The CPS Redesign’s Effects on Measured Unemployment Duration in the Great Recession

Abstract

During the Great Recession, unemployment duration has increased to much higher levels than during earlier severe recessions. Previous studies using data from non-recessionary periods have found that part of this increase was caused by a 1994 redesign in the way the Current Population Survey measures unemployment duration. This paper uses data from recessionary and non-recessionary periods to determine how the size of the redesign’s effect on the distribution of unemployment duration changes over the business cycle. I find that, for most measures of unemployment duration, the redesign effect is relatively constant across business cycle conditions, but the redesign effect on median unemployment duration tends to shrink during recessionary periods. This suggests a constant adjustment factor will adequately correct for the CPS redesign for most variables I consider, but for median duration the use of a constant adjustment factor will lead to underestimating the true median duration during high unemployment periods such as the Great Recession.

Introduction

During the Great Recession, mean unemployment duration in the United States rose from 16.6 weeks in December 2007 to 34.2 weeks in December 2010, as estimated by the monthly Current Population Survey (CPS). The recession has seen the highest
values of mean unemployment duration ever recorded in the CPS, which dates back to
1948. The current highs are more than 14 weeks greater than the highs seen during the
recession of the early 1980s. This is in spite of the unemployment rate during the Great
Recession remaining lower than the highs in the early 1980s. As seen in Figure 1, both
mean and median unemployment durations have almost doubled from their pre-recession
lows in the mid-2000s. The fraction of the unemployed with durations of greater than
fourteen weeks increased to 59% in 2010, almost double the average over the last twenty
years. Elsby, Hobijn and Sahin (2010) have found that the decrease in outflows from
unemployment have played a far bigger role in increasing in the unemployment rate in
the Great Recession, leading to record-long average unemployment duration. Even in
expansionary periods in the 1990s and 2000s, average reported unemployment duration
has remained at markedly higher levels than in past expansions. Valletta (2005) and
Abraham and Shimer (2001) both document the trend of increasing unemployment
durations, a trend that accelerated after the 1994 redesign.

One cause for caution in interpreting the recent CPS data is that the CPS
underwent a major redesign in 1994 that altered the way the CPS collected its data.
These changes, detailed in the Background section, directly affected the structure of the
reported unemployment duration distribution, making direct comparisons between the
pre-redesign and post-redesign periods inaccurate. Using data from non-recessionary
periods, Abraham and Shimer (2001) and Polivka and Miller (1998) present results that
indicate the changes in the 1994 CPS redesign led to an increase in reported
unemployment duration.
Prior research has focused on two different methods to correct for changes caused by the redesign when comparing CPS unemployment duration data from the pre-redesign and post-redesign periods. Shimer (2007) uses only incoming rotation groups for the post-redesign period since there are strong reasons to think the redesign only affected responses in the ongoing rotation groups of the CPS. This method removes any bias caused by the redesign, but at the cost of reducing the sample size by three-fourths because it excludes all of the ongoing rotation group data. The other method for correction, used by Abraham and Shimer (2001), Elsby, Michaels, and Solon (2009) and others, applies a single adjustment factor to the full sample of post-redesign data to correct for the changes caused by the redesign. If the redesign effect is constant across time, then the constant adjustment factor will consistently correct for the redesign effect in the post-redesign period. Table 1 presents the constant adjustment factors found in the literature for the share of the unemployed with duration less than five weeks.

However, due to cyclical variation in the composition and labor market experiences of the unemployed, the effect of the CPS redesign could be different during a recessionary period. Applying an adjustment factor calculated during a non-recessionary period to account for the redesign effect could lead to biased estimation of unemployment duration during a recession. For example, 18.6% of unemployed workers had a duration of five weeks or less in 2010, and 59.3% had a duration of fifteen weeks or longer. Polivka and Miller found adjustment factors of 1.21 for the fraction with short-term duration, and 0.85 for the fraction with long-term duration. To make the 2010 data comparable to pre-1993 data, we can multiply by the adjustment factor. This increases the fraction with short-term durations from 18.6% to 22.4% and decreases the fraction
with long-term durations from 59.3% to 50.7%. If the true adjustment factors cyclically decrease in magnitude during recessions, the use of a constant adjustment factor would overcorrect for the redesign. In that case, the common adjustment factor would create downwards-biased estimates of unemployment duration.

