The Nature of Wage Adjustment in the U.S.: New Evidence from Linked Worker-Firm Data

Andre Kurmann, Erika McEntarfer, and Jim Spletzer

November, 2013

Preliminary draft for comments only. Please do not cite or circulate.

Abstract

Using linked worker-firm data from the Longitudinal Employer Household Dynamics (LEHD) program from the U.S. Census, we analyze the nature of wage changes for workers remaining with the same firm. Consistent with the existing literature, we find that the distribution of nominal hourly wage changes is characterized by a noticeable spike at zero and missing mass to the left of zero. However, we argue here that the relevant measure of downward rigidity in labor cost is the change in workers' annual earnings. Building on this insight, we analyze the distribution of annual earnings changes and how it relates to firm-specific employment decisions. We find that the distributional characteristics of the nominal annual earnings change distribution vary substantially across firms and over the business cycle. In particular, while the earnings change distribution of both small firms and firms that have relatively stable employment exhibit a pronounced spike at zero and missing mass to the left of zero, the distributions for larger established firms and contracting firms are approximately symmetric and show little evidence of a zero spike. We discuss the implications of our results for the literature on downward wage rigidity.

1 Introduction

What is the nature of wage changes for workers remaining with the same firm? How does the distribution of wage changes vary over the business cycle and is it systematically related to employer characteristics? Is the wage change distribution of a firm related to job creation and destruction at the firm?

Answering these questions is important both for the evaluation of different labor market theories and for policy debates. In particular, there is a long-standing debate in macroeconomics whether wages are more difficult to adjust downward and whether, as a result, firms shed more workers in response to

adverse shocks than they otherwise would. Moreover, if this downward wage rigidity (DWR) is in nominal terms, then very low levels of inflation negatively affect employment since this makes the downward rigidity bind more often.

Motivated by this debate, a large empirical literature has developed that analyzes the nature of wage changes for individual workers. For the U.S., however, data availability has to date been confined to household surveys and case studies, thus preventing a systematic investigation of how the ability to adjust wages may vary across different firms and industries. More importantly, the lack of linked worker-firm data has prevented the literature from testing whether firms under duress indeed reduce employment more when they are subject to DWR than when they can flexibly adjust wages downward.

In this paper, we use linked worker-firm data to provide new evidence on how firms adjust labor costs over the business cycle and how these adjustments are related to their labor input decisions. The starting point of our analysis is a very simple but important insight that the existing literature on DWR has ignored so far: if firms can adjust labor costs of an employee downward by reducing hours worked, bonuses or overtime pay, then DWR in the hourly base wage rate may not be a binding constraint for employment decisions. But then, the relevant metric to study the employment effects of DWR is not the distribution of *hourly wage rate changes* as implied by much of the existing literature. Instead, from the perspective of the firm, the distribution of *annual earnings* changes of workers remaining with the same firm provides a better metric of the flexibility of labor cost and the firm's employment decision.

Based on this insight, we first use a previously unexplored part of the LEHD data to investigate whether firms adjust hours worked as a function of an employee's hourly wage rate change. We then examine how the distributional characteristics of annual earnings changes are related to firm attributes and the firm's employment decisions; and how this evidence sheds new light on the DWR debate.

This research is still very much in progress. The main results so far can be characterized as follows. Consistent with the existing literature, we find that the distribution of nominal hourly wage rate changes is characterized by a noticeable spike at zero and missing mass to the left of zero. In comparison, the distribution of annual earnings changes has a smaller spike at zero and has generally fatter tails with less missing mass to the left of zero. Decomposing annual earnings changes into hourly wage rate changes and hours worked changes, we further find evidence that firms increase annual earnings of existing workers primarily by increasing the hourly wage rate but reduce annual earnings mainly by adjusting hours downward. This suggests that on average, firms indeed shy away from adjusting hourly wage rates downward and instead use other means of reducing labor cost – namely adjusting hours.

When we turn to examining the distributional characteristics of annual earnings changes across firms, we find that the spike at zero and the missing

mass to the left of zero does not seem to be a general feature. In particular, evidence of zero spikes and missing mass is concentrated in small and young firms; and firms that do not experience large employment changes. When we examine contracting firms, we find instead that their annual earnings change distribution is approximately symmetric with no apparent zero spike. Hence, contracting firms appear to be both downsizing employment and downsizing labor cost for a substantial share of the remaining workers.

