Sectoral Reallocation, Employment and Earnings Over the Business Cycle

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From expansion to recession, the distribution of earnings changes shifts to the left; during a recession there are more earnings losses than in an expansion. In a recent paper Guvenen et al. (2013, JPE) document and quantify these facts by analysing several moments of the earnings change distribution. Their analysis, however, leaves unexplained the reasons why this distribution varies over the business cycle. In this paper we investigate to what extent (i) the cyclical change in the number of workers reallocating across jobs and (ii) the cyclical changes in the returns to this reallocation can explain the observed earnings dynamics over the business cycle. We quantify their relative contributions by first focusing on aggregate worker flows and then using cross-sectoral worker flows to gain insights on the effects on reallocation across occupations and industries. Our main finding is that sectoral mobility is particularly important for pulling down the top of the earnings change distribution in recessions: both fewer switches and the decline in the returns to switching diminish the potential for large earnings gains. At the bottom of the distribution, the increased incidence of unemployment during recession, rather than an increase in the cost of an unemployment spell, is responsible for the increase in observed earnings losses.

Our exercise uses data from the Survey of Income and Program Participation (SIPP) in the 1996, 2001, 2004 and 2008 panels. This gives us time series, with some breaks, that include the Great Recession and some of the 2001 recession. Our main object of interest is the month-to-month changes in real earnings among workers in this sample. For employed workers we compute the earnings changes by comparing consecutive months. For those workers that experienced a non-employment spell, we connect pre-displacement earnings with re-employment earnings. We compute these earnings changes also for those workers

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who changed employers, either directly and through an intervening spell of unemployment, and switched sectors, treating an occupational change and industry change separately. Using these data, we study the distribution of changes in earnings both non-parametrically and through quantile regressions.

When analysing the entire period of observation, our results confirm that most earnings changes occur among job movers either directly across employers or through unemployment. Earnings of workers in continuing employment relationships are very stable. On a month-to-month basis, the top and bottom quartiles of earnings changes are almost constant for those staying in a job: they range from -0.3% to 0.0% and the median change is -0.2%. This feature is not surprising given the literature on the "stickiness" of wages within a job and volatility of wages of new hires (for a recent example see Haefke, Sonntag and van Rens, 2013, JME).

A less well known result, however, is that **job movers have fairly wide bands of earnings changes: from the bottom to top quartile of earnings changes there is a range from a loss to a gain of about 25%, as shown in Table 1.** For those who also switched sectors we find that the dispersion of earnings changes is about twice that. Unemployed workers also have larger earning changes, in that these changes are generally more negative. Unemployment generally lowers re-employment earnings at the median by a fifth, but the bottom quartile of those who change through unemployment is twice the fall in earnings compared to the bottom quartile of those who do not transition through unemployment.

	Mean	25th pctile	Median	75th pctile
Overall	0.04	-0.35	0.01	0.43
Switch	0.05	-0.41	0.02	0.50
No switch	0.02	-0.24	0.00	0.28
Transitions through unemployment				
Overall	-0.01	-0.38	0.00	0.35
Switch	-0.01	-0.51	-0.01	0.51
No switch	-0.02	-0.28	0.00	0.25

Table 1: The distribution of earnings changes

The above evidence suggests that **labor market transitions, especially sectoral transitions, are key factors in earnings changes.** As it is now well documented the incidence of these transitions is also cyclical. In particular, from expansion to recession, employer-to-employer flows fall and conditional on switching employers, sectoral transitions

fall too. On the other hand, unemployment increases during recession. The decline in sectoral switching and employer-to-employer changes in general decreases the worker's access to upside earnings risk, whereas the rise in unemployment incidence during a recession increases earnings risk to the downside. Combining these forces, pulling out the bottom and pushing down the top, shift the earnings change distribution downwards during a recession. However, the returns to worker mobility is not necessarily constant over the business cycle. For many reasons, the returns associated with an unemployment spell or to sectoral switch could change over the business cycle and the changes to these returns may differ across the earnings change distribution.

We now present preliminary results from our attempt to systematically separate whether the top end of earnings changes comes down because the potential gains from a sectoral switch are lower or because fewer people make these transitions. We also ask the opposite of the effect of unemployment. To put structure onto our analysis, we can consider a simple regression that relates the change in earnings—or residual earnings after controlling for various observable traits—to indicators for unemployment and earnings changes. Thus, we partition the population into groups based on the transion they make. The simplest form of this regression estimates the effects at the mean.

$$\Delta w = \sum_s \mathbb{I}_{\text{sw}} \times (\mathbb{I}_{U \to E} \beta_{s,UE} + \mathbb{I}_{E \to U} \beta_{s,EU} + \mathbb{I}_{E \to E} \beta_{s,EE}) + \epsilon$$

Since we are also interested in the effects across the distribution, we run a quantile regression at various levels of earnings changes, as in equation 1. We estimate this regression in expansions and in recessions. The resulting coefficients are the marginal effects of the transition during recession and expansion and can be interpreted as the returns to a job switch. At quantile τ, $\beta_{UE}(\tau)$ shows how the short-run cost of unemployment differs in recession and expansion and $\beta_s(\tau)$ shows the change in the returns to switching sectors across the earnings distribution.

