(q)}{h'\Big(h^{-1}\big(T(q)\big)\Big)} \tag{40}$$

where

$$T'(q) = \frac{-\alpha_W'(q)}{[\alpha_W(q)]^2}\Big(r\bar{U} - [h(b)-\varepsilon]\Big) \tag{41}$$

Note that in equilibrium, since we restrict attention to $q(\varepsilon)$ such that $w(q) \geq \max\{h(b) - \varepsilon, h(d)\}$ (depending on whether or not the worker collects UI), $\bar{U} \geq h(b) - \varepsilon$; as a result, since $\alpha_W'(q) < 0$, $T'(q) > 0$. That is, the worker's indifference curve is strictly increasing in (q, w) space. Related, define the zero profit function defined in Equation (24) and/or Equation (26) as:

$$\mathcal{P}(q) = y - \frac{\gamma(r+\lambda)}{q_U(\varepsilon)\alpha_W\big(q_U(\varepsilon)\big)} - \lambda\tau \tag{42}$$

Viewed in this way, the problem of determining the optimal q becomes one of finding the indifference curve tangent to the firm's zero profit curve. The next Lemma shows that $\mathcal{P}(q)$ is strictly increasing and strictly concave.

Lemma 5 *The wage defined in Equation (42) (and Equation (29)) is such that* $\mathcal{P}'(q) > 0$ *and* $\mathcal{P}''(q) < 0$.

Proof: First, recall that our matching function is assumed to be such that $\alpha_E'(q) > 0$ and $\alpha_E''(q) < 0$. Differentiating Equation (42) with respect to q gives,

$$\mathcal{P}'(q) = \frac{\gamma(r+\lambda)\alpha_E'(q)}{\big[\alpha_E(q)\big]^2}$$

which is > 0 given the properties of $\alpha_E(q)$. Differentiating again with respect to q yields,

$$\mathcal{P}''(q) = \frac{\gamma(r+\lambda)\alpha_E''(q)\big[\alpha_E(q)\big]^2 - 2\gamma(r+\lambda)\alpha_E'(q)\alpha_E(q)}{\big[\alpha_E(q)\big]^2}$$

which is < 0 since $\alpha_E''(q) < 0$ and $\alpha_E'(q) > 0$. ■

Proof of Proposition 1:

We begin by showing that there must exist a wage function $w(\varepsilon)$ for UI collectors, and then show there exists a distinct wage for non-collectors, w_N. Suppose that there exists only one equilibrium wage, $\hat{w}$ that all employed workers receive if matched with a firm. Denote the expected queue length associated with this wage by $q(\hat{w})$. Next, consider any $\varepsilon_1 \leq \varepsilon^*$, where ε^* is the unique cut-off value given by Lemma 1. By definition of equilibrium, $\hat{w}$ must satisfy $U(\varepsilon_1) = \sup_{w'} U(\varepsilon_1, w')$. Then consider any $\varepsilon_2 < \varepsilon_1$. Notice that $B(w)$ from Equation (36) does not depend on ε and $C(q)$ from Equation (37) is decreasing in ε. Thus, $B(\hat{w};\varepsilon_1) = B(\hat{w};\varepsilon_2)$ and $C(q(\hat{w});\varepsilon_1) > C(q(\hat{w});\varepsilon_2)$. From Lemma 4, $\hat{w}$ and $q(\hat{w})$

satisfy$B(\hat{w};\varepsilon_1) + C(q(\hat{w});\varepsilon_1) = 0 > B(\hat{w};\varepsilon_2) + C(q(\hat{w});\varepsilon_2)$. This implies, however, that the marginal cost of decreasing $\hat{w}$ exceeds the gain (of decreasing q along the zero-profit curve), increasing utility for a worker with $\varepsilon = \varepsilon_2$, a contradiction to $\hat{w}$ being an equilibrium wage. Therefore, any equilibrium wage must be a function of ε for $\varepsilon \leq \varepsilon^*$. Call this function $w_U(\varepsilon)$.

The final step in the proof is to verify a distinct wage for non-collectors. The alternative is that all non-collectors receive the wage $w_U(\varepsilon^*)$. Notice, then, at this wage, some workers prefer to collect UI benefits (those with $\varepsilon = \varepsilon^*$ while the rest ($\varepsilon > \varepsilon^*$) do not collect. Thus, for a firm opening this job, the expected probability a separated worker collects is $0 < p < 1$. Suppose this is true. We take two cases separately: Case 1: Observable ε and Case 2: Unobservable ε. In Case 1: Since profits are higher for a firm with $p = 0$ (relative to $p > 0$), for any wage, a firm can offer $w_N = w_U(\varepsilon^*) + \mu$, for some $\mu > 0$, for only workers with $\varepsilon > \varepsilon^*$. Although those workers with $\varepsilon = \varepsilon^*$ would also like to apply, the perfect observability of ε prevents this. Since this clearly raises utility for those with $\varepsilon > \varepsilon^*$, all non-collectors prefer to apply for this job, violating optimal application of $w_U(\varepsilon^*)$ for all $\varepsilon \geq \varepsilon^*$.

Finally, consider Case 2: unobservable ε. In this case, the previous argument does not hold, since the firm cannot prevent any worker from applying to a particular job (wage). Again, suppose that all $\varepsilon \geq \varepsilon^*$ search for the $w_U(\varepsilon^*)$ job, at the expected queue length $q_U(\varepsilon^*)$. Notice that $p > 0$ for this job since both some collectors and non-collectors apply, but $p = 1$ for all $\varepsilon < \varepsilon^*$ as only collectors apply to these jobs. We will show that in this case there exits a $\delta > 0$ such that $w_U(\varepsilon^*; 1 > p > 0) > w_U(\varepsilon^* - \delta; p = 1)$ and $q_U(\varepsilon^*; 1 > p > 0) < q_U(\varepsilon^* - \delta; p = 1)$. This would imply a neighborhood around ε^* where optimal application is violated, since for those $\varepsilon \in [\varepsilon^* - \delta, \varepsilon^*)$, the $w_U(\varepsilon^*; 1 > p > 0)$ job would pay a higher wage and arrive faster, strictly dominating the $w_U(\varepsilon^* - \delta; p = 1)$ job. To show this, we use the fact that optimal application and profit maximization imply equilibrium wages and queue lengths must be such that the worker's indifference curve is tangent to the zero profit curve (in (q, w) space). That is, they must satisfy,

$$\mathcal{P}'(q_U^*(\varepsilon)) = \frac{\partial \mathcal{W}}{\partial q} = \frac{T'(q_U^*(\varepsilon))}{h'\Big(h^{-1}\big(q_U(\varepsilon)\big)\Big)} \tag{43}$$

Now, begin with the claim that $w_U(\varepsilon^*; 1 > p > 0) > w_U(\varepsilon^* - \delta; p = 1)$. We first show that $w_U(\varepsilon^*; 1 > p > 0) > w_U(\varepsilon^*; p = 1)$ and then a standard continuity argument delivers the desired result. Suppose instead that $w_U(\varepsilon^*; 1 > p > 0) \leq w_U(\varepsilon^*; p = 1)$. Given the zero profit curves for each p, profit maximization implies that $q_U(p < 1) < q_U(p = 1)$. Then, Assumption 1 implies $T''(q) > 0$ so that $T'(q_U(p = 1)) > T'(q_U(p < 1)$. Moreover, strict convexity of the utility function $h(\cdot)$ implies that $\dfrac{1}{h'(w_U(p = 1))} \geq \dfrac{1}{h'(w_U(p < 1))}$. Combining these inequalities along with $P''(q) < 0$ and Equation (43) we have:

$$\frac{T'(q_U(p = 1))}{h'(w_U(p = 1))} > \frac{T'(q_U(p < 1))}{h'(w_U(p < 1))}$$
$$\Rightarrow P'(q_U(p = 1)) > P'(p < 1)$$
$$\Rightarrow q_U(p < 1) > q_U(p = 1)$$

which is a contradiction to the argument above that $q_U(p < 1) < q_U(p = 1)$. Thus, $w_U(\varepsilon^*; 1 > p > 0) > w_U(\varepsilon^*; p = 1)$.