2 The Data

We use data from the Longitudinal Employer-Household Dynamics (LEHD) Program at the U.S. Census Bureau to examine hourly wage rate and total annual earnings adjustment for continuing workers across firms. The core of these interlinked files are worker-level earnings reports submitted by employers to state governments on a quarterly basis, who in turn submit those records to the LEHD program as part of the Local Employment Dynamics federal-state partnership. The wage record data are submitted along with establishment-level datasets collected as part of the Quarterly Census of Employment and Wages, which provides information about employers. Overall, the LEHD data covers over 95% of employment in the private sector, as well as employment in state and local government.[1]

The linked worker-firm dimension of the LEHD is crucial for our investigation. At the same time, the LEHD has three other important advantages over the survey-based datasets historically used to compute wage change distributions for the U.S. First, the LEHD covers the quasi-totality of private-sector workers in the participating U.S. States. The size of the dataset – millions and millions of observations – allows us to decompose the data in several important dimensions without compromising its representativeness. Second, the LEHD is based on administrative data which, while not entirely free from error or noise, is not subject to rounding and recall errors that plague survey-based measures and may bias statistics on changes in wages and hours worked towards zero. Third, the LEHD wage records include all forms of monetary compensation received throughout a year and not just the base wage. The LEHD therefore captures the total cost of a worker to the firm.

[1] For a full description of the LEHD data, see Abowd et al. (2009). Our analysis considers only workers employed in private-sector firms.

3 The Distribution of Hourly Wage and Annual Earnings Changes in LEHD Data

The existing literature on downward wage rigidity mainly considers changes in the *hourly base wage rate*. Comparing the distribution of wage changes in the LEHD data and survey data presents some challenges, as the unemployment insurance wage record data does not generally contain information on individual hours worked. Hours data are, however, available for three LEHD states (WA, RI, and MN) for a subset of our time-series. In the first part of this paper we use this hours data to decompose annual wage earnings changes into changes into average hourly wage rates and changes in annual hours worked.

Figure 1 shows the distribution of the change in hourly wage rates and the corresponding distribution in the change in annual total earnings for workers remaining with the same firm in 2010-2011 for our three states. The distribution of hourly wage changes is quite similar to that reported in the existing literature based on survey data from the PSID and the CPS (e.g. Kahn, 1997; Card and Hyslop, 1997; Daly, Hobjin and Lucking, 2012; or Elsby, Shin and Solon, 2013). In particular, there is a large mass of workers who experience a zero hourly wage changes (about 10%), with a substantial mass of workers experiencing small positive changes in the hourly rate in the range of 1-5% and substantially fewer workers experiencing a negative change in the hourly rate.

Comparing the distribution of changes in hourly wage rates to the corresponding distribution of changes in annual earnings in Figure 1, it is clear that they are similar, although the distribution annual earnings changes is substantially fatter, consistent with the point discussed above that firms may adjust hours worked as well as hourly wage rates. Figure 2 expands on Figure 1 by making this more explicit. In Figure 2 we compare the distribution of changes in hourly wage rates, changes in hours worked, and annual earnings changes. Interestingly, the distribution of changes in hours worked is both symmetric and concentrated between -10% and 10%, suggesting that firms have substantial flexibility in adjusting hours worked downward (eliminating overtime, temporary furloughs, cutting hours of part-time staff).

Figure 3 decomposes positive and negative annual earnings changes into changes in hours worked and hourly wage rates. Increases in annual earnings up to about 20% are largely due to an increase in the hourly wage rate (very large increases in annual pay have larger hours contributions). Decreases in annual pay, by contrast, come largely from reductions in hours worked. Specifically, for workers who received a 5%-20% reduction in annual pay from the previous year, 80% of that cut comes from a reduction in hours worked. For workers with smaller earnings reductions, this ratio is even larger (even exceeding 100% on average, which implies that these workers actually had increases in their hourly wage rate).

Figures 1-3 together suggest an interesting new fact about how firms adjust labor costs downward while retaining workers, namely that in many instances,

they adjust hours downward more flexibly than they renegotiate the hourly wage rate. This explains why the distribution of changes in annual earnings is fatter and more symmetric than the distribution of changes in hourly wage rates, with more workers receiving nominal annual earnings losses than nominal hourly wage cuts.

