Recessionary Loss of Routine Occupations Within and Between Industries

Stephan Lindner

Over the past 30 years, technological advances in computer processing and automation have significantly changed the U.S. labor market. Jobs that require some manual or cognitive skills but involve routine, clearly defined procedures, like precision welding or bookkeeping, have been disappearing. The same tasks can now be accomplished by fewer, more highly skilled workers using computers and sophisticated machines. Because many of these occupations are middle-skill jobs, their disappearance has resulted in a significant, ongoing “hollowing out” of the labor market (Autor and Dorn forthcoming). In just eight years, between 2003 and 2011, the number of routine occupations as a percentage of all jobs declined from 49 percent to 45 percent.¹

Research suggests that declining employment in routine, middle-skill occupations and restructuring of the workforce has not been steady over the past few decades. Rather, most has occurred during recessions, including the Great Recession (Jainovich and Siu 2012). For instance, of the 4 percentage point decline in routine jobs between 2003 and 2011, 75 percent occurred between 2008 and 2011.²

This accelerated restructuring has also manifested in larger wage cuts for workers who became unemployed during the Great Recession, compared to workers who became unemployed before the recession (Mitchell and Nichols 2012). Firms apparently restructure their workforce during recessions by hiring and firing workers with different occupational skills. However, the exact nature of this process is still poorly understood.

This brief assesses restructuring during the Great Recession by examining how employment in routine and nonroutine jobs changed both within and across industries. Restructuring within versus between industries is important for policymakers because industries define the work setting of occupations.³ Therefore, workers will often find it easier to learn skills for a new occupation within their present industry than to learn skills for a new occupation in a different industry.

Only a small fraction of the decline in routine jobs during the Great Recession can be attributed to declining shares of routine jobs within industries. Most of the decline occurred between industries, because industries with a high share of routine jobs lost employment...
during the recession. In contrast, industries less affected by the recession have a much smaller share of routine jobs, resulting in their overall decline. This implies that workers in routine occupations who lost their jobs during the Great Recession face multiple barriers to reemployment. They will likely need to develop new skills for a different, nonroutine occupation in a different industry.

Data

The analysis uses two nationally representative surveys: the Job Openings and Labor Turnover Survey (JOLTS) and the Current Population Survey (CPS). The JOLTS contains information on job separations, job openings (“vacancies”), and new hires by industries and month. The CPS is a nationally representative survey of individuals that provides monthly information about labor market conditions.

I align industry definitions across the two surveys and then combine them by industries. For each industry, I tabulate the characteristics of employed, unemployed, and newly hired workers using the CPS, then add industrywide vacancy information from the JOLTS. I classify unemployed workers’ industry as the one in which they were most recently employed. The analysis focuses on the 2003 to 2011 period, which covers the years before and during the Great Recession as well as the early recovery period.

To identify routine middle-skill occupations in the CPS, I use the classification scheme developed by Jaimovich and Siu (2012). Routine occupations include, for instance, office and administrative support as well as transportation and material moving. Nonroutine occupations are, for instance, management (highly skilled) or food preparation (encompassing several skill levels).

After examining occupational skill levels and employment across all industries, I then focus on four large industries with different mixes of routine, middle-skill jobs versus nonroutine occupations before the Great Recession. Two industries, construction and manufacturing, had a high share of workers in routine occupations in 2003, whereas the other two industries, education and professional services, had a low initial share of workers in such occupations. Selecting a few industries with contrasting workforces illustrates main trends in employment and unemployment within and across industries. Specifically, I describe industrywide layoffs and vacancies during the recession and then analyze the occupational mix of employed workers within industries.

### Industries and Routine Occupations

Table 1 presents the percentage of workers in routine occupations (at all skill levels) by industry, as well as those industries’ shares of total employment for 2003 to show their relative importance for total employment before the Great Recession. Industries with a high percentage of workers in routine occupations in 2003 included construction, manufacturing, and mining and logging. Most routine occupations in these industries are manual, such as material moving. Industries with few workers performing routine occupations in 2003 tended to be in the service sector (e.g., education, leisure and hospitality, and professional and business services).

### Unemployment and Vacancies across Industries

Figure 1 displays unemployment rates for construction, manufacturing, education, and professional services from 2003 to 2011. Before the recession, unemployment rates across the four focal industries were generally low, especially for service industries. Unemployment rates increased in all four industries as the recession unfolded, but construction and manufacturing exhibited by far the largest increases, 7.5 and 4.3 percentage points between 2008 and 2010. Professional and business services experienced a more modest increase (3.5 percentage points), while the unemployment rate

---

**Table 1. Mix of Workers by Industries in 2003 (%)**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Workers in routine occupations</th>
<th>Total employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>84.3</td>
<td>7.2</td>
</tr>
<tr>
<td>Educational, health, and social services</td>
<td>17.8</td>
<td>13.4</td>
</tr>
<tr>
<td>Financial activities</td>
<td>54.9</td>
<td>7.0</td>
</tr>
<tr>
<td>Information</td>
<td>47.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Leisure and hospitality</td>
<td>15.8</td>
<td>8.4</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>70.6</td>
<td>12.5</td>
</tr>
<tr>
<td>Mining and logging</td>
<td>74.1</td>
<td>0.4</td>
</tr>
<tr>
<td>Other services</td>
<td>44.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Professional and business services</td>
<td>29.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Public sector</td>
<td>27.4</td>
<td>14.6</td>
</tr>
<tr>
<td>Trade</td>
<td>85.1</td>
<td>15.1</td>
</tr>
<tr>
<td>Transportation, warehousing, and utilities</td>
<td>80.7</td>
<td>4.0</td>
</tr>
</tbody>
</table>


Note: All percentages are calculated using person weights from the CPS.
increased the least in education, health, and social services (2.2 percentage points).

