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Inequality in Household Income:
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Inequality in Household Income: A Cross-Country Inter-Industry Analysis

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Abstract

This study explores the plausibility of extending research on income inequality to incorporate relative living standards based on household head's industry of employment. Data from the Luxembourg Income Study is used to assess the relative level and movement of per capita disposable household income for households whose heads are employed in three industries – manufacturing, construction, and trade – and six countries-- Australia, Canada, Finland, Germany, Sweden, and the U.S. The results indicate that typical households defined by their heads' industries of employment make significant moves within their countries' income distributions over time, and that the patterns of movement within nation-specific household income distributions vary across countries.

Introduction

Recent research on income inequality has compared adjusted post-tax after transfer disposable income of households in rich countries (Gottschalk and Smeeding, 1997). The findings generally indicate that Anglo-Saxon nations (e.g. United States, U.K, Canada, and Australia) have experienced higher levels of inequality than continental European and Nordic countries (e.g. Germany, Finland, and Sweden). The purpose of the present study is to explore the plausibility of extending research on income inequality to incorporate relative living standards based on household head's industry of employment.

Another motivation for the study is to assess how changes in global political economic environments may have affected relative living standards over a period that extends roughly over the period of the 1990s. An obvious implication is that factors such as increased trade liberalization, changing production technologies, demographic changes, and country-specific social welfare policies may have affected some industries more than others, and thus may have altered relative earnings and living standards of households that rely on earnings to generate their living standards.

For example, if manufacturing in the high labor cost countries is increasingly competing with manufacturing in lower labor cost countries through trading arrangements, then one might expect to see downward pressure on earnings of manufacturing workers in high labor cost countries, which would be accompanied by a relative deterioration of manufacturing workers position in the country's income distribution. On the other hand, manufacturing that relies on low-skilled labor may simply have moved to low labor cost countries, leaving the high labor cost countries to specialize in manufacturing requiring highly skilled and highly compensated labor inputs.

The result may simply be a redistribution of manufacturing employment from low value added to high value added jobs, which could shift the position of manufacturing households upward in the income distribution.

For industries in which there is less direct international competition in labor and product markets, such as construction and wholesale/retail trade, one would expect that labor market conditions and institutional considerations governing wage setting and tax and transfer policies would be more important in determining the level and trends of relative living standards. For example, the construction industry in the U.S. has experienced substantial de-unionization and an increased use of less-skilled, largely immigrant labor (The Center to Protect Workers Rights 2002). To the extent that other nations have not experienced such institutional pressures, and tend to have more re-distributive tax and transfer policies, one might expect their construction households to have maintained their position in the income distribution compared to construction households in the U.S.

Data and Methods

Cross-country estimates of relative living standards by the houshehold head's industry of employment are made using the Luxembourg Income Study (LIS) database, which contains roughly comparable earnings, income and demographic data on random samples of households from over 20 nations (LIS, 2003).[1] The usefulness and limitations of LIS data have been thoroughly discussed elsewhere (e.g. Gottschalk and Smeeding 1997). The database contains separate national data sets in roughly five-year waves. I use

[1] See data appendix for a list of the data sets used in this study.

data on six countries for which data is available corresponding roughly to the years 1990 and 2000.[2]

To compare the relative position of households within the income distribution by the head's industry of employment, I construct indexes closely related to the commonly used ratios found in many studies on income inequality (For example, see Gottschalk and Joyce (1998) and Gottschalk and Smeeding (1997)). The three measures of position within the income distribution are:

(1) $\text{Median}_{it}/\text{Median}_{all,t}$

(2) $\text{Median}_{it}/90^{th}\ \text{Percentile}_{all,t}$

(3) $\text{Median}_{it}/10^{th}\ \text{Percentile}_{all,t}$,

where,

i=construction, manufacturing, and trade

and

t=first period (approx. 1990), second period (approx. 2000).

Measure (1) summarizes the degree to which median adjusted disposable household income for household heads of industry i is greater (or less) than median household income for all household heads at time t. Measure (2) summarizes the degree to which median adjusted disposable income for household heads of industry i is less than the 90^{th} percentile of the overall income distribution at time t. Measure (3) summarizes

[2]Because relevant data are not available for all countries for both time periods, the choice of countries to include in the study was partly dependent on data availability. In addition the data are not strictly uniform with respect to the two time periods. Data for Australia is dated 1985 and 1994, Canadian data from 1991 and 1997/98, German data 1989 and 2000, Swedish data from 1992 and 2000, and data from Finland and the USA from 1991 and 2000.

the degree to which median adjusted disposable income for household heads of industry i is greater than the 10^{th} percentile of the overall income distribution at time t.

The data are censored to include only household heads of working age, which I define as ages 15-64. Adjusted disposable household income is net of taxes and transfers and is adjusted to account for household size. On the one hand, households of larger size must spread income among more members, which reduces per capita income. On the other hand, larger households are likely to contain more earners and are able to spread fixed household costs, such as housing costs, among more household members. Economies of scale mean that multi-person households do not experience monotonically decreasing living standards as measured by per capita disposable income as household sizes increase. Like other research on household income inequality, I assume an elasticity of disposable income with respect to household size to be .5 (see Gottschalk and Smeeding 1997).