4 The Distribution of Annual Earnings Changes by Firm Growth and Size

Thus far, we have focused our analysis on three states in the years 2010-2011, the sample for which we have data on hours worked. For the remainder of this paper, we move away from our three-state subsample to a larger sample of LEHD states and longer time-series. Specifically we move now to results for a 30 state sample covering the years 1999-2011. This means our focus going forward will be on the change in annual wage earnings of workers remaining with the same firms. However, we argue in the paper based on a small theoretical model and the evidence presented above that total annual earnings is the more relevant variable than hourly wage rates to analyze the question of how firms adjust labor costs and how this influences their employment decisions.

We start our analysis by reporting the distribution of changes in annual earnings of incumbent workers according to where their employers falls in the firm growth distribution. As shown in Figure 4, for firms that are neither growing nor shrinking substantially, we find a distribution with a noticeable spike at zero, with substantial missing mass on the negative part of the support. However, for firms that are shrinking in size and are likely in the midst of layoffs, the spike at zero almost disappears, and there is a substantial jump in the proportion of workers receiving earnings cuts (and a corresponding drop in the proportion of workers receiving earnings increases).

These results for contracting firms are hard to square with the predictions usually associated with DWR. According to this theory, we should see a bigger 'pile-up' of zero earnings changes in contracting firms, as inability to adjust labor cost downward results in layoffs for workers who would have otherwise received negative wage cuts. Instead, we see almost no spike at all at the zero point in the earnings change distribution, and substantial numbers of job stayers receiving cuts to annual earnings at the firm.

We next cut the data by firm age and size. As shown in Figure 5, we find that the earnings change distribution of small/young firms exhibits a pronounced spike at zero and substantial missing mass to the left of zero. By contrast, the distribution for larger/older firms has no zero spike and is generally more symmetric. This again is hard to square with conventional wisdom regarding which workers should have better protection from wage cuts in downturns,

which would logically be at larger firms with greater ability to borrow to insure the implicit contract between worker and firm.

5 Further Analysis

We will investigate several possible avenues by which downward nominal earnings rigidity may vary by observable firm characteristics. These results are largely under development, but here we outline some of the conjectures we intend to investigate.

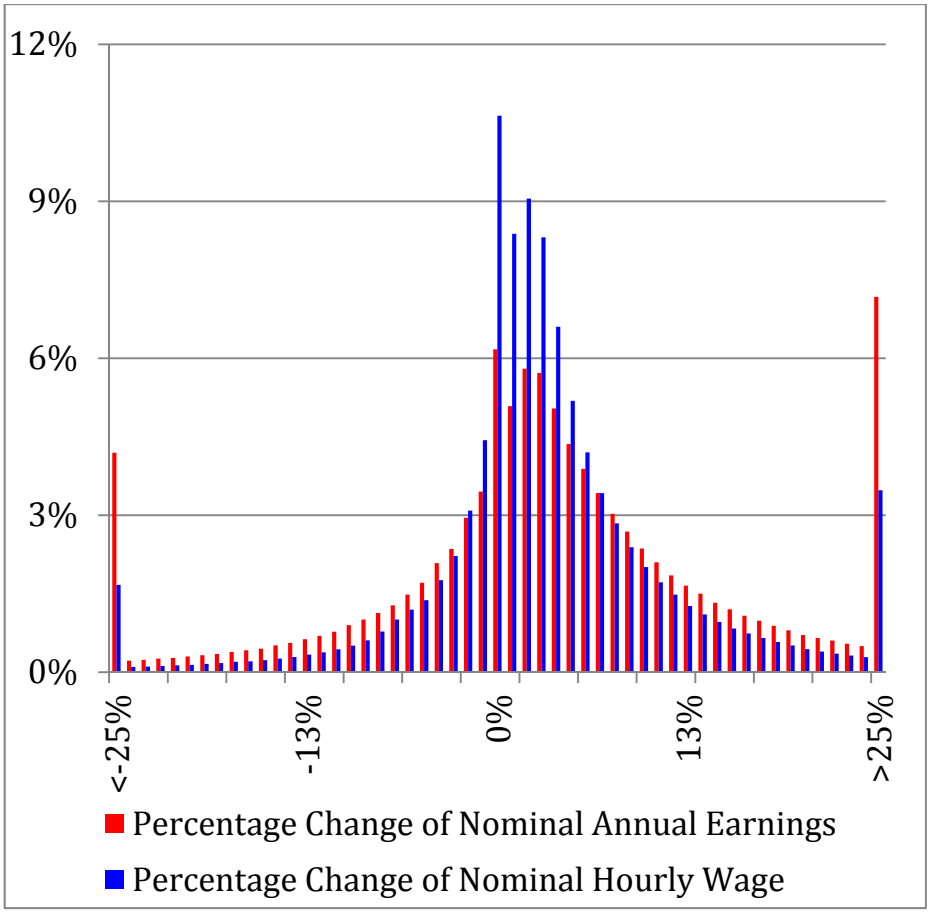
- At any point in time, there is substantial job separation in the U.S. labor market, with workers quitting to take other jobs; workers being laid off; or firms dying. If job separation is more likely for workers who would otherwise receive a wage cut, then this introduces a survival bias that makes the wage change distribution asymmetric with missing mass on the negative part of the support. Moreover, as job separations drop during downturns, the survival bias is attenuated, which would explain why the missing mass on the negative part of the support has become smaller during recessions (a result not shown above). In addition, job separations are on average larger in small/young firms, which would explain why their distribution has somewhat more missing mass in the negative support part.
- Firms do not (are unable to) insure workers against large adverse shocks, just small ones. Firms experiencing large adverse shocks therefore shed both workers and cut labor costs, which would explain why there is more symmetry in the earnings change distribution of contracting firms.
- Small firms have higher average cost of turnover (each worker has more complex job, no dedicated recruiting staff, etc) and so, small firms are more likely to freeze wages than cut staff (or risk losing staff by cutting wages). This would explain larger zero spike for small/young firms.