One solution to this would be to use only incoming rotation group data in the post-redesign period as Shimer (2007) did. The downside to that approach is that the exclusion of three-fourths of the sample group substantially increases the volatility of the time series and reduces the precision of estimates based on them. In order to continue to use the full CPS dataset in the post-redesign years, but also avoid the potential biases of a single constant adjustment factor, a flexible adjustment factor is needed to correct for the redesign across heterogeneous business cycle conditions.

In this paper, I will examine the literature around the CPS redesign, and then use a flexible model to estimate the effects of the CPS redesign during varying economic conditions to determine if the CPS redesign is causing unemployment duration measures during the current recession to be inflated compared to previous recessions and if a flexible adjustment factor is needed for the post-redesign data. Using the flexible model, I find that reported unemployment durations are higher during recessionary periods than a constant adjustment factor would predict, and this effect is especially strong when looking at median duration.

**Background**

The monthly CPS collects a variety of labor force information from a sample of roughly 60,000 residential addresses. Each residential address selected to be interviewed
is randomly chosen to participate based on a stratified sampling scheme designed to ensure reliable estimates at both the state and national levels. Additionally, each address selected remains in the survey for eight months, broken into two separate four-month periods in the sample with an eight-month period out of the sample in the middle. Given this design, the rotation group in its fifth month in the survey will be the group that has just finished the eight-month period out of the sample. Three-quarters of all addresses in the sample in a given month will appear in the next month’s sample, and, due to the eight-month out-of-sample period, one-half of all addresses in the sample in a given month will appear in the sample one year later. If a household leaves its home address in the sample, then it will no longer be followed, and a new family that moved in would be interviewed for the remaining months for that address in the survey. In practice this has a small effect since few households move in a given month.

Households in the sample for a given month are contacted by a CPS interviewer to collect the information for the survey. Starting in 1994, the CPS interviewers were equipped with laptop computers in order to assist with the interview process, both to improve consistency from month to month and to allow for more complex questionnaire design. For the unemployment duration question in the CPS, prior to the use of laptops, the interviewer would each month ask an unemployed individual how long he or she had been unemployed. The inaccuracy of this method without computer assistance is one of the many problems that led to the CPS redesign in 1994 (Bregger and Dippo 1993). Astonishingly, prior to the redesign, only 26.1 percent of workers unemployed in consecutive months reported an increase in unemployment duration of three to five weeks from month to month (Polivka and Miller 1998). 46 percent reported an increase of less
than three weeks, and 28.3 percent reported an increase of more than five weeks, suggesting that measurement error played a large role in reported unemployment duration. Additionally, Poterba and Summers (1986) found that spurious transitions in and out of unemployment recorded in the CPS led to a substantial understating of unemployment duration.

To reduce this form of measurement error, the use of dependent interviewing began with the introduction of laptop computers to CPS interviewers. The interviewer would ask the unemployed individual how long he or she had been unemployed only during the first or fifth month in survey. For the other months, the computer could automatically update unemployment duration for those who continued to be unemployed since the computer would have the person’s reported unemployment duration from the previous month stored in it.

For workers who switch labor force status to unemployed while in the survey, the first time they report their unemployment duration they can report any unemployment duration, even values that are contradictory with their address’s previous labor force participation. For example, if a worker reported being employed in the first month in the CPS and unemployed in the second month, that worker could still report her unemployment duration as greater than four weeks. In each following month, the dependent interviewing procedures will then automatically update their unemployment duration based on the first reported value if the worker remains unemployed.

The change to dependent interviewing also prevented those who had short-term employment during the month between CPS interviews from having that employment counted by the CPS to restart their unemployment duration. When the duration question
was asked every month before the redesign, an unemployed worker who had briefly
worked could choose to restart his unemployment duration based on the brief
employment spell, but with dependent interviewing that was no longer possible.