Now, given this, we can then show that $q_U(p < 1) < q_U(p = 1)$. Suppose instead

$q_U(p < 1) \geq q_U(p = 1)$. Then, from the properties of $T(\cdot)$ discussed above, $T'(q_U(p < 1)) \geq T'(q_U(p = 1)$. Since $w_U(\varepsilon^*; 1 > p > 0) > w_U(\varepsilon^*; p = 1)$, the strict concavity of $h(\cdot)$ implies $\dfrac{1}{h'(w_U(p < 1))} \geq \dfrac{1}{h'(w_U(p = 1))}$. Combining these inequalities again with Equation (43) yields:

$$\frac{T'(q_U(p < 1))}{h'(w_U(p < 1))} > \frac{T'(q_U(p = 1))}{h'(w_U(p = 1))}$$
$$\Rightarrow P'(q_U(p < 1)) > P'(p = 1)$$
$$\Rightarrow q_U(p = 1) > q_U(p < 1)$$

a contradiction. Thus, $q_U(p < 1) < q_U(p = 1)$. Combining these results, if all non-collectors search for the wage $w_U(\varepsilon^*)$, then this wage is such that $w_U(\varepsilon^*; 1 > p > 0) > w_U(\varepsilon^*; p = 1)$ and $q_U(\varepsilon^*; p < 1) < q_U(\varepsilon^*; p = 1)$. Then, since the policy functions, $w_U(\varepsilon)$ and $q_U(\varepsilon)$ are continuous functions of ε (for a given p), there exists a $\delta > 0$ such that $w_U(\varepsilon^*; 1 > p > 0) > w_U(\varepsilon^* - \delta; p = 1)$ and $q_U(\varepsilon^*; p < 1) < q_U(\varepsilon^* - \delta; p = 1)$. Notice, however, that this implies the $w_U(\varepsilon^*)$ job has a higher wage and lower job arrival rate than the jobs offered to UI collectors with $\varepsilon \in [\varepsilon^* - \delta, \varepsilon^*)$. As a result, those workers with $\varepsilon \in [\varepsilon^* - \delta, \varepsilon^*)$ have higher utility from searching for the $w_U(\varepsilon^*)$ job, violating optimal application. Therefore, there must exist a distinct wage w_N for $\varepsilon > \varepsilon^*$. ■

We now turn towards the proof of Proposition 2. Towards this end, the following Lemma is used:

Lemma 6 *The function defined by* $G(q) = \dfrac{\alpha_W(q)}{r + \lambda + \alpha_W(q)}$ *is such that* $G'(q) < 0$.

Proof: Differentiating with respect to q yields,

$$G'(q) = \frac{\alpha_W'(q)(r+\lambda)}{\big(r+\lambda+\alpha_W(q)\big)^2} < 0$$

where the inequality follows from the properties of the matching function that imply $\alpha_W'(q) < 0$. ■

Proof of Proposition 2:

We show that any equilibrium must satisfy the optimization problems in Equations (23) to (26). Suppose that $\Big\{\mathbb{W}, Q, \mathbf{U}, \mathbf{E}, \mathbf{N}, \mathcal{T}\Big\}$ is an equilibrium with $w_U^* \in \mathbb{W}$ and $q_U^*(w_U^*) = Q(w_U^*) > 0$, for all ε. Furthermore, suppose there exists another w_U' and $q_U'(w_U')$ that achieves a higher value of the objective function in Equation (23) (it is without loss of generality that we use w_U, q_U, as the case for q_N, w_N and the objective in Equation (25) follows analogously). That is, suppose that for any $\varepsilon \leq \varepsilon^*$, q_U' and w_U' satisfy

$$\left(\frac{1}{r+\lambda+\alpha_W\big(q_U'(\varepsilon)\big)}\right)\left((r+\lambda)(h(b)-\varepsilon)+\alpha_W\big(q_U'(\varepsilon)\big)h\big(w_U'(\varepsilon)\big)\right) > \mathbf{U}(\varepsilon) \tag{44}$$

Then, by definition of $Q(w)$ in equilibrium, for the wage w_U' it must satisfy optimal application, which implies

$$\left(\frac{1}{r+\lambda+\alpha_W\big(Q(w_U')\big)}\right)\left((r+\lambda)(h(b)-\varepsilon)+\alpha_W\big(Q(w_U')\big)h\big(w_U'(\varepsilon)\big)\right) \leq \mathbf{U}(\varepsilon) \tag{45}$$

Combining Equations (44) and (45) implies that

$$\frac{\alpha_W\big(Q(w_U')\big)}{r+\lambda+\alpha_W\big(Q(w_U')\big)} < \frac{\alpha_W\big(q_U'(w_U')\big)}{r+\lambda+\alpha_W\big(q_U'(w_U')\big)}$$

From Lemma 6, this inequality implies that $q'_U(w'_U) < Q(w'_U)$. Now, profit maximization in equilibrium implies that w^*_U and $Q(w^*_U)$ satisfy Equation (24) with equality. Furthermore, this profit maximization implies that any other w_U cannot earn greater than this. Combining $q'_U(w'_U) < Q(w'_U)$, the fact that $\alpha_E(q)$ is increasing in q, along with the profit maximization just discussed implies that

$$y - w'_U - \frac{\gamma(r+\lambda)}{\alpha_E(q'_U)} - \lambda\tau < y - w'_U - \frac{\gamma(r+\lambda)}{\alpha_E(Q(w'_U))} - \lambda\tau \leq 0$$

Thus, q'_U, w'_U do not satisfy profit maximization, and thus are not feasible in equilibrium. Therefore, any equilibrium allocation must satisfy Equations (23) to (26). ■

Proof of Lemma 2:

Proof: Consider ε_1 and ε_2 such that $\varepsilon_2 > \varepsilon_1$. Denote $q^*_U(\varepsilon)$ the optimal choice of queue length (defined by Equation (23) or Equation (28)) for a given ε. Since $\alpha_W(q)$ is strictly decreasing in q, we need to show that $q^*_U(\varepsilon_1) > q^*_U(\varepsilon_2)$. Now, suppose instead that $q^*_U(\varepsilon_2) \geq q^*_U(\varepsilon_1)$. Notice, for a given q, $T'(q)$ is increasing in ε; therefore, $T'(q;\varepsilon_2) > T'(q;\varepsilon_1)$. Since by assumption, $q^*_U(\varepsilon_2) \geq q^*_U(\varepsilon_1)$ and $T(q)$ is increasing in q, we also have that $T'(q^*_U(\varepsilon_2)) > T'(q^*_U(\varepsilon_1))$. Moreover, since $\mathcal{P}(q)$ is increasing in q, we also have that $w_U(q_U(\varepsilon_2)) \geq w_U(q_U(\varepsilon_1))$. Thus, the strictly concave utility function implies $\frac{1}{h'\left(h^{-1}\left(q_U(\varepsilon_2)\right)\right)} \geq \frac{1}{h'\left(h^{-1}\left(q_U(\varepsilon_1)\right)\right)}$, implying that $\frac{T'(q^*_U(\varepsilon_2))}{h'\left(h^{-1}\left(q_U(\varepsilon_2)\right)\right)} > \frac{T'(q^*_U(\varepsilon_1))}{h'\left(h^{-1}\left(q_U(\varepsilon_1)\right)\right)}$.