References

- Abowd, John M., Bryce E. Stephens, Lars Vilhuber, Fredrik Andersson, Kevin L. McKinney, Marc Roemer, and Simon D. Woodcock. 2009. "The LEHD Infrastructure Files and the Creation of the Quarterly Workforce Indicators." In *Producer Dynamics: New Evidence from Micro Data*, Vol. 68, Studies in Income and Wealth, ed. Timothy Dunne, J.Bradford Jensen and Mark J. Roberts, 149-230. Chicago: University of Chicago Press.
- Card, David and Dean Hyslop. 1997. "Does Inflation'Grease the Wheels of the Labor Market?' In *Reducing Inflation: Motivation and Strategy*, ed. Christina D. Romer and David H. Romer. Chicago: University of Chicago Press.

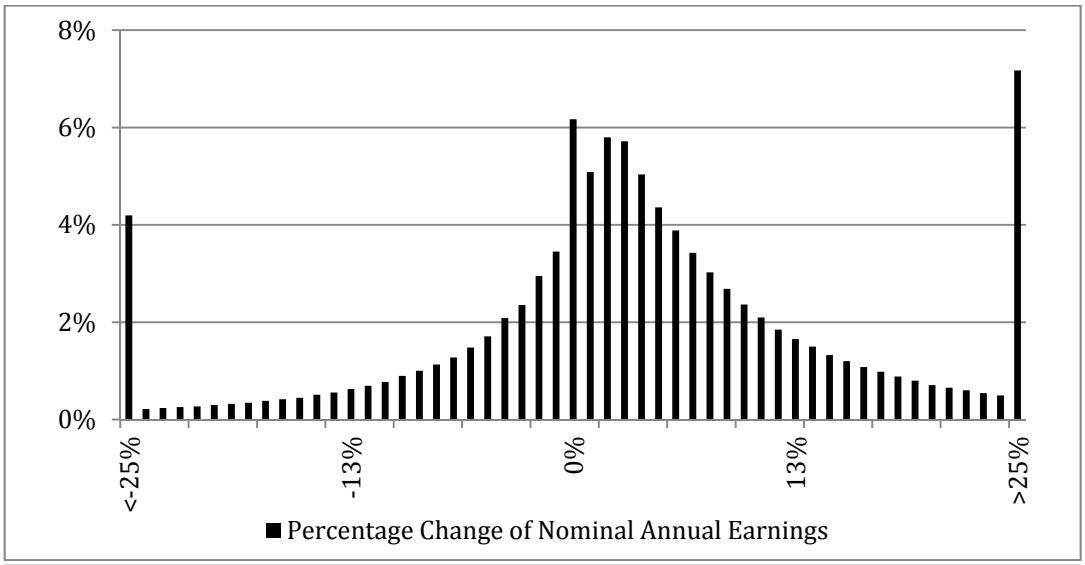
- Daly, Mary, Bart Hobjin and Brian Lucking. 2012. “Why Has Wage Growth Stayed Strong?” FRSBSF Economic Letter 2012-10.
- Elsby, Michael W., Donggyun Shin and Gary Solon. 2013. “Wage Adjustment in the Great Recession.” NBER Working Paper 19478.
- Kahn, Shulamit. 1997. “Evidence of Nominal Wage Stickiness from Microdata.” American Economic Review 87(5), 993-1008.