$$F_{\Delta w}^{-1}(\tau) = \sum_s \mathbb{I}_{\text{sw}} \times (\mathbb{I}_{U \to E} \beta_{s,UE}(\tau) + \mathbb{I}_{E \to U} \beta_{s,EU}(\tau) + \mathbb{I}_{E \to E} \beta_{s,EE}(\tau)) \qquad (1)$$

A first key result that comes out from this analysis is that $\beta_{UE}(\tau)$ is the same in expansions and recessions for almost all quantiles τ. This means that **the short-run cost of job loss (the difference between displacement and re-employment wages), does not differ significantly over the business cycle. On the other hand, sectoral switch-**

ing does get a lower reward in recessions. The two sets of coefficients are pictured in Figure 1, in which we use occupation as the sector classification. This means that the downward effect on the earnings change distribution comes from the increased incidence of unemployment, because its cost does not increase. On the other hand, both the decline in the incidence of switching and the decline in its potential gains pull in earnings increases during recession.
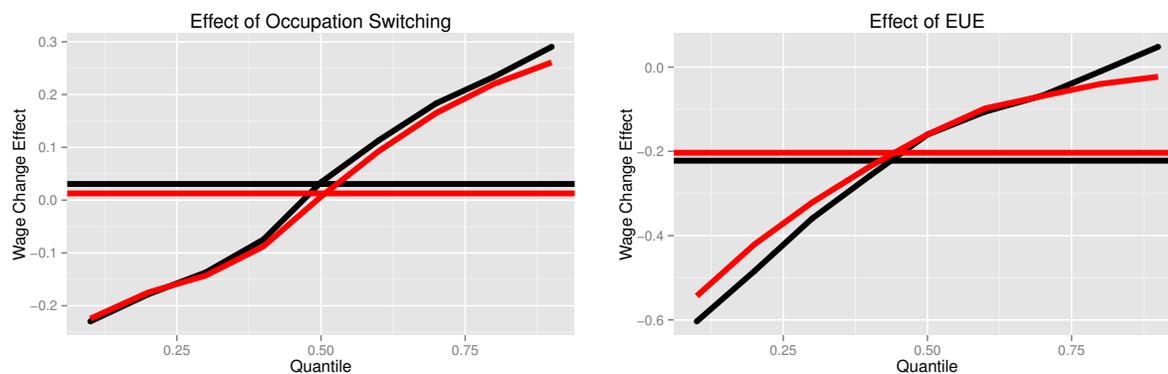

Figure 1: The coefficients on occupation switching (Left) and unemployment (Right) during recession (red) and expansions (black). Horizontal lines plot the mean regression coefficient.

To formalize this dichotomy—the contribution of the change in coefficients and the change in the incidence of a transition to the difference in earnings change distributions—we use a Machado-Mata decomposition (see Machado and Mata, 2005, J Appl. Econ.). The advantage of this quantile-based decomposition is that it allows us to state the contribution to changes at each quantile of the distribution.

A second key results that comes out from our analysis is that during a recession **nearly all of the lower tail's elongation (of the earnings change distribution) comes from the increased incidence of unemployment.** In a way, this conclusion is unavoidable even without the statistical decomposition, because the cost of unemployment did not increase greatly and there are not vastly more employer-to-employer transitions that entail large earnings losses during recession. The cyclical reduction of sectoral switching affects most strongly the upper-tail of the earnings change distribution. But here the story is mixed, both the returns to switching and the incidence of switching fall and both tamp down the chance of a large gain in earnings.

Upon establishing that both the incidence and *nature* of sectoral switching changes from recession to expansion, we try to delve more deeply into the types of sectoral switches and their effect on a worker. To frame our analysis, one can imagine that a sectoral change

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involves both a "ladder effect," whereby workers may move up or down to higher or lower expected earnings, and also an "idiosyncratic effect," which describes the earnings of the matched worker after controlling for the expected earnings within that sector. This logic leads us to include a few more terms into Equation 1

$$F_{\Delta w^r}^{-1}(\tau) = \beta_l(\tau)\Delta w^{sec} + \beta_r(\tau)w_{t-1}^r + \beta_{UE}(\tau)\mathbb{I}_{U \to E} \tag{2}$$

where w^r is the residual wage within a sector, Δw^{sec} is the change in the expected wage from one sector to the next and is zero among non-switchers. The coefficient $\beta_l(\tau)$ describes the ladder effect, and it is particularly important in the analysis. It seems that **during recessions, climbing the occupational ladder involves less wage improvement** as the term diminishes consistently across quantiles, as shown in Table 2. Notice also that the returns to moving up are diminishing: when we control for the average wage in the prior occupation, the coefficient is generally negative.

Quantile	0.1	0.25	0.5	0.75	0.9
$\beta_l(\tau)$, "ladder effect"					
Expansion	-0.141	-0.176	-0.039	0.051	0.072
Recession	-0.145	-0.207	-0.144	-0.106	-0.063
$\beta_r(\tau)$, "idiosyncratic effect"					
Expansion	-0.526	-0.560	-0.617	-0.720	-0.795
Recession	-0.526	-0.544	-0.624	-0.716	-0.786

Table 2: Coefficient on change in occupational wage, $\beta_l(\tau)$ from Equation 2

Up to now we have shown the importance of sectoral mobility and unemployment risk in determining the cyclical behaviour of the earnings change distribution. In particular, we have explored the role of occupations switching. The next step is to also investigate industry changes and make robustness checks to our analysis. We will also propose a simple model that can explain these changes to explore the causality.