Now, by definition of being an optimal solution, $q^*_U(\varepsilon_1)$ satisfies,

$$\mathcal{P}'(q^*_U(\varepsilon_1)) = \frac{\partial \mathcal{W}}{\partial q} = \frac{T'(q^*_U(\varepsilon_1))}{h'\left(h^{-1}\left(q_U(\varepsilon_1)\right)\right)}$$

Since $\mathcal{P}''(q) < 0$, $\mathcal{P}'(q_U^*(\varepsilon_2)) \leq \mathcal{P}'(q_U^*(\varepsilon_1))$, which combined with the results above implies,

$$\frac{T'(q_U^*(\varepsilon_2))}{h'\Big(h^{-1}\big(q_U(\varepsilon_2)\big)\Big)} > \frac{T'(q_U^*(\varepsilon_1))}{h'\Big(h^{-1}\big(q_U(\varepsilon_1)\big)\Big)} = \mathcal{P}'(q_U^*(\varepsilon_1)) \geq \mathcal{P}'(q_U^*(\varepsilon_2))$$

which is a contradiction to $q_U^*(\varepsilon_2)$ being an optimal solution to Equation (23). Therefore, $q_U^*(\varepsilon_2) < q_U^*(\varepsilon_1)$. ■

Lemma 2 describes how the equilibrium allocations to UI collectors depend on the direct utility cost of collecting benefits. Intuitively, as ε increases, net benefit provided by UI is reduced which acts similarly to a decrease in UI benefits. Hence, the worker prefers to trade-off lower wages for a faster job arrival rate.

Proof of Proposition 3:

Proof: First consider (i) $\varepsilon^* < h(b) - h(d)$. Define $\hat{\varepsilon} = h(b) - h(d)$. Suppose instead that $\varepsilon^* \geq \hat{\varepsilon}$. Notice that if $\varepsilon = \hat{\varepsilon}$, collectors and non-collectors have the same flow utility. Moreover, the set of feasible wages for a firm hiring non-collectors, given any q, includes as a subset the wages available to a firm hiring collectors. This implies that by definition of $\mathbf{N}$, $\mathbf{N} \geq \mathbf{U}(\hat{\varepsilon})$. Then, if $\varepsilon^* > \hat{\varepsilon}$,

$$\mathbf{N} \geq \mathbf{U}(\hat{\varepsilon}) > \mathbf{U}(\varepsilon^*)$$

where the last inequality comes from Lemma 3. This is a contradiction to the definition of ε^* where $\mathbf{U}(\varepsilon^*) = \mathbf{N}$. Then, what if $\varepsilon^* = \hat{\varepsilon}$? Consider the determination of (q, w) as the tangency point of the worker's indifference curve and the zero-profit curve. This implies that the equilibrium q must satisfy $\mathcal{P}'(q) = \mathcal{W}'(q)$, or:

$$\frac{\gamma(r+\lambda)\alpha_E'(q)}{\big[\alpha_E(q)\big]^2} = \frac{-\alpha_W'(q)}{\big[\alpha_W(q)\big]^2}\big[r\bar{U} - H(c)\big] \tag{46}$$

where $H(c) = h(b) - \varepsilon$ for a UI collector and $H(c) = h(d)$ for a non-collector. Notice, for $\varepsilon = \hat{\varepsilon}$, Equation (46) is the same for UI collector's and non-collectors. Since $\mathcal{P}(q)$ and $\mathcal{W}(q)$ are strictly concave and convex, respectively, this has a unique solution. Therefore, $q_U(\hat{\varepsilon}) = q_U(\varepsilon^*) = q_N$. Since $p = 1$ for $\varepsilon = \varepsilon^*$, the wage for a UI collector, from Equation (24), is such that $w_U(\varepsilon^*) < w_N$. Given the same flow utility, however, $q_U(\varepsilon^*) = q_N$ and $w_U(\varepsilon^*) < w_N$ imply that $\mathbf{U}(\varepsilon^*) < \mathbf{N}$, a contradiction to the definition of ε^*. Thus, $\varepsilon^* < \hat{\varepsilon}$.

To show property (ii), $q_U(\varepsilon) > q_N$, for all $\varepsilon \leq \varepsilon^*$, we can start with the fact argued above that from Equation (46), $q_U(\hat{\varepsilon}) = q_N$. Combining this with $\varepsilon^* < \hat{\varepsilon}$ and Lemma 2 yields the desired result. ■

The following two Lemmas are needed in the proof of Proposition 5:

Lemma 7 *When $\tau = 0$, $\mathbf{U}(\hat{\varepsilon}; \tau = 0) = \mathbf{N}(q_N^*)$, where q_N^* is defined as the solution to Equations (25) to (26), $\mathbf{U}(\varepsilon)$ is given by Equations (28) to (29), and $\hat{\varepsilon} = h(b) - h(d)$.*

Proof: When $\tau = 0$, from Equations (26) and (29), the zero-profit curves for firms hiring collectors and for firms hiring non-collectors coincide. Moreover, at $\hat{\varepsilon} = h(b) - h(d)$, a UI collector and non-collector have identical flow utility, and thus identical indifference curves in (q, w) space. As a result, the utility maximizing (q, w) combination must also coincide, implying that $\mathbf{U}(\hat{\varepsilon}; \tau = 0) = \mathbf{N}(q_N^*)$. ■

Proof of Proposition 4:

Proof: The proof follows the same logic as the proof of Proposition 2 above, and is thus omitted here.. The only difference is the additional constraint in Equation (32) that is required for optimal application. In the proof of Proposition 5 we show that this constraint must bind at $\varepsilon = \varepsilon^*$; i.e. the constraint must be imposed. ■

The following Lemma is also used in the proof of Proposition 5:

Lemma 8 *The value function $U(\varepsilon;\tau)$ is decreasing in τ.*

Proof: Differentiating $U(\varepsilon)$ in Equation (8) with respect to τ (using the Envelope Theorem) gives:

$$\frac{\partial U}{\partial \tau} = \left(\frac{\alpha_W\big(q_U(\varepsilon)\big)}{r+\lambda+\alpha_W\big(q_U(\varepsilon)\big)}\right)\left(h'\big(w_U(\varepsilon)\big)\right)\left(\frac{\partial w_U}{\partial \tau}\right)$$

The first two terms in parenthesis are positive, and from Equation (29) (or Equation (24)), $\dfrac{\partial w_U}{\partial \tau} < 0$. ■

Proof of Proposition 5:

Proof: To show property (i), denote ε^* as the unique cut-off value such that $\mathbf{U}(\varepsilon) \geq \mathbf{N}$ for all $\varepsilon \leq \varepsilon^*$, with equality at $\varepsilon = \varepsilon^*$. This simply represents the unique crossing point of U and N identified in Lemma 1. Further let $\hat{\varepsilon} = h(b) - h(d)$. Property (i) says $\varepsilon^* = \hat{\varepsilon}$. Suppose instead this is not true. Then there are two possibilities: Case 1: $\varepsilon^* < \hat{\varepsilon}$. In this case, notice that since $h(b) - \hat{\varepsilon} = h(d)$, it must be that $\tilde{U}(\hat{\varepsilon}) = \mathbf{N}(\tilde{q}_N)$, for any equilibrium $\tilde{q}_N$. Moreover, by definition, $\mathbf{U}(\varepsilon^*) = \mathbf{N}(\tilde{q}_N)$. Using this along with Lemma 3, given $\hat{\varepsilon} > \varepsilon^*$:

$$\tilde{U}(\varepsilon^*) = \mathbf{N}(\tilde{q}_N) = \mathbf{U}(\varepsilon^*) > \mathbf{U}(\hat{\varepsilon})$$

a contradiction to equilibrium conditions, as the constraint in Equation (32) is violated. The other possibility then is Case 2: $\varepsilon^* > \hat{\varepsilon}$. In this case, using the definitions of $\hat{\varepsilon}$ and ε^*, the fact that $\tilde{U}(\varepsilon)$ (given by Equation (27)) is decreasing in ε, and the constraint in Equation (32) implies:

$$\mathbf{N}(\tilde{q}_N) = \mathbf{U}(\varepsilon^*) \geq \tilde{U}(\varepsilon^*) > \tilde{U}(\hat{\varepsilon}) = \mathbf{N}(\tilde{q}_N)$$

a contradiction. Therefore, $\varepsilon^* = \hat{\varepsilon} = h(b) - h(d)$.