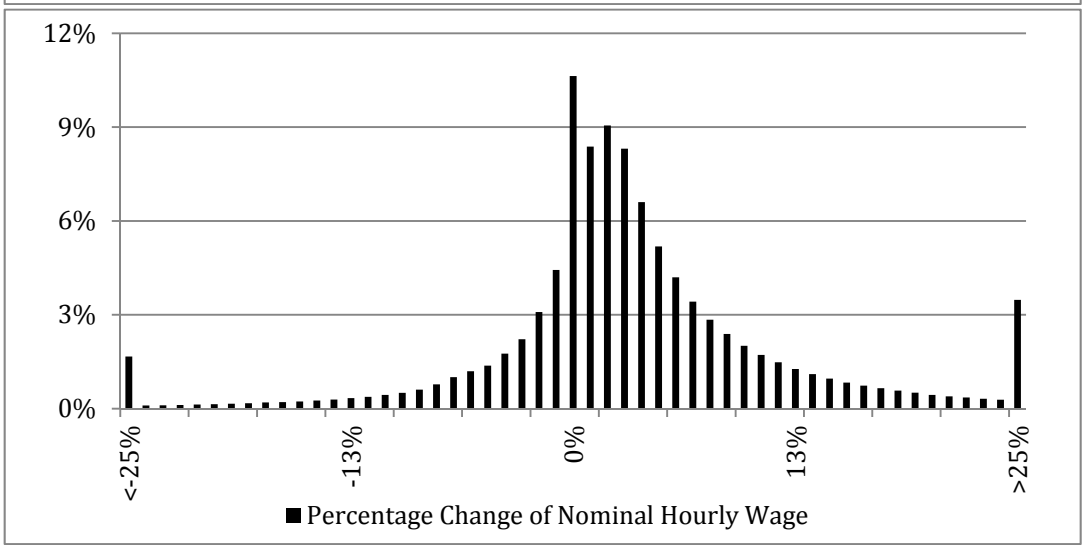
Figure 1: Distribution of Hourly Wage and Annual Earnings Changes



Pooled data for MN, RI, and WA; 2010-2011.

Figure 2: Distribution of Annual Earnings Changes, Hours Changes, and Hourly Rate of Pay