While the redesign was being implemented, the Census Bureau conducted a parallel CPS
survey to create a control group to compare the effects of the redesign against. From July
1992 to December 1993, the parallel survey implemented dependent interviewing and
other changes in the redesign, and from January 1994 to May 1994, the parallel survey
used the pre-redesign methods since the main CPS had switched over to the redesigned
method with dependent interviewing. The parallel survey involved 12,000 households
that were selected using the same method as the CPS.

Polivka and Miller (1998) examine the effects of the 1994 CPS redesign using the
parallel survey for a variety of labor force statistics. Regarding unemployment duration,
their main findings were that when dependent interviewing was used the percentage of
the unemployed who had less than 5 weeks unemployment duration dropped 6 percentage
points and the percentage of unemployed who had greater than 14 weeks duration rose 6
percentage points. They attribute these shifts to a reduction in reporting inconsistencies
and a reduction in response burden for the long-term unemployed. Reporting
inconsistencies were reduced for those in the ongoing rotation groups because the
dependent interviewing procedures had the computer automatically update
unemployment duration for those unemployed in consecutive months.

Polivka and Miller also present some results that suggest the parallel survey was
not perfectly comparable to the CPS due to a persistent “parallel survey effect” they find
in some of the statistics. They give the example that female employment-to-population
ratios in the parallel survey were higher than in the full CPS both before and after the switch to the redesign, suggesting that some component of the parallel survey design was driving this result rather than the change in CPS design.

Data

The primary data used in this paper come from the micro-level CPS monthly survey data from January 1976 to December 2010, available publicly at the National Bureau of Economic Research (NBER) website. These data include the responses of households to a variety of labor market questions, including unemployment duration. The responses were aggregated up to the month level for both the full sample and for only incoming rotation groups to construct the measures of mean and median unemployment duration and the percentage of the unemployed in a rotation group in a month with unemployment duration of a given length: short-term (less than five weeks), medium-term (five to fourteen weeks), or long-term (greater than fourteen weeks).

Preliminary Analysis and Results

Since the first and fifth rotation groups are unaffected by dependent interviewing, comparing them to the full sample will give a sense of what effect dependent interviewing has on unemployment duration. This will give the level of attenuation in the full sample relative to the portion of the sample conducted without using dependent interviewing after the redesign. Figure 3 shows the ratio of mean and median unemployment duration for those in the incoming rotation groups relative to the full sample. Prior to 1994, the ratio for mean duration remains close to 1, suggesting the lack

1 The data are available at http://nber.org/data/cps_basic.html.
of any significant difference in reported duration between the incoming rotation groups and the other rotation groups in the absence of dependent interviewing. Following the introduction of dependent interviewing in 1994, the ratio drops to a low of .96 before increasing to .99 in 2010, indicating that the introduction of dependent interviewing had some effect on reported duration.

Previous research by Bailar (1975) and others has shown that, for some labor force data collected by the CPS, a pattern of “rotation group bias” exists due to the discrepancies between responses from the incoming rotation groups and ongoing rotation groups in the sample. If rotation group bias is present in the unemployment duration variables used here for reasons other than the introduction dependent interviewing, then looking at the ratio of incoming rotation groups’ duration to the full sample’s duration would not give an accurate representation of the effect of dependent interviewing. Since the pre-1994 ratio is basically 1, rotation group bias does not appear to be a problem in the unemployment duration variables.

The ratio for median unemployment duration follows the same trend as mean unemployment duration, but with far more dramatic movement. After the CPS redesign, the ratio drops to below .8 in 2000 as the unemployment rate falls from 1994 to 2000. In the 2001 recession, the ratio sharply increases as the unemployment rate spikes. In the mid-2000s, the ratio remains relatively constant as unemployment remains above its late-90s lows. The ratio once again increases sharply during the Great Recession, moving the ratio above 1, effectively removing any effect of dependent interviewing on median unemployment duration during the Great Recession. It is likely the median is more affected by the redesign than the mean since the redesign largely causes shifts from short-
term reported unemployment to medium-term reported unemployment, as seen in Figure 4. These shifts have relatively small effects on the mean since the mean is largely driven by the long right-tail on the unemployment distribution, and the shift from short to medium-term duration is swamped by the size of the long-term durations, but the median is more sensitive to shifts in the middle of the distribution.