Next, to show property (ii), that $\tilde{q_N} \neq q_N^*$, suppose instead that $\tilde{q}_N = q_N^*$. It is sufficient to show that at q_N^* the constraint is violated at $\varepsilon = \varepsilon^* = h(b) - h(d)$. That is, $\tilde{U}(\varepsilon^*) > U(\varepsilon^*)$. Towards this end, notice that by definition of $\tilde{U}(\varepsilon)$ and ε^*, $\tilde{U}(\varepsilon^*) = \mathbf{N}(q_N^*)$. Moreover, from Lemma 8 $\mathbf{U}(\varepsilon^*; \tau > 0) < \mathbf{U}(\varepsilon^*; \tau = 0)$, and from Lemma 7 $\mathbf{U}(\varepsilon^*; \tau = 0) = \mathbf{N}(q_N^*)$. Combining these relationships implies:

$$\mathbf{U}(\varepsilon^*; \tau > 0) < \mathbf{U}(\varepsilon^*; \tau = 0) = \mathbf{N}(q_N^*) = \tilde{U}(\varepsilon^*)$$

a contradiction to the equilibrium conditions. Thus, $\tilde{q}_N \neq q_N^*$ in the private information equilibrium. ■

Proof of Corollary 1:

Proof: For notation, denote the firm's zero profit curve from Equation (42) for workers collecting UI (with τ paid at separation) by $\mathcal{P}_U(q)$ and for a non-collector as $\mathcal{P}_N(q)$. Note, given $\tau > 0$, Equation (42) implies that given any q, $\mathcal{P}_N(q) > \mathcal{P}_U(q)$.

In equilibrium, the "incentive" constraint imposed by Equation (32) implies that a non-collector and a UI collector with $\varepsilon = \varepsilon^*$ must be on the same indifference curve. That is, $\mathcal{W}(\tilde{q}_N) = \mathcal{W}(q_U^*(\varepsilon^*))$. In addition, equilibrium requires the zero profit curve to intersect the indifference curve at the equilibrium q. For UI collectors this is a tangency, while for non-collectors (under private information) it is an intersection, which we show happens twice. To show this, we start by showing that at $q = q_N^*$, $\mathcal{W}(q) - \mathcal{P}_N(q) < 0$ and crosses zero twice, once with $\tilde{q}_N^L < q_N^*$ and once with $\tilde{q}_N^H > q_N^*$.

From Lemmas 7 and 8, $\mathbf{N}(q_N^*) = \mathbf{U}(\varepsilon^*; \tau = 0) > \mathbf{U}(\varepsilon^*; \tau > 0) = \mathbf{N}(\tilde{q}_N)$. As a result, $\mathcal{P}_N(q_N^*) = \mathcal{W}(q_N^*; \mathbf{N}(q_N^*)) > \mathcal{W}(\tilde{q}_N; \mathbf{N}(\tilde{q}_N)) = \mathcal{W}(q_U^*(\varepsilon^*); \mathbf{U}(\varepsilon^*)) = \mathcal{P}_U(q_U^*(\varepsilon^*))$. Thus, at q_N^*, $\mathcal{W}(q_N^*) - \mathcal{P}_N(q_N^*) < 0$. Now, consider $\mathcal{W}(q) - \mathcal{P}_N(q)$ as q decreases. Towards this end, given the properties of the matching function, notice that $\lim_{q\to 0} \alpha_W(q) = \infty$, $\lim_{q\to\infty} \alpha_W(q) = 0$, $\lim_{q\to 0} \alpha_E(q) = 0$, and $\lim_{q\to\infty} \alpha_E(q) = \infty$.

$$\lim_{q\to 0} \mathcal{W}(q) = U^* - (r+\lambda)h(d) \tag{47}$$

$$\lim_{q\to\infty} \mathcal{W}(q) = h^{-1}\big[\infty\big] = \infty \tag{48}$$

$$\lim_{q\to 0} \mathcal{P}(q) = -\infty \tag{49}$$

$$\lim_{q\to\infty} \mathcal{P}(q) = y - \chi_i \lambda \tau \tag{50}$$

where recall $\chi_i, i = U, N$ is an indicator variable with $\chi_U = 1$ and $\chi_N = 0$. Using Equations (47) to (50) implies that $\lim_{q\to 0} \mathcal{W}(q) - \mathcal{P}_N(q) > 0$. Thus, it starts negative at $q = q_N^*$ and is eventually positive. Since $\mathcal{W}(q)$ is strictly convex (and strictly increasing) and $\mathcal{P}(q)$ is strictly concave (and strictly increasing), this crossing only happens once. As a result, there exists an equilibrium $\tilde{q}_N^L < q_N^*$. We similarly show that there exists an equilibrium $\tilde{q}_N^H > q_N^*$.

Specifically, Equations (47) to (50) imply that $\lim_{q \to \infty} \mathcal{W}(q) - \mathcal{P}_N(q) > 0$, which combined with the strict convexity of $\mathcal{W}(q)$ and strict concavity of $\mathcal{P}(q)$ yields a unique crossing above q_N^*. ■

C State Level Take-up Data

In Section 2.2 we examine the U.S. take-up rate. This is accomplished by estimating eligible unemployed in each state according to their respective eligibility rules. This produces an FEU for the entire U.S. economy, which is used along with the FIU (tabulated by the BLS) for the entire U.S. to produce the take-up rate. The BLS also tabulates the FIU for each U.S. state individually. Given this, we can also estimate an FEU for each state, which is then combined with the FIU for that state to estimate the state's UI take-up rate. We have done this exercise and present the results in Table 8.

Table 8 provides the average value of each statistic for the entire 1989-2012 time period for each U.S. state. This table presents similar information to Table 1. Specifically we display the FIU, take-up rate (TUR), fraction of *ineligible* unemployed (Inelig.), and then the fraction of ineligible from monetary criteria (Mon.), quits (Quits), and exhaustions (Exhaust). Note, the sum of the state average take-up rates will not sum to the U.S. average take-up rate presented in Table 1. This is because of the different population sizes of each state, which implies a weighted average of the state take-up rates is required to arrive at the total U.S. take-up rate we calculate in Table 1.

In the last two columns of Table 8 we examine the impact of changes in eligibility rules since 1989 for each state. Similarly to the exercise carried out in Table 2, here we fix eligibility rules in 1989, only updating for inflation where necessary. We then re-estimate the FEU in each state, each year under these hypothetical rules and calculate the associated take-up rate. The column labeled "TUR 1989 Rules" displays this alternative take-up rate and the column labeled "1989-Orig. Rules" takes the alternative take-up rate minus the original. A positive difference in this column indicates that actual eligibility rules have become more restrictive since 1989, while a negative difference indicates the rules have become more generous. In most states the difference remains relatively small (essentially 0 in several cases), but a few examples of large changes do exist. All of the calculations in the last two columns are based on the average in each state from 1989-2012.