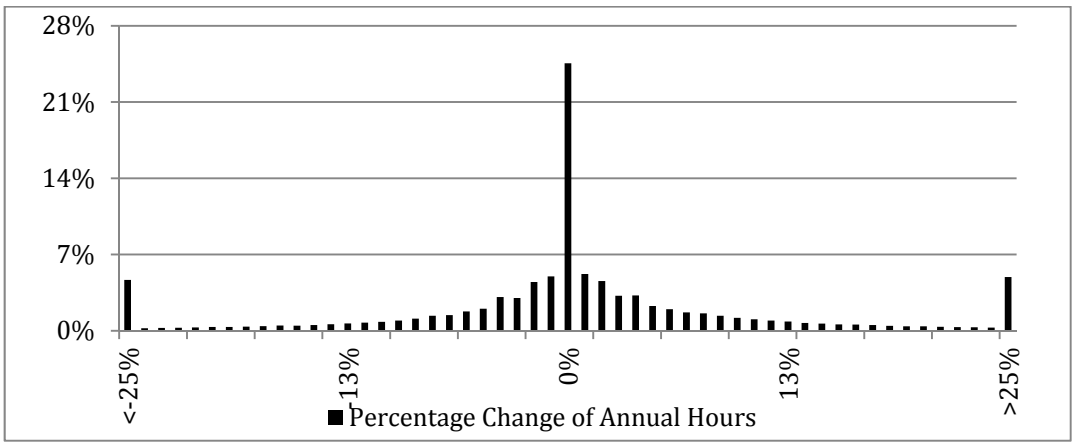
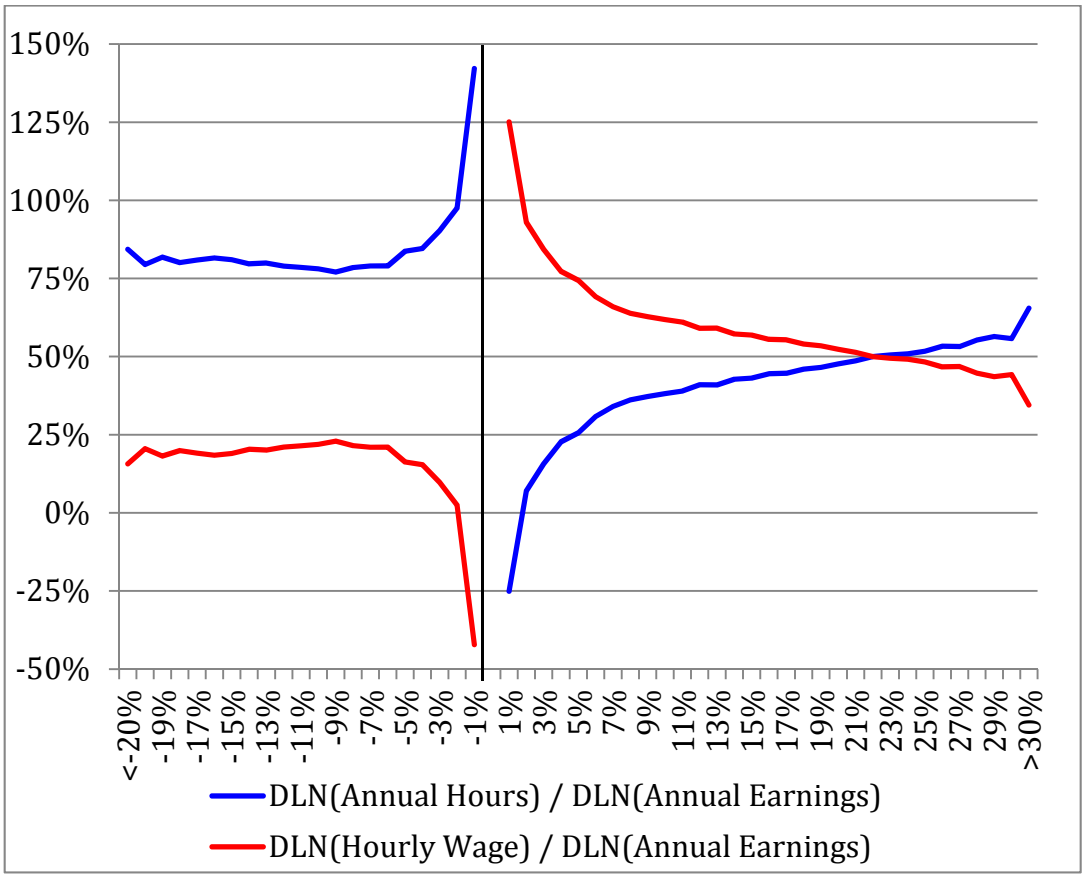
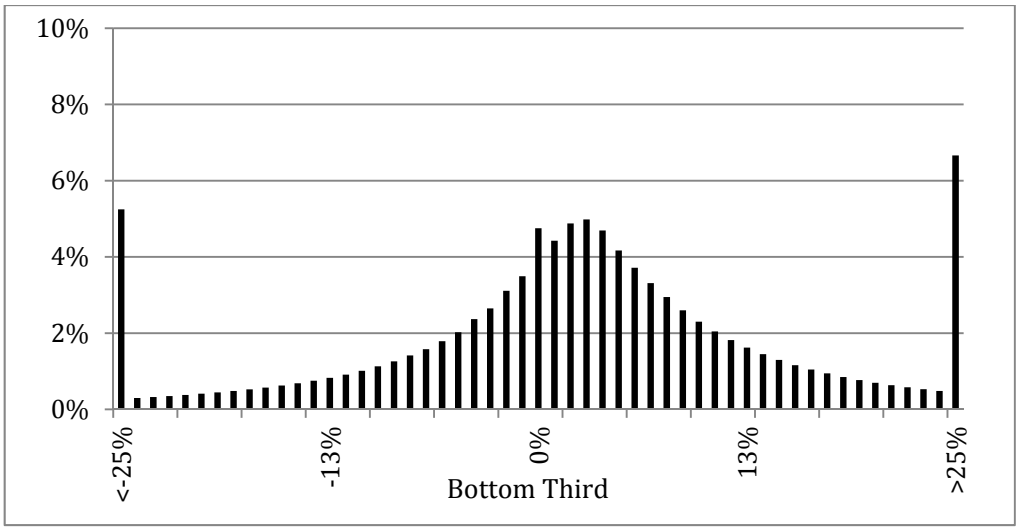


