Wage Density Decompositions, Applied to Institutions and Wage Structure

14.662 Spring 2009
David Autor

Source: Autor, Katz and Kearney 2008

Source: DiNardo, Fortin and Lemieux 1996.
Figure 1A—Kernel density estimates of men’s real log wages 1973–1992 ($1979).

Source: DiNardo, Fortin and Lemieux 1996
What is the true 'gender gap'?

A - $\bar{X}_F (\beta_m - \beta_F)$

B - $\bar{X}_m (\beta_m - \beta_F)$

C - $(\bar{X}_m - \bar{X}_F)^{\frac{1}{2}} (\beta_m - \beta_F)$
DiNardo, Fortin and Lemieux, 1996
An illustration of the estimation of the effect of the minimum wage for male high school dropouts with 20 years or less of experience.
Figure 4—1988 density of men's real log wages ($1979) adjusted for the indicated factors.

Source: DiNardo, Fortin and Lemieux 1996
FIGURE 5—1988 density of women’s real log wages ($1979) adjusted for the indicated factors.

Source: DiNardo, Fortin and Lemieux 1996
Figure 6.—Smoothed differences between the 1988 density adjusted for indicated factors and the 1979 density for men.

Source: DiNardo, Fortin and Lemieux 1996
Figure 7.—Smoothed differences between the 1988 density adjusted for indicated factors and the 1979 density for women.

Source: DiNardo, Fortin and Lemieux 1996
## Some key results of DFL for Males:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Change</th>
<th>MinWg</th>
<th>Unions</th>
<th>X’s</th>
<th>S&amp;D</th>
<th>Unexplained</th>
</tr>
</thead>
<tbody>
<tr>
<td>MinWg 1st</td>
<td>0.195</td>
<td>25.3%</td>
<td>10.7%</td>
<td>20.7%</td>
<td>20.7%</td>
<td>22.6%</td>
</tr>
<tr>
<td>S&amp;D 1st</td>
<td>0.195</td>
<td>16.0%</td>
<td>24.1%</td>
<td>4.8%</td>
<td>32.6%</td>
<td></td>
</tr>
<tr>
<td>MinWg 1st</td>
<td>0.076</td>
<td>65.7%</td>
<td>-25.6%</td>
<td>49.7%</td>
<td>10.9%</td>
<td>-0.7%</td>
</tr>
<tr>
<td>S&amp;D 1st</td>
<td>0.076</td>
<td>43.5%</td>
<td>-5.5%</td>
<td>26.9%</td>
<td>33.9%</td>
<td></td>
</tr>
</tbody>
</table>

## Key results of DFL for females:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Change</th>
<th>MinWg</th>
<th>Unions</th>
<th>X’s</th>
<th>S&amp;D</th>
<th>Unexplained</th>
</tr>
</thead>
<tbody>
<tr>
<td>MinWg 1st</td>
<td>0.328</td>
<td>45.1%</td>
<td>1.3%</td>
<td>25.6%</td>
<td>11.1%</td>
<td>16.9%</td>
</tr>
<tr>
<td>S&amp;D 1st</td>
<td>0.328</td>
<td>41.6%</td>
<td>0%</td>
<td>14.6%</td>
<td>26.8%</td>
<td></td>
</tr>
<tr>
<td>MinWg 1st</td>
<td>0.243</td>
<td>61.7%</td>
<td>-4.1%</td>
<td>32.1%</td>
<td>-4.5%</td>
<td>14.8%</td>
</tr>
<tr>
<td>S&amp;D 1st</td>
<td>0.243</td>
<td>56.5%</td>
<td>-3.0%</td>
<td>18.7%</td>
<td>13.0%</td>
<td></td>
</tr>
</tbody>
</table>

Source: DiNardo, Fortin and Lemieux 1996
Figure Ib
Figure 1a
Figure II
Selected Percentiles of the Wage Distribution, Minimum Wage, Relative to the Median: 1973–1993

Source: Lee 1999
Wage Distribution Density Estimates: Low-, Medium-, and High-Wage States, 1979
Figure III

Source: Lee 1999
FIGURE VIa

Source: Lee 1999
**Figure VIb**

An OLS approach to wage density decomposition

Juhn, Murphy and Pierce 1993
Fig. 1.—Indexed real weekly wages by percentile, 1963–89

Source: Juhn, Murphy and Pierce 1993
### TABLE 4

**Observable and Unobservable Components of Changes in Inequality**

<table>
<thead>
<tr>
<th>Differential</th>
<th>Total Change (1)</th>
<th>Observed Quantities (2)</th>
<th>Observed Prices (3)</th>
<th>Unobserved Prices and Quantities (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-10</td>
<td>.373</td>
<td>.035</td>
<td>.128</td>
<td>.208</td>
</tr>
<tr>
<td>90-50</td>
<td>.146</td>
<td>.020</td>
<td>.068</td>
<td>.061</td>
</tr>
<tr>
<td>50-10</td>
<td>.227</td>
<td>.015</td>
<td>.060</td>
<td>.147</td>
</tr>
</tbody>
</table>