Table 8: Take-up Rates by U.S. State

State	FIU	TUR	Inelig.	Mon.	Quits	Exhaust	TUR 1989 Rules	1989 - Orig. Rules
AK	0.336	0.949	0.051	0.707	0.159	0.092	0.949	0.000
AL	0.774	0.383	0.617	0.051	0.577	0.311	0.646	0.262
AR	0.348	0.905	0.095	0.709	0.189	0.061	0.892	-0.013
AZ	0.402	0.570	0.430	0.685	0.200	0.073	0.596	0.026
CA	0.438	0.809	0.191	0.702	0.145	0.111	0.826	0.017
CO	0.372	0.610	0.390	0.653	0.225	0.081	0.602	-0.008
CT	0.438	0.910	0.090	0.594	0.187	0.177	0.910	-0.001
DC	0.390	0.704	0.296	0.723	0.160	0.076	0.690	-0.015

DE	0.442	0.840	0.160	0.619	0.239	0.100	0.834	-0.006
FL	0.369	0.608	0.392	0.683	0.186	0.089	0.615	0.008
GA	0.619	0.418	0.582	0.330	0.510	0.129	0.308	-0.110
HI	0.297	0.946	0.054	0.700	0.196	0.063	0.931	-0.015
IA	0.568	0.627	0.373	0.596	0.258	0.105	0.627	0.000
ID	0.492	0.831	0.169	0.691	0.193	0.074	0.850	0.019
IL	0.456	0.738	0.262	0.673	0.166	0.119	0.754	0.016
IN	0.420	0.675	0.325	0.688	0.177	0.094	0.686	0.011
KS	0.375	0.796	0.204	0.690	0.203	0.066	0.768	-0.029
KY	0.494	0.531	0.469	0.635	0.242	0.081	0.550	0.019
LA	0.504	0.579	0.421	0.624	0.255	0.079	0.340	-0.239
MA	0.459	0.915	0.085	0.638	0.176	0.144	0.909	-0.006
MD	0.493	0.612	0.388	0.652	0.197	0.110	0.632	0.020
ME	0.523	0.678	0.322	0.638	0.210	0.110	0.673	-0.005
MI	0.344	0.902	0.098	0.745	0.111	0.102	0.898	-0.003
MN	0.511	0.693	0.307	0.701	0.157	0.100	0.718	0.025
MO	0.483	0.657	0.343	0.620	0.236	0.102	0.642	-0.015
MS	0.333	0.757	0.243	0.757	0.146	0.055	0.758	0.001
MT	0.428	0.829	0.171	0.666	0.222	0.070	0.874	0.045
NC	0.384	0.797	0.203	0.643	0.221	0.095	0.797	0.000
ND	0.764	0.412	0.588	0.506	0.352	0.100	0.412	0.000

NE	0.411	0.768	0.232	0.624	0.259	0.075	0.758	-0.011
NH	0.473	0.537	0.463	0.623	0.207	0.128	0.560	0.023
NJ	0.438	0.910	0.090	0.640	0.148	0.170	0.910	0.000
NM	0.569	0.482	0.518	0.528	0.328	0.102	0.335	-0.147
NV	0.665	0.555	0.445	0.284	0.487	0.204	0.445	-0.110
NY	0.432	0.823	0.177	0.714	0.128	0.116	0.880	0.057
OH	0.383	0.744	0.256	0.724	0.149	0.085	0.775	0.031
OK	0.303	0.745	0.255	0.704	0.189	0.065	0.908	0.163
OR	0.415	0.907	0.093	0.631	0.207	0.120	0.904	-0.003
PA	0.463	0.922	0.078	0.686	0.156	0.116	0.925	0.003
RI	0.383	0.908	0.092	0.688	0.144	0.127	0.924	0.016
SC	0.432	0.703	0.297	0.632	0.211	0.116	0.719	0.016
SD	0.358	0.518	0.482	0.744	0.187	0.027	0.521	0.004
TN	0.406	0.692	0.308	0.696	0.188	0.074	0.689	-0.004
TX	0.351	0.598	0.402	0.711	0.187	0.061	0.586	-0.012
UT	0.574	0.437	0.563	0.512	0.349	0.097	0.322	-0.116
VA	0.398	0.565	0.435	0.697	0.197	0.064	0.608	0.043
VT	0.487	0.863	0.137	0.665	0.211	0.082	0.854	-0.009
WA	0.563	0.694	0.306	0.585	0.231	0.142	0.694	0.000
WI	0.501	0.890	0.110	0.680	0.194	0.084	0.863	-0.028
WV	0.412	0.744	0.256	0.680	0.186	0.092	0.761	0.016

WY	0.597	0.454	0.546	0.593	0.289	0.077	0.454	0.000

D State Laws: 2012

In this section we present a detailed description of the eligibility laws in each state in 2012.

SIGNIFICANT PROVISIONS OF STATE UNEMPLOYMENT INSURANCE LAWS
EFFECTIVE JANUARY 2012

	BENEFITS							COVERAGE	TAXES	
	Earnings/ Employment Needed in Base Period to Qualify[1]	Computation of Weekly Benefit Amount	Weekly Benefit Amount[2] Mini-mum	Weekly Benefit Amount[2] Maxi-Mum	Weekly Earnings Disregarded[3]	Calculation of Number of Benefit Weeks[4]	Number of Benefit Weeks[5]	Size of Payroll (Length of Employment/ Wages Paid)[6]	2012 Wages Subject to Tax	2011 Minimum & Maximum Rates[7] New Employer Rate[8]
AL	1½ x HQW; qualify for at least minimum WBA	1/26 avg of 2 highest qtrs	$45	$265	$15	Lesser of 1/3 BPW or 26 x WBA	15-26	20 weeks or $1,500 in any qtr	$8,000	0.59% 6.74% 2.70%
AK	$2,500; wages in 2 qtrs	0.9-4.4% of annual wages + $24 per dep up to $72	$56-128	$370-442	$50 and ¼ wages over $50	Weighted schedule of BPW to HQW	16-26	Any size	$34,600	1.00% 5.40% 3.40%
AZ	1½ x HQW and $1,500 in 1 qtr; or wages in 2 qtrs with wages in 1 qtr sufficient to qualify for maximum WBA, and total BPW ≥ taxable wage base	1/25 HQW	$60	$240	$30	Lesser of 1/3 BPW or 26 WBA	12-26	20 weeks or $1,500 in any qtr	$7,000	0.02% 5.86% 2.00%
AR	35 x WBA; wages in 2 qtrs	1/26 HQW	$82	$457	40% WBA	Lesser of 25 x WBA or 1/3 BPW	9-25	One employee for 10 or more days in a CY	$12,000	1.00% 6.90% 3.80%
CA	$1,300 in HQ, or $900 in HQ with BPW = 1¼ x HQ	1/23 to 1/26 HQW	$40	$450	Greater of $25 or 1/4 wages	Lesser of 26 x WBA or ½ BPW	14-26	Over $100 in any qtr	$7,000	1.50% 6.20% 3.40%
CO	40 x WBA or $2,500, whichever is greater	Higher of 60% of 1/26 of 2 consecu-tive HQW, capped by 50% of State avg weekly earn-ings or 50% of 1/52 BP earnings capped by 55% of State avg weekly earnings	$25	$454 or $500	¼ WBA	Lesser of 26 x WBA or 1/3 BPW	13-26	20 weeks or $1,500 in any qtr	$11,000	1.00% 5.40% 1.70%
CT	40 x WBA	1/26 avg of 2 highest qtrs + $15 per dep, up to 5; DA capped at WBA (For construction workers, 1/26 HQ)	$15-30	$573-648 Eff. 10/2/11	1/3 wages	Uniform duration	26	20 weeks or $1,500 in any qtr	$15,000	1.90% 6.80% 3.70%
DE	36 x WBA	1/46 total wages in 2 highest qtrs	$20	$330	Greater of $10 or 50% WBA	½ BPW	24-26	20 weeks or $1,500 in any qtr	$10,500	0.10% 8.00% 2.60%
DC	1½ x HQW or within $70; not less than $1,950 in 2 qtrs; $1,300 in 1 qtr	1/26 HQW	$50	$359	1/5 of wages plus $20	Lesser of 26 x WBA or ½ BPW	19-26	Any size	$9,000	1.60% 7.00% 2.70%
FL	1½ x HQW; minimum $3,400; wages in 2 qtrs	1/26 HQW	$32	$275	8 x federal hourly mini-mum wage	25% BPW	9-23	20 weeks or $1,500 in any qtr	$8,500	1.03% 5.40% 2.70%
GA	Wages in 2 qtrs & 150% x HQW or HQW divided by 21 for WBA w/ total earnings at least 40 x WBA	1/42 of wages in highest 2 qtrs or 1/21 HQW	$44	$330	$50	Lesser of 26 x WBA or ¼ BPW	6-26	20 weeks or $1,500 in any qtr	$8,500	0.025% 5.40% 2.62%
HI	26 x WBA; wages in 2 qtrs	1/21 HQW	$5	$523	$150	Uniform duration	26	Any size	$38,800	1.20% 5.40% 4.00%