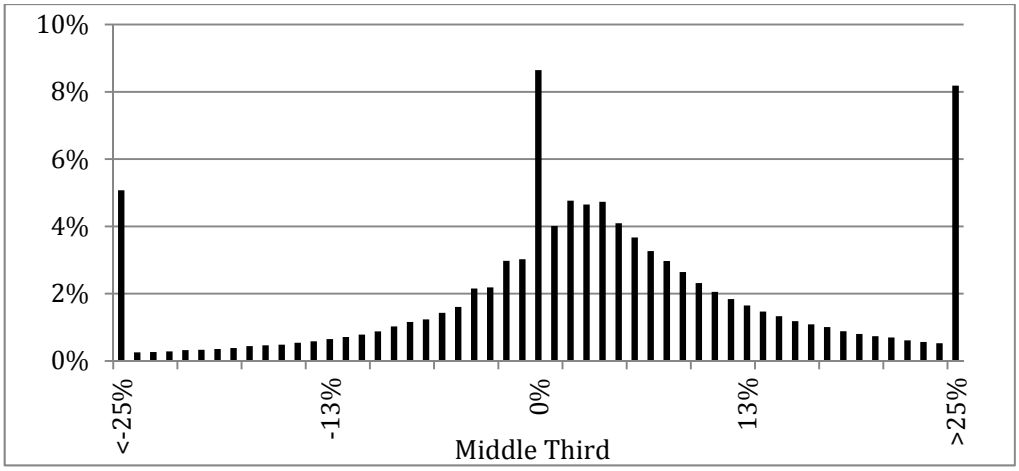
Figure 3: Decomposition of Annual Earnings Changes, by Hours and Hourly Rate of Pay

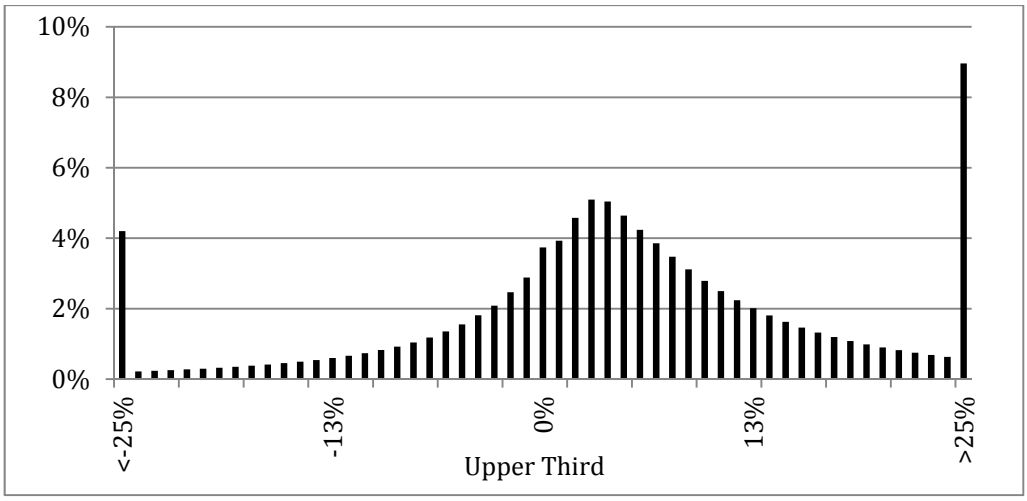


Pooled data for MN, RI, and WA; 2010-2011.