Figure 4 shows the ratio of incoming rotation groups relative to the full sample for the percentage of the unemployed with short-term duration, medium-term duration, and long-term duration. Prior to the CPS redesign, in the absence of dependent interviewing, the short-term duration ratio hovers close to 1, but after the CPS redesign, the ratio is about 1.15. This is very similar to the ratio found in Elsby, Michaels, and Solon (2009) and is consistent with what Polivka and Miller found and suggests that dependent interviewing leads to fewer workers reporting short unemployment durations.

For both medium-term and long-term duration, the pre-redesign ratio is roughly 1, but after the redesign, the ratio drops, though more sharply for medium-term unemployment. For the ratio of the share of unemployed with duration greater than 15 weeks, this is much less pronounced than for the ratio of medium-term duration. This is inconsistent with Polivka and Miller’s findings, which found a large effect on long-term duration but little change in medium-term duration.\footnote{Abraham and Shimer (2001) present evidence that suggest the parallel survey effect may have skewed Polivka and Miller’s results due to idiosyncratic differences in the parallel CPS and the actual CPS for the unemployment duration variables of interest.} Figure 4 suggests that the effect of dependent interviewing is largely to move the unemployed from less than five weeks duration to the five to fourteen weeks category.

In both figures, from 2008 to 2010, the ratios move closer to 1, suggesting that the use of a common adjustment factor for the CPS redesign could possibly lead to
overestimation of unemployment duration in the Great Recession. From these figures there is evidence to suggest the effect of the CPS redesign weakens during periods of high unemployment.

For a more formal regression analysis to quantify the effects of the redesign over the business cycle, let \( Y_t \) be a measure of unemployment duration or the percentage of the unemployed with duration of a specified length in a sample (e.g., the percentage of the unemployed with an unemployment duration of zero to four weeks), with \( t \) denoting the month. \( Y_t^{IRG} \) represents the measure for the incoming rotation groups only, and \( Y_t^{FS} \) represents the measure for the full sample of all eight rotation groups.

The model is given by

\[
\log\left(\frac{Y_t^{IRG}}{Y_t^{FS}}\right) = \delta_1 + \delta_2 Y94_t + \delta_3 U_t + \delta_4 (U_t - U^*) Y94_t + \sum_{i=1}^{11} \beta_i m_i + \varepsilon_t
\]

where

\( \delta_1 \) = Effect of being an incoming rotation group

\( Y94_t = 1 \) if month \( t \) is January 1994 or after (zero otherwise)

\( \delta_2 \) = Effect of the redesign at mean unemployment rate

\( U_t = \) Seasonally-adjusted unemployment rate in month \( t \)

\( U^* = \) Mean of seasonally-adjusted unemployment rate 1976-2010

\( \delta_3 \) = Effect of changes in the unemployment rate prior to redesign

\( \delta_4 \) = Effect of the redesign interacted with the demeaned unemployment rate

\( m_i = 1 \) if \( t \) falls in calendar month \( i \) (zero otherwise)

\( \beta_i = \) Seasonal effect of calendar month \( i \)

\( \varepsilon_t = \) Sampling error for month \( t \)
The $\delta_2$ coefficient represents the effect of the redesign at the mean unemployment rate. This will provide similar results to the past literature if $\delta_3$ and $\delta_4$ are restricted to be zero. To expand on the previous literature, the model relaxes the assumptions of the previous literature by allowing $\delta_3$ and $\delta_4$ to be unequal to zero. The effects of changes in the unemployment rate will be captured by $\delta_3$, and seasonal effects will be captured by the $\beta_i$ terms. The $\delta_4$ coefficient is the key object of interest since it is how the effect of the redesign changes over the business cycle. Prior literature has assumed that the redesign effect is a constant multiplicative or additive factor in every time period, regardless of employment conditions. By relaxing the assumption that $\delta_4 = 0$, the estimation based on the model will be able to detect any business-cycle varying redesign effect. In order to distinguish the business-cycle varying redesign effect from the effects of a varying business cycle in the original survey design, the assumption that $\delta_3 = 0$ needs to also be relaxed.