**A. 1964–88**

<table>
<thead>
<tr>
<th>Differential</th>
<th>Total Change (1)</th>
<th>Observed Quantities (2)</th>
<th>Observed Prices (3)</th>
<th>Unobserved Prices and Quantities (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-10</td>
<td>.165</td>
<td>.029</td>
<td>.014</td>
<td>.119</td>
</tr>
<tr>
<td>90-50</td>
<td>.059</td>
<td>.011</td>
<td>.010</td>
<td>.036</td>
</tr>
<tr>
<td>50-10</td>
<td>.106</td>
<td>.018</td>
<td>.004</td>
<td>.083</td>
</tr>
</tbody>
</table>

**B. 1964–79**

<table>
<thead>
<tr>
<th>Differential</th>
<th>Total Change (1)</th>
<th>Observed Quantities (2)</th>
<th>Observed Prices (3)</th>
<th>Unobserved Prices and Quantities (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-10</td>
<td>.208</td>
<td>.006</td>
<td>.114</td>
<td>.089</td>
</tr>
<tr>
<td>90-50</td>
<td>.087</td>
<td>.009</td>
<td>.058</td>
<td>.026</td>
</tr>
<tr>
<td>50-10</td>
<td>.121</td>
<td>- .003</td>
<td>.056</td>
<td>.064</td>
</tr>
</tbody>
</table>

**C. 1979–88**

**Note.**—The years refer to the middle point of the 3-year interval. Col. 1 gives the change in the indicated statistics over the years shown. Components in cols. 2–4 are calculated on the basis of the full distribution accounting scheme outlined in the text.

Source: Juhn, Murphy and Pierce 1993
Fig. 7.—Ninetieth-tenth percentile log wage differential and components, 1963–89

Source: Juhn, Murphy and Pierce 1993
A DFL Approach to Residual Inequality

Lemieux 2006
Increased Residual Wage Inequality: Composition Effects, Noisy Data, or Rising Demand for Skill?
Changes in Educational Composition: 1973 - 2003

Source: Autor, Katz and Kearney 2005

Source: Autor, Katz and Kearney 2005
Actual and counterfactual residual variance of wages for men, 1973 to 2003

Source: Lemieux 2006
Actual and counterfactual residual variance of wages for females, 1973 to 2003

Source: Lemieux 2006
Actual and counterfactual residual 90-10 for men, 1973 to 2003
Actual and counterfactual residual 90-10 for women, 1973 to 2003
Male residual variance predicted using the minimum wage (holding characteristics at their 1973 level)
Residual Male 90/10 Hourly Wage Inequality

Autor, Katz, Kearney 2005 NBER WP #11628
Residual Male 90/50 Hourly Wage Inequality

Log 90/50 wage ratio

Autor, Katz, Kearney 2005 NBER WP #11628
Residual Male 50/10 Hourly Wage Inequality

Autor, Katz, Kearney 2005 NBER WP #11628
Female residual variance predicted using the minimum wage (holding characteristics at their 1973 level)
Log 90/10 Hourly Earnings Inequality and Real Minimum Wage

90/10 Gap = 2.60 (0.14) - 0.74 (0.09) x MinWage, R-Squared=0.71

Source: Autor, Katz and Kearney 2008
Log 50/10 Hourly Earnings Inequality and Real Minimum Wage

50/10 Gap = 1.09 (0.07) - 0.26 (0.04) x MinWage, R-Squared=0.58

Source: Autor, Katz and Kearney 2008
A quantile approach to wage density decomposition

Machado-Mata 2005
(and Autor, Katz and Kearney 2005)
Overall Male 90/10 Hourly Wage Inequality

Source: Autor, Katz and Kearney 2005
Overall Male 90/50 Hourly Wage Inequality

Source: Autor, Katz and Kearney 2005
Overall Male 50/10 Hourly Wage Inequality

Source: Autor, Katz and Kearney 2005
Actual and Simulated Overall Inequality (MORG): Male 90/10

Source: Autor, Katz and Kearney 2005
Actual and Simulated Overall Inequality (MORG): Female 90/10

Source: Autor, Katz and Kearney 2005
Actual and Counterfactual Overall Inequality (MORG): Male 90/10

Source: Autor, Katz and Kearney 2005
Actual and Counterfactual Overall Inequality (MORG): Male 90/50

Source: Autor, Katz and Kearney 2005
Residual Male 90/10 Hourly Wage Inequality

Log 90/10 wage ratio


CPS March CPS May/ORG

Autor, Katz, Kearney 2005 NBER WP #11628
Residual Male 90/50 Hourly Wage Inequality

Log 90/50 wage ratio


CPS March CPS May/ORG

Autor, Katz, Kearney 2005 NBER WP #11628
Residual Male 50/10 Hourly Wage Inequality

Log 50/10 wage ratio


CPS March  CPS May/ORG

Autor, Katz, Kearney 2005 NBER WP #11628
Comparison of Residual Hourly Inequality (MORG): Male 90/10

Source: Autor, Katz and Kearney 2005
Actual and counterfactual residual 90-10 for men, 1973 to 2003
Actual and Counterfactual Residual Inequality (MORG): Male 90/10

Source: Autor, Katz and Kearney 2005
Actual and Counterfactual Residual Inequality (MORG): Male 90/50

Source: Autor, Katz and Kearney 2005
Actual and Counterfactual Residual Inequality (MORG): Male 50/10

Source: Autor, Katz and Kearney 2005