The unemployment rate shows how many workers are currently out of work and looking for work, but to fully understand their chances to find new employment, we should also examine the number of vacancies. Figure 2 displays vacancy rates for each industry. Construction and manufacturing had fewer vacancies than service-sector industries during that time. Vacancy rates decreased during the recession in all four industries and then started to recover slowly in 2010.

Figure 3 combines supply and demand for workers by displaying the unemployment-to-vacancy ratio for each of the four industries. The ratio surged for manufacturing and construction and remained high even during the recovery. By the end of 2012, 5 unemployed workers were still available per open position in manufacturing; for construction, that number was more than 10. By contrast, the ratio increased only slightly in the service industries during the recession and remained below 5 for all years. Not only is unemployment higher in manufacturing and construction than in the other two industries, the chance of finding work in those industries is far lower than in the others.

**Routine Jobs Within and Between Industries**

Restructuring from routine to nonroutine jobs did not increase during the Great Recession because firms changed their mix of employees with routine versus nonroutine occupations. Rather, firms with high concentrations of routine occupations were more likely to downsize or go out of business. Figure 4 shows the share of employed workers in routine occupations for each of the four industries between 2003 and 2011. These trends, strikingly, show no large up or down swings. Generally, the share of employed workers in routine occupations decreased gradually over time in all industries. These
findings are consistent with those of other studies reporting that risk of job loss or unemployment increased proportionately for various groups of workers during the Great Recession (Congressional Budget Office 2012; Mitchell and Nichols 2012).

Most of the decline in routine jobs follows, then, because industries with a high share of routine occupations lost many jobs, while industries less affected by the recession had a much smaller share of such jobs. This is evident from figure 4: routine occupations account for 70 percent and 80 percent of all jobs in industries such as manufacturing and construction, respectively—industries that also experienced much larger upswings in unemployment rates (see figure 1). By contrast, less than 30 percent of all jobs in the two service industries depicted in figure 4 are in routine occupations; unemployment in these industries increased more modestly.

Conclusions

This brief shows that although the share of routine jobs within industries gradually decreased, most of the overall employment decline for such occupations can be attributed to shifts in employment between industries. Industries with a high fraction of routine occupations laid off high proportions of their workforce, most of whom previously worked in routine occupations. As a consequence, employment shares of these industries declined, and with that the number of routine jobs as a share of all jobs.

Although some of this trend toward industries with many nonroutine jobs may reverse as the economy further recovers, the previous two recessions strongly suggest that many lost routine jobs will not come back (Jaimovich and Siu 2012). Therefore, it is not sufficient for workers laid off from routine occupations in industries with a high share of such jobs to learn new skills in their industry. Rather, these workers must acquire new skills in different occupations and different industries.

Figure 3. Unemployment-to-Vacancy Ratio by Selected Industries, 2003–2011 (%)

Figure 4. Fraction of Employed Workers with Routine Occupations, by Industry, 2003–2011 (%)
Notes
1. Author’s own calculations. See text for a description of the data used in this study.
2. Author’s own calculations. See text for a description of the data used in this study.
3. Kambourov and Manovskii (2009) argue that most of the skills workers acquire at their jobs are occupation specific, rather than industry specific, as suggested by earlier studies (Neal 1995; Parent 2000). However, workers who lost their job and must acquire new skills at a different occupation may find this learning process easier in a familiar work setting than in an unfamiliar one. Similarly, employers are likely more willing to hire an individual with some expertise in their industry than someone who lacks this background.
4. Specifically, I first aggregate multiple industries in the JOLTS corresponding to one industry in the CPS (e.g., the durable goods manufacturing and nondurable goods manufacturing industries in the JOLTS become one industry, manufacturing). Furthermore, the JOLTS, but not the CPS, classifies public-sector jobs as one separate industry. I reclassify such jobs in the CPS as belonging to the public sector.
5. JOLTS data are available from January 2001 forward, but years before 2003 are still influenced by the 2001 recession and therefore not used.
6. The vacancy rate is defined as the number of vacancies divided by the number of people in the labor force.
7. Formally, the overall decline in routine jobs can be decomposed into an employment decline within industries and an employment decline between industries (see, for instance, Bound, Lindner, and Waidmann 2010 for such decomposition techniques). Using such a decomposition for 2008 to 2011 and all 12 industries, only one-third of the overall decline in routine jobs can be attributed to declining employment within industries; the remaining two-thirds of the decline occurs between industries (i.e., from industries with a high fraction of routine occupations to industries with a low fraction of routine occupations).

References


Recessionary Loss of Routine Occupations Within and Between Industries

About the Author
Stephan Lindner is a research associate with the Income and Benefits Policy Center at the Urban Institute.

Unemployment and Recovery Project

This brief is part of the Unemployment and Recovery project, an Urban Institute initiative to assess unemployment's effect on individuals, families, and communities; gauge government policies' effectiveness; and recommend policy changes to boost job creation, improve workers’ job prospects, and support out-of-work Americans. Major funding for the project is from the Rockefeller and Ford Foundations.

Copyright © February 2013

The views expressed are those of the author and do not necessarily reflect those of the Urban Institute, its trustees, or its funders. Permission is granted for reproduction of this document, with attribution to the Urban Institute.

URBAN INSTITUTE
2100 M Street, NW
Washington, DC 20037-1231
(202) 833-7200
publicaffairs@urban.org  www.urban.org