	BENEFITS							COVERAGE	TAXES	
	Earnings/ Employment Needed in Base Period to Qualify[1]	Computation of Weekly Benefit Amount	Weekly Benefit Amount[2]		Weekly Earnings Disregarded[3]	Calculation of Number of Benefit Weeks[4]	Number of Benefit Weeks[5]	Size of Payroll (Length of Employment/ Wages Paid)[6]	2012 Wages Subject to Tax	2011 Minimum & Maximum Rates[7] New Employer Rate[8]
			Mini-mum	Maxi-Mum						
ID	1¼ x HQW; not less than the minimum qualifying wages in 1 qtr $1,872	1/26 HQW	$72	$343	½ WBA	Weighted schedule of BPW to HQW	10-26	20 weeks or $1,500 in any qtr	$34,100	0.96% 6.80% 3.36%
IL	$1,600; $440 outside HQ	47% of claimant's AWW in 2 highest qtrs	$51-77	$403-549	½ WBA	Uniform duration	25	20 weeks or $1,500 in any qtr	$13,560	0.70% 8.40% 3.80%
IN	1½ x HQW totaling at least $2,500 in last 2 qtrs; not less than $4,200 in BP	5% of 1st $2,000 of wage credits in HQ, 4% of remaining HQW credits; wage credits limited to $9,250	$50	$390	Greater of $3 or 20% WBA from other than BP employers	Lesser of 28% BPW or 26 x WBA	8-26	20 weeks or $1,500 in any qtr	$9,500	0.70% 9.50% 2.50%
IA	1¼ x HQW; 3.5% of the statewide AAW in HQ; ½ HQW in qtr not the HQ	1/23 HQW or 1/19 – 1/22 HQW for claimants with deps	$57-70	$385-473	¼ WBA	1/3 BPW	7-26	20 weeks or $1,500 in any qtr	$25,300	0.00% 9.00% 1.90%
KS	30 x WBA; wages in 2 qtrs	4.25% HQW	$111	$444	25% WBA	1/3 BPW	10-26	20 weeks or $1,500 in any qtr	$8,000	0.11% 7.40% 4.00%
KY	1½ x HQW; 8 x WBA in last 2 qtrs; $750 outside HQ	1.923% BPW	$39	$415	1/5 wages	1/3 BPW	15-26	20 weeks or $1,500 in any qtr	$9,000	1.00% 10.00% 2.70%
LA	$1,200 total BPW; wages in 2 qtrs; 1½ x HQW	1/25 of the avg of wages in 4 qtrs of BP x 1.05 x 1.15	$10	$247	Lesser of ½ WBA or $50	Uniform duration	26	20 weeks or $1,500 in any qtr	$7,700	0.11% 6.20% InAvg%
ME	2 x AWW in 2 different BP qtrs; total BPW = 6 x AWW	1/22 avg wages paid in 2 highest qtrs of BP + $10 per dep up to ½ WBA	$64-96	$366-549	$25	1/3 BPW	22-26	20 weeks or $1,500 in any qtr	$12,000	0.86% 7.95% 3.02%
MD	1½ x HQW; $576.01 in HQ; $1,776.01 in HQ Eff. 3/4/12	1/24 HQW + $8 per dep up to 5 deps	$25-65 $50-90 Eff. 3/4/12	$430	≤ $50	Uniform duration	26	Any size	$8,500	2.20% 13.50% 2.60%
MA	30 x WBA; $3,500 minimum	50% AWW + $25 per dep up to ½ WBA	$33-49	$653-979	1/3 WBA	36% BPW	10-30	13 weeks or $1,500 in any qtr	$14,000	1.26% 12.27% 2.83%
MI	1½ x HQW; at least $2,871 in HQ; or wages in 2 or more BP qtrs totaling at least $17,206.80 (20 x State AWW of $860.34)	4.1% HQW + $6 for each dep up to 5	$117-147	$362	WBA reduced by 40¢ for every $1 earned. Earnings and benefits limited to 1.6 x WBA	43% BP wages	14-20	20 weeks or $1,000 in CY	$9,500	0.06% 10.30% 2.70%
MN	At least $1,000 in HQ; $250 outside HQ	Higher of 50% of 1/13 HQW up to 43% of State AWW <u>or</u> 50% of 1/52 BPW up to 66⅔% of State AWW	$38	$385-597	WBA reduced by 55¢ for every $1 earned	Lesser of 1/3 BPW or 26 x WBA	11-26	Any size	$28,000	0.50% 9.40% 2.91%
MS	40 x WBA; $780 in HQ; wages in 2 qtrs	1/26 HQW	$30	$235	$40	Lesser of 1/3 BPW or 26 x WBA	13-26	20 weeks or $1,500 in any qtr	$14,000	0.85% 5.40% 2.70%