Due to the possibility of incoming rotation group bias in the responses of the households, the $\delta_1$ term is included in the model to ensure that differences in incoming and ongoing rotation groups are not included in the effects of redesign. If $\delta_1$ were restricted to be zero, the redesign effect would be confounded with rotation group bias since all ongoing rotation groups were affected by the redesign and no incoming groups were affected by it. Looking at only the post-1994 data, it is impossible to distinguish the effects of rotation group bias from the effects of dependent interviewing. With the 1976 to 1993 data, it will be possible to get an estimate of the rotation group bias prior to the
redesign. Since the incoming rotation group procedures did not change significantly with the redesign, presumably the rotation group bias before and after the redesign will be similar.

These models will consistently estimate the effects of dependent interviewing if the only effect of the CPS redesign on the distribution of unemployment duration was caused by the introduction of dependent interviewing. If there are effects of the redesign that affect all rotation groups such as changes to the allowable responses, then the incoming rotation groups in post-1994 months will not be comparable to pre-redesign rotation groups. If that were the case, then \( \delta_2 \) and \( \delta_4 \) will not identify the full redesign effect. Abraham and Shimer (2001) present evidence that suggests the effects of the CPS redesign outside of dependent interviewing are minimal, so this model should enable consistent estimation of the effect of dependent interviewing through \( \delta_2 \) and \( \delta_4 \).

**Regression Estimation and Results**

Using OLS on CPS monthly data from 1976 to 2010, I first estimate the model assuming \( \delta_3 = \delta_4 = 0 \) in order to create a table comparable to those in the literature. Durbin-Watson tests accept the null of serial non-correlation for short-term share, medium-term share, long-term share, and mean duration dependent variables; however, the test was inconclusive for the median duration dependent variable. To be conservative, I use Newey-West serial-correlation-robust standard errors for this and all following regressions, allowing for first-order serial-correlation. Table 2 presents the results of these regressions for each dependent variable of interest. Rotation group bias is significant in only the medium-term share and median duration regressions. The
magnitude of these effects is small relative to the size of the effect from dependent interviewing, even when the rotation group bias is significant, suggesting that rotation group bias does not play a large role.

The effects of dependent interviewing in Table 2 are in line with what Abraham and Shimer find for 1994 to 2000, with an adjustment factor of about 1.14 to correct the post-redesign short-term share to be comparable to pre-redesign data. The decrease in the reported short-term unemployment post-redesign is offset largely by an increase in medium-term share, with a smaller increase in the long-term share. This is at odds with the findings from the CPS parallel survey, which found that most of the shift was from short-term unemployment into long-term unemployment, providing further evidence for a parallel survey effect skewing the results of the parallel CPS. Additionally, the effect of dependent interviewing is much stronger on median duration than mean duration. Post-redesign median duration has an adjustment factor of 0.89, while mean duration’s adjustment factor is .97. All of the constant redesign effects are significant at the 1% level.

Table 3 presents the results of including the demeaned unemployment rate and the interaction of the demeaned unemployment rate and the redesign in the model. For the short-term share and medium-term share dependent variables, the interaction term is significant at the 5% level, and the median duration interaction term is significant at the 1% level. The interaction term is also significant at the 10% level for the mean duration dependent variable. The main unemployment rate effect is significant at the 5% level for all three share variables. The main unemployment rate effect is quite small economically, less than one-tenth the size of the main redesign effect.
Interestingly, almost all of the coefficients of the interaction terms have the opposite sign of their corresponding redesign coefficient, suggesting that the effects of dependent interviewing are muted during periods of high unemployment. However, the size of this effect is rather small for most of the dependent variables. Table 4 shows the business-cycle varying adjustment factor for each duration variable. The business-cycle varying adjustment factor is derived by setting all the non-redesign-dependent terms in the model to zero and then solving for $Y_t^{IRG}$. The general expression for this is given at the top of Table 4. For most duration variables, the business-cycle varying component of the adjustment factor is less than one percent per percentage point of the unemployment rate. The largest effect is on median unemployment duration; during the peak of unemployment during the Great Recession, the business-cycle varying adjustment factor from Table 4 for median duration is roughly .946, which is .053 larger than the constant adjustment factor of .893. This translates into median duration being about one week higher under the varying adjustment factor as compared to the constant adjustment factor. For the other dependent variables, the difference between the varying and constant adjustment factors is less than half that size.