Figure 4: Distribution of Annual Earnings Changes, by Firm Employment Growth

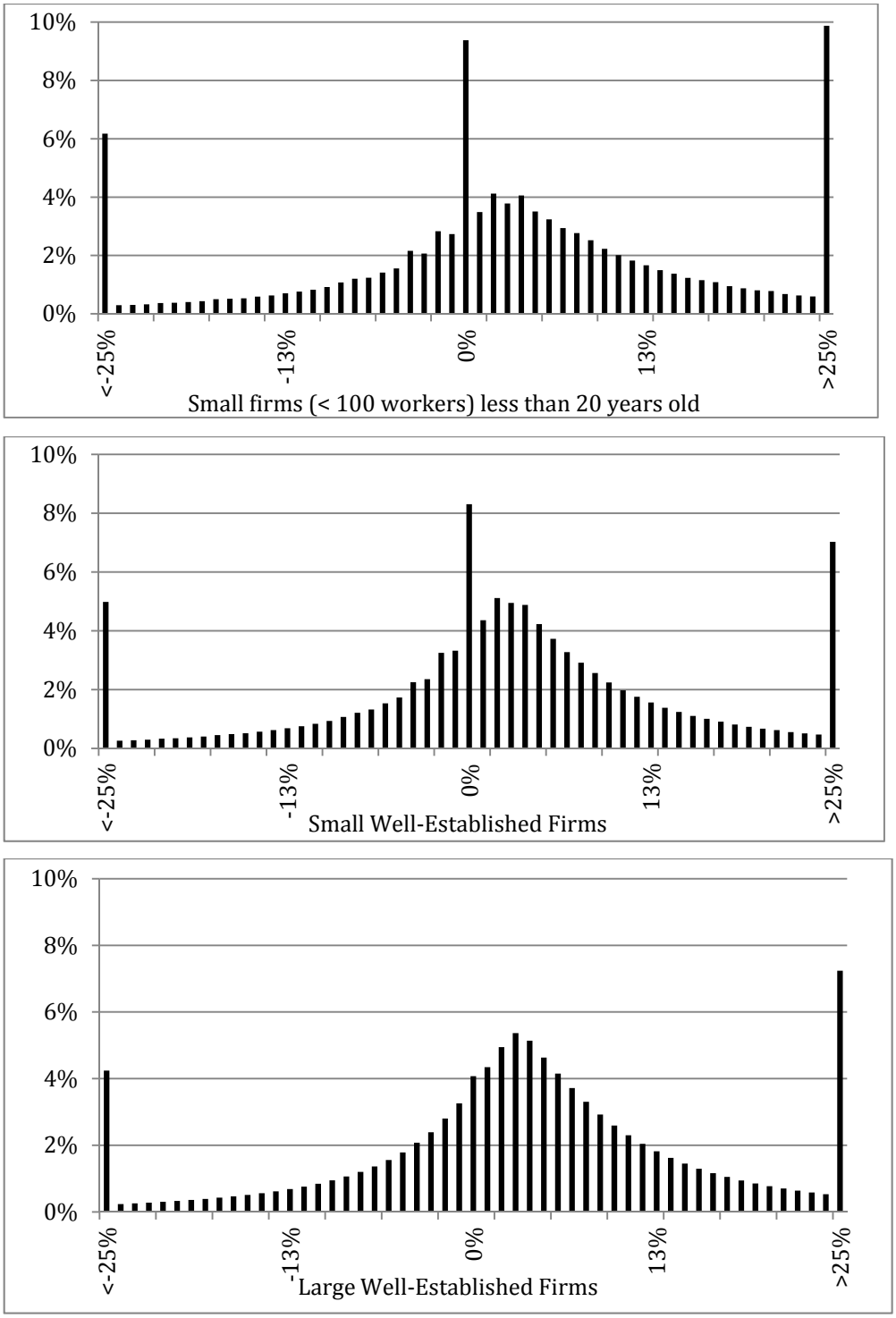






Pooled data for 30 states; 2000-2011.

Figure 5: Distribution of Annual Earnings Changes, by Firm Age and Size



Pooled data for 30 states; 2000-2011.