	BENEFITS: Earnings/ Employment Needed in Base Period to Qualify[1]	BENEFITS: Computation of Weekly Benefit Amount	BENEFITS: Weekly Benefit Amount[2] Mini-mum	BENEFITS: Weekly Benefit Amount[2] Maxi-Mum	BENEFITS: Weekly Earnings Disregarded[3]	BENEFITS: Calculation of Number of Benefit Weeks[4]	BENEFITS: Number of Benefit Weeks[5]	COVERAGE: Size of Payroll (Length of Employment/ Wages Paid)[6]	TAXES: 2012 Wages Subject to Tax	TAXES: 2011 Minimum & Maximum Rates[7] New Employer Rate[8]
MO	1½ x HQW; $1,500 in 1 qtr; or wages in 2 qtrs of BP = 1½ maximum taxable wage base	4% of the avg of the 2 HQWs	$35	$320	Greater of 20% WBA or $20	Lesser of 20 x WBA or 1/3 BPW	8-20	20 weeks or $1,500 in any qtr	$13,000	0.00% 9.75% 3.51%
MT	BPW = 1½ x HQW and total wages ≥ 7% of AAW or BPW ≥ 50% of AAW	1% BPW or 1.9% wages in 2 HQs	$123	$431	½ wages in excess of ¼ WBA	Weighted schedule of BPW to HQW	8-28	$1,000 in current or preceding year	$27,000	0.82% 6.12% InAvg%
NE	$3,868 in BP; $1,850 in HQW and wages in at least 1 other qtr of $800	½ AWW	$70	$354	¼ WBA	Lesser of 26 x WBA or 1/3 BPW	14-26	20 weeks or $1,500 in any qtr	$9,000	0.00% 8.66% 2.50%
NV	1½ x HQW in BP and $400 in HQ; or wages in 3 of 4 qtrs in BP and $400 in HQ	1/25 HQW	$16	$396	¼ wages	Lesser of 26 x WBA or 1/3 BPW	12-26	$225 in any qtr	$26,400	0.25% 5.40% 2.95%
NH	$2,800; $1,400 in each of 2 qtrs	1%-1.1% annual wages	$32	$427	30% WBA	Uniform duration	26	20 weeks or $1,500 in any qtr	$14,000	0.01% 7.00% 3.70%
NJ	20 weeks employment at 20 x State hourly minimum wage or 1,000 x State hourly minimum wage	60% of claimant's AWW + DA	$87-100	$611	Greater of 20% WBA or $5	100% base weeks worked in base year up to 26	1-26	$1,000 in any year	$30,300	0.50% 5.80% 2.80%
NM	$1,749.54 in HQW and wages in at least 1 other qtr	53.5% of AWW paid in BP qtr in which wages were highest	$74-111	$397-447	1/5 WBA	Lesser of 26 x WBA or 60% BPW	16-26	20 weeks or $450 in any qtr	$22,400	0.05% 5.40% 2.00%
NY	1½ x HQW; $1,600 in HQ	1/26 HQW unless HQW ≤ $3,575 then, 1/25 HQW	$64	$405	None. All employment affects WBA	Uniform duration	26	$300 in any qtr	$8,500	1.50% 9.90% 4.10%
NC	6 x AWW; wages in 2 qtrs of BP	1/26 HQW	$45	$522	10% AWW in HQ	(BPW / HQW) x 8 2/3	13-26	20 weeks or $1,500 in any qtr	$20,400	0.24% 6.84% 1.20%
ND	1½ x HQW; wages in 2 qtrs	1/65 of wages in 2 HQs + ½ wages in 3rd HQ	$43	$470	60% WBA	Weighted schedule of BPW to HQW	12-26	20 weeks or $1,500 in any qtr	$27,900	0.20% 10.00% 1.37%
OH	20 weeks employment with wages averaging 27.5% of State AWW; wages in 2 qtrs	½ claimant's AWW + DA of $1-$139 based on claimant's AWW and number of dep	$111	$400-539	1/5 WBA	20 x WBA + 1 x WBA for each quali-fying week in excess of 20	20-26	20 weeks or $1,500 in any qtr	$9,000	0.70% 9.60% 2.70%
OK	$1,500 and 1½ x HQW	1/23 HQW	$16	$368	$100	Weighted schedule of BPW to HQW	18-26	20 weeks or $1,500 in any qtr	$19,100	0.30% 7.50% 1.00%
OR	BPW ≥ $1,000 and BPW ≥ 1½ x HQW; or 500 hours of employment in BP	1.25% BPW	$118	$507	1/3 WBA or 10 x $8.50 (i.e., the State minimum wage)	Lesser of 26 x WBA or 1/3 BPW	3-26	18 weeks or $1,000 in any qtr	$33,000	2.20% 5.40% 3.30%

	BENEFITS							COVERAGE	TAXES	
	Earnings/ Employment Needed in Base Period to Qualify[1]	Computation of Weekly Benefit Amount	Weekly Benefit Amount[2]		Weekly Earnings Disregarded[3]	Calculation of Number of Benefit Weeks[4]	Number of Benefit Weeks[5]	Size of Payroll (Length of Employment/ Wages Paid)[6]	2012 Wages Subject to Tax	2011 Minimum & Maximum Rates[7] New Employer Rate[8]
			Mini-mum	Maxi-Mum						
PA	$800 in HQ; $1,320 in BP; at least 20% of BPW outside HQ; 16 credit weeks in BP	1/23-1/25 HQW + $5 for 1 dep; $3 for 2nd dep	$35-43	$573-581	Greater of $6 or 40% WBA	At least 16 credit weeks for minimum, 18 for maximum	16 or 26	Any size	$8,000	2.68% 10.82% 3.70%
PR	40 x WBA; $280 minimum; $77 in 1 qtr; wages in 2 qtrs	1/11- 1/26 HQW	$7	$133	WBA	Uniform duration	26	Any size	$7,000	2.40% 5.40% 3.30%
RI	1½ x HQW. 200 x minimum hourly wage in 1 qtr and 400 x minimum hourly wage in BP; or 1,200 x minimum hourly wage in BP	4.62% HQW + greater of $15 or 5% of the benefit rate per dep, capped at the greater of $50 or 25% of WBA	$68-118	$566-707	1/5 WBA	36% BPW	8-26	Any size	$19,600 or $21,100 for high tax group em-poyers	1.69% 9.79% 2.46%
SC	1½ x HQW; $4,455 minimum; $1,092 in HQ	1/20 HQW	$42	$326	¼ WBA	1/3 BPW	13-20	20 weeks or $1,500 in any qtr	$12,000	0.10% 11.28% 2.24%
SD	$728 in HQ; 20 x WBA outside HQ	1/26 HQW	$28	$323	¼ wages over $25	1/3 BPW	15-26	20 weeks or $1,500 in any qtr	$12,000	0.00% 9.50% 1.20%
TN	40 x WBA; $780.01 avg wages in highest 2 qtrs; BPW outside HQW ≥ the lesser of 6 x WBA or $900	1/26 of avg 2 highest qtrs	$30-80	$275-325	Greater of $50 or ¼ WBA	Lesser of 26 x WBA or ¼ BPW	13-26	20 weeks or $1,500 in any qtr	$9,000	0.50% 10.00% 2.70%
TX	37 x WBA; wages in at least 2 qtrs	1/25 HQW	$61	$426	Greater of $5 or ¼ WBA	27% BPW	10-26	20 weeks or $1,500 in any qtr	$9,000	0.78% 8.25% 2.70%
UT	$3,200 in BP and 1½ x HQW	1/26 HQW - $5	$25	$467	30% WBA	27% BPW/WBA	10-26	Any size	$29,500	0.40% 9.40% InAvg%
VT	$2,203 HQW + BPW ≥ 40% HQW	Wages in the 2 highest qtrs divided by 45	$68	$425	Greater of 30% WBA or $40	Lesser of 26 x WBA or 46% BPW	21-26	20 weeks or $1,500 in any qtr	$16,000	1.30% 8.40% 1.00%
VA	$2,700 in highest 2 qtrs of BP	1/50 of the 2 highest qtrs	$54	$378	$50	See table in law	12-26	20 weeks or $1,500 in any qtr	$8,000	0.77% 6.87% 3.17%
VI	1½ x HQW and $858 in HQ; or $858 in HQ and 39 x WBA in BP	1/26 HQW	$33	$495	25% in excess of $15	1/3 BPW	13-26	Any size	$23,700	0.10% 9.00% 3.00%
WA	680 hours; wages in BP or alternate BP	3.85% of avg of high 2 qtrs in BP	$138	$583	¼ of wages over $5	Lesser of 26 x WBA or 1/3 BPW	1-26	Any size	$38,200	0.49% 6.00% InAvg%
WV	$2,200 and wages in 2 qtrs	55% of 1/52 of median wages in worker's wage class	$24	$424	$60	Uniform duration	26	20 weeks or $1,500 in any qtr	$12,000	1.50% 7.50% 2.70%
WI	35 x WBA and 4 x WBA outside HQ	4% HQW up to maximum WBA	$54	$363	$30 plus 33% of wages in excess of $30	Lesser of 40 X BPW or 26 X WBR	4-26	20 weeks or $1,500 in any qtr	$13,000	0.27% 9.80% 3.60%