The median may have the strongest cyclical component since in non-recessionary periods, the median reported duration is just under 10 weeks, and the main effect of the redesign was to shift workers from short-term to medium-term durations. Since the median falls in the medium-term duration, the redesign effect would shift it higher since the redesign increased the number of medium-term durations. During the Great Recession, median duration rose to above 20 weeks, so at this higher level, the switching between short-term and medium-term reported durations would no longer affect the
median since none of those switches would cross from one side of the median to the other.

Summary and Conclusions

In my analysis of the effects of the CPS redesign on unemployment duration, I confirm the findings of Abraham and Shimer that the main effect of dependent interviewing is a decrease in reported short-term unemployment and an increase in reported medium-term unemployment with a smaller increase in long-term unemployment, leading to an increase in reported mean and median unemployment duration. In contrast, Polivka and Miller, using the CPS parallel survey, found that the redesign induced a large increase in reported long-term unemployment, suggesting that the design of the parallel survey may be driving some of their results.

In addition, I find some evidence to suggest that the effects of dependent interviewing on unemployment duration vary meaningfully throughout the business cycle. The point estimates indicate that the effect of dependent interviewing is smaller during periods with high unemployment, so applying a single adjustment factor to correct for dependent interviewing could lead to underestimating unemployment durations during periods of high unemployment. However, though the effect is statistically significant in the measure of median unemployment duration and the share variables, the economic significance of the interaction effect is generally small.

Due to the small magnitude of the changes in the redesign effect over the business cycle, the most appropriate correction for the redesign when using CPS unemployment duration data is a single constant adjustment factor for most dependent variables of
interest. The one case where the varying adjustment factor may make a meaningful difference is for the median unemployment duration. Figure 5 shows the differences of the two different adjustment factors over the redesign period. If future researchers wish to include a flexible redesign adjustment factor across the business cycle when using CPS unemployment data, the factors provided in Table 3 should be simple to apply. The flexible adjustment factor will, especially in the case of median duration, more accurately correct for the redesign effect while avoiding the imprecision caused by using only incoming rotation group data when dealing with post-redesign years.

Relative to the increase in unemployment duration during the Great Recession, the effects of dependent interviewing on mean and median unemployment duration are small, especially since the size of the dependent interviewing effect shrinks during recessions. This suggests that very little of the reported increase in mean and median unemployment durations during the Great Recession is caused by the change to dependent interviewing in the CPS, and the prevalent use of constant adjustment factors in unemployment duration time series means those time series are biased downwards to a small degree during periods of high unemployment.

One possible cause to this cyclical variation in the size of the effect of dependent interviewing is that unemployed workers most accurately recall their unemployment duration during periods of high unemployment, as documented by Akerlof and Yellen (1985). Dependent interviewing prevents workers from misreporting their increase in unemployment duration relative to what they reported when they entered the survey. Since workers are more likely to correctly report their duration during recessions,
dependent interviewing has a smaller effect simply because workers would have made fewer mistakes during those periods even without it.

Future work includes allowing for the adjustment factor to be flexible across other dimensions than just in response to the unemployment rate and developing methods to further reduce the measurement error caused by the independent interviewing method still in use for the incoming rotation groups. The effects of dependent interviewing may vary based on the demographics of the unemployed or in response to changes in unemployment insurance programs instead of simply across business cycle conditions, so a model that better captures these effects may provide a more accurate correction for the redesign.

**References**


Figure 1: The five-quarter rolling average quarterly mean and median duration from 1976 to 2010.

Figure 2: The five quarter rolling average of unemployed workers with a short-term, medium-term, or long-term unemployment duration from 1976 to 2010.
Figure 3: The five quarter rolling average of the ratio of mean and median unemployment duration in the incoming rotation groups to the full sample from 1976 to 2010.

Figure 4: The ratio of incoming rotation groups to the full sample of the percentage of the unemployed with short-term, medium-term, or long-term unemployment duration from 1976 to 2010.
Figure 5: Unadjusted median duration, median duration with a constant adjustment factor, and median duration with the business-cycle varying adjustment factor for 1994 to 2010.