	BENEFITS							COVERAGE	TAXES	
	Earnings/ Employment Needed in Base Period to Qualify[1]	Computation of Weekly Benefit Amount	Weekly Benefit Amount[2]		Weekly Earnings Disregarded[3]	Calculation of Number of Benefit Weeks[4]	Number of Benefit Weeks[5]	Size of Payroll (Length of Employment/ Wages Paid)[6]	2012 Wages Subject to Tax	2011 Minimum & Maximum Rates[7] New Employer Rate[8]
			Mini-mum	Maxi-Mum						
WY	1.4 x HQW; at least 8% of statewide AAW	4% HQW	$32	$444	50% WBA	Lesser of 26 x WBA or 30% BPW	11-26	Any size	$23,000	0.67% 10.00% InAvg%

This document is prepared for general reference and may not reflect all the details of a State's law. It is posted on the Web site below. Consult the State agency or the State law for authoritative information. More detailed information may be found in the *Comparison of State Unemployment Insurance Laws*, which also includes information on Temporary Disability Insurance Programs, at http://www.oui.doleta.gov/unemploy/statelaws.asp.

KEY:

Avg – Average	AAW - Average Annual Wage	AWW - Average Weekly Wage	BP - Base Period
BPW - Base Period Wages	CQ - Calendar Quarter	CY- Calendar Year	Dep – Dependent
DA - Dependents Allowance	HQ - High Quarter	HQW - High Quarter Wages	InAvg - Industry Average
MBA - Maximum Benefit Amount	WBA - Weekly Benefit Amount	"=" - Equal To	">" - Greater Than
"≥" - Greater Than or Equal To	"≤" - Less Than or Equal To	"%" - Percent	"+" – Plus
Qtrs - Quarters	"x" - Times		

OTHER PROVISIONS OF LAW:

Waiting Week – Most States require a 1-week waiting period where the claimant must meet all eligibility conditions before benefits are payable. The following States do not require a waiting week: CT, DE, GA, IA, MD, MI, NV, NJ, VT (until 7/1/12), and WY. The waiting week may be paid after a specified period of unemployment in AL, MO, TN, and TX. In some States, it may be suspended under certain conditions.

Base Periods – Almost all qualifying earnings are determined using a BP consisting of the first 4 of the last 5 completed CQs. A few States use a different BP. In the following States, more recent earnings may be used in an alternative BP under certain conditions: AK, AR, CA (effective 04/01/12) CO, CT, DE, DC, GA, HI, ID, IL, IA, KS, ME, MD, MA, MI, MN, MT, NE, NV, NH, NJ, NM, NY, NC, OH, OK, OR, RI, SC, SD, TN, UT, VT, VA, VI, WA, WV, and WI.

FOOTNOTES:

[1] Reflects basic qualifying formula. Some States have alternative qualifying formulas.

[2] When two amounts given, higher includes DA; the higher figure for both the minimum and maximum WBAs includes DA for the maximum number of deps. If state has a DA and only one amount is given, the maximum is the same with or without the allowance. The total amount of DA payable in any week is limited by a cap. CO and MN do not pay DA. The lower amount is based on HQWs, and the higher amount is based on total BPWs.

[3] This column lists the amount of weekly earnings that are disregarded (will not reduce the WBA). However, earnings in excess of those listed will be deducted from the WBA, resulting in a reduced payment.

[4] For States that use earnings, further calculation is needed to derive the number of benefit weeks--take the amount obtained from the formula listed (which is the claimant's MBA) and divide it by the claimant's WBA. States with uniform duration do not have to calculate the number of benefit weeks since it is fixed at 25 or 26 weeks. In MO, when calculating 1/3 BPW, BPW are limited to 26 x WBA for each quarter.

[5] Lists number of benefit weeks for only the regular program for total unemployment. In States with uniform duration, all eligible claimants receive the same number of benefit weeks (in IL the maximum amount payable cannot exceed one's BPW, resulting in some claimants being paid less than 26 weeks). For FL the maximum number of weeks annually decreases from 23 with each half percent decline in the avg unemployment rate below 10.5% during the 3rd CQ of the preceding year; however, the maximum number of weeks cannot fall below 12 when the avg unemployment rate is less than 5%. For WA the maximum number of benefit weeks decreases from 30 to the lesser of 26 or 1/3 BPW if the State unemployment rate falls to 6.8% or below. When MA is paying extended benefits and/or emergency unemployment compensation, the maximum number of weeks of regular benefits is 26. For WI, with some limited exceptions, individuals with significant ownership interest in family partnerships, LLCs and corporations, and certain of their family members, are limited to 4 weeks of regular UI benefits. In some States, additional weeks of benefits are payable under limited circumstances such as high unemployment, continuation of approved training, or workforce dislocations.

[6] Coverage is determined by the size of the employing unit's payroll or the number of days or weeks worked during a CY and applies to employing units who, during any CQ in the current or immediately preceding CY, paid wages of $1,500 or more, or to employing units who employ one or more workers on at least 1 day in each of 20 weeks during the current or immediately preceding CY; such employing units are liable for taxes, and the workers accrue benefit rights. For those States with "Any size," all workers are covered regardless of payroll size or weeks worked. States may have different thresholds for agricultural, domestic, and nonprofit employing units.

[7] Rates apply only to experience rated employers and do not include applicable non UI taxes, surtaxes, penalties, or surcharges. In most States, rate year 2011 begins on January 1, 2011, and ends on December 31, 2011. In NH, NJ, TN, and VT rate year 2011 begins on July 1, 2011, and ends on June 30, 2012. Tax rates for 2012 will be posted in the July 2012 issue. For ME there is an additional 0.06% for the Competitive Skills Scholarship Fund on all employer rates. The rates for IL include the fund building surcharge.

[8] New employer rate shown is the basic rate. Higher rates may apply depending on industry classification and/or other factors: AR (employers can elect to receive rate based on rate schedule), CO, DE (construction employers pay an avg industry rate), DC, IA (9.0% construction employers), IL (4.1% construction employers which includes the fund building surcharge), KS (6.0% construction employers), KY (foreign & domestic construction firms receive maximum rate), MA (8.62% new construction employers), ME (predetermined yield), MD (foreign contractors assigned avg industry rate, and in 2011 new construction employers headquartered in another state pay a 13.3% avg industry rate), MI (construction employers receive industry rate), MN (high experience rating industries are assigned a rate of 9.69% plus base rate, assessments, and fees), MT, MO (greater of 3.51% or InAvg), NE, NJ, NY (highest rate assigned to employers with positive account balances or 3.4%, whichever is less), ND, OH (new construction employers pay InAvg), PA (new construction employers pay 9.7%), SD (6.0% construction employers), TN, TX, UT, VT (construction employers pay InAvg), WA (90% of InAvg), WV (construction & foreign entities pay 8.5%), WI (larger employers & new construction employers pay higher rate), and WY (InAvg, but not less than 1.0%). NJ and LA rates depend on rate schedule in effect. In RI new employers pay an additional 0.21% Job Development Fund.

If you have any questions, please contact **Loryn Lancaster** at **202-693-2994** or **Agnes Wells** at **202-693-2996.**