Table 1: Constant adjustment factors found in previous literature for short-term (< 5 weeks unemployed) unemployment share.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Data</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polivka and Miller</td>
<td>1994 CPS Parallel Survey</td>
<td>1.2048</td>
</tr>
<tr>
<td>Abraham and Shimer</td>
<td>1994 to 2000</td>
<td>1.2183</td>
</tr>
<tr>
<td>Shimer</td>
<td>1994 to 2007</td>
<td>1.166</td>
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<tr>
<td>Elsby, Michaels and Solon</td>
<td>1994 to 2005</td>
<td>1.1549</td>
</tr>
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</table>
Table 2: Estimating the effects of rotation group bias and the constant effect of dependent interviewing using data from 1976 to 2010.

<table>
<thead>
<tr>
<th>Effect of Dependent Interviewing ( (\delta_2) )</th>
<th>Unemployed &lt; 5 Weeks</th>
<th>Unemployed 5-14 Weeks</th>
<th>Unemployed &gt; 14 Weeks</th>
<th>Mean Duration</th>
<th>Median Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.134***</td>
<td>-0.154***</td>
<td>-0.0357***</td>
<td>-0.0274***</td>
<td>-0.113***</td>
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<td>Standard Error</td>
<td>(0.00410)</td>
<td>(0.00596)</td>
<td>(0.00513)</td>
<td>(0.00406)</td>
<td>(0.0106)</td>
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<table>
<thead>
<tr>
<th>Incoming Rotation Group Effect ( (\delta_1) )</th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Redesign Adjustment Factor ( e^{\delta_1} )</th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
</tbody>
</table>

| Observations                                     | 420                   | 420                    | 420                   | 420           | 420            |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Estimating the effects of dependent interviewing over the business cycle using data from 1976 to 2010.

<table>
<thead>
<tr>
<th>Effect of Dependent Interviewing at ( U^* ) ( (\delta_2) )</th>
<th>Unemployed &lt; 5 Weeks</th>
<th>Unemployed 5-14 Weeks</th>
<th>Unemployed &gt; 14 Weeks</th>
<th>Mean Duration</th>
<th>Median Duration</th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.134***</td>
<td>-0.140***</td>
<td>-0.0284***</td>
<td>-0.0235***</td>
<td>-0.0862***</td>
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<td>Standard Error</td>
<td>(0.00442)</td>
<td>(0.00561)</td>
<td>(0.00532)</td>
<td>(0.00424)</td>
<td>(0.00905)</td>
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<table>
<thead>
<tr>
<th>Dependent Interviewing Interacted with ( (U_t - U^*) ) ( (\delta_4) )</th>
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<tbody>
<tr>
<td>Mean</td>
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<tr>
<td>Standard Error</td>
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<tr>
<th>Demeaned Seasonal Unemployment Rate ( (\delta_3) )</th>
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<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Error</td>
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<thead>
<tr>
<th>Incoming Rotation Group Effect ( (\delta_1) )</th>
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<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
</tbody>
</table>

| Observations                                     | 420                   | 420                    | 420                   | 420           | 420            |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Table 4: Business-cycle variant redesign adjustment factors.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Adjustment Factor = $e^{\delta \bar{d}_i(U_i - U^*)}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed &lt; 5 Weeks</td>
<td>1.143 * 1.0068 $(U_i - U^*)$</td>
</tr>
<tr>
<td>Unemployed 5-14 Weeks</td>
<td>0.869 * 1.0096 $(U_i - U^*)$</td>
</tr>
<tr>
<td>Unemployed &gt; 14 Weeks</td>
<td>0.972 * 1.0006 $(U_i - U^*)$</td>
</tr>
<tr>
<td>Mean Duration</td>
<td>0.977 * 1.0041 $(U_i - U^*)$</td>
</tr>
<tr>
<td>Median Duration</td>
<td>0.917 * 1.0298 $(U_i - U^*)$</td>
</tr>
</tbody>
</table>

Note: $U^* = 6.344$, the mean of the seasonally adjusted unemployment rate over 1976-2010