Results

Measures of Income Inequality

Before the industry-specific measures of household income inequality are discussed, three indicators of inequality are presented to describe the inequality in disposable income in the six nations (see Tables 1-6). The measures are ratios of the ninetieth and tenth percentiles (P90/P10), the fiftieth and ninetieth percentiles (P50/P90), and the fiftieth and tenth percentiles (P50/P10) of the distributions of adjusted per capita disposable household income. The results generally corroborate previous research on inequality in the income distribution. Of the nations being studied, the U.S. has highest

levels of overall inequality, and the Anglo-Saxon nations have significantly higher levels of inequality than their continental European counterparts.

Tables 1-6 about here

The trend in inequality also reveals differences between the U.S. and other nations. While in virtually all cases indicators of inequality in the other nations point to increasing inequality, the P90/P10 and P50/P10 ratios in the U.S. are falling, which is likely a result of the extraordinarily tight labor markets of the late 1990s that increased real wages of less-skilled workers.

Changes in Relative Income by Industry

If the economic structure remains relatively stabile, then one would expect that the ratio of median income of household heads employed in a given industry to the overall median to remain constant over time. The results suggest that in most cases the measures of household income inequality are quite stable; however, in some notable instances median incomes calculated for household heads' industries of employment gained or lost ground to overall median incomes. Results in Table 7 summarize the changes by industry and nation. Notice that incomes of construction households remained relatively stable, with the exception of Canada, where median construction income grew 18.9 percent relative to the overall median. None of the other changes reached conventional levels of significance.

Table 7 about here

Manufacturing was the most volatile industry group. Changes in median household disposable income reached statistical significance in three of the six nations, with the most extreme change occurring in the U.S. Manufacturing households in the U.S. and Finland both experienced increases relative to the overall median, while their counterparts in Canada experienced a decline in income relative to the overall median.

Trade, like construction, appeared to be quite stable according to this measure of inequality. The only nation whose trade households experienced a change in median income that reached statistical significance was Canada, where households whose head was employed in trade increased their position against the overall median by 12.2 percent.

Inequality by Industry (P50i/P90 and P50i/P10)

Typical households (households at the median) with heads employed in the three industries tended to lose ground with respect to per capita income to the households in the 90th percentile. Two notable exceptions to the trend are found among Canadian construction and trade households and manufacturing households in the U.S.

The P50i/P10 ratio showed the most volatility during the 1990s. In most cases the ratio increased suggesting that households with a head employed in one of the three industries gained relative to the 10th percentile in the income distribution. The pattern in the U.S. deviates from the norm in the construction and trade industries so that the median income drew closer to income at the tenth percentile. The effect is likely related to increased wages for less skilled workers as well as stagnation of wages in construction and trade. Manufacturing demonstrates the most volatility in this measure of inequality.

Five of the six nations saw typical manufacturing households increase their income relative to households at the 10th percentile of the income distribution**.**

Discussion and Conclusions

The findings suggest that households' position within the income distribution to some extent relies on their industry of employment, which, given the significant inter-industry wage differentials, may not be that surprising (for example see Krueger and Summers 1987 and Erdil and Yetkiner 2001). Perhaps more surprising is that 1) typical households defined by their heads' industries of employment appear to make significant moves within their countries income distribution over time. For example, in the U.S. manufacturing households moved from 1.13 times the average disposable per capita income to 1.48 times over the 1991-2000 period; and 2) the pattern of movement within the nation-specific household income distributions varies significantly across countries. For example, disposable per capita income of manufacturing families in the U.S. gained relative to the overall median, whereas their counterparts in Canada lost ground to the overall median.

Differences in households' relative position within the income distribution based on industry of employment both across nations and over time within nations suggests that further investigation of cross-country inter-industry comparisons of income inequality may provide a fruitful avenue for continued study. In particular, the differences in the construction sector between the U.S. and Canada and the changing fortunes of manufacturing households would likely prove intriguing topics for future research.

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Data Appendix

The LIS database consists of a collection of household income surveys from 25 countries. The data are organized into five waves, with the first wave starting around 1980, and continuing every five years culminating in the fifth wave around the year 2000. Not every country has contributed data corresponding to each wave, although there is a core of nations for which all five waves are available. Once received, the LIS harmonizes the data by constructing key variables, which are comparable across nations. One such variable is disposable household income, the variable of interest in the present study. Each survey used in the present analysis also has information on the household head's industry of employment.

The estimates are derived from the following data sets collected by the LIS:

Income and Housing Survey, Australia, 1985.

Income and Housing Survey, Australia, 1994.

Survey of Consumer Finances, Canada, 1990.

Survey of Consumer Finances, Canada, 1997.

Income Distribution Survey, Finland, 1991.

Income Distribution Survey, Finland, 2000.

German Social Economic Panel Study, Germany, 1989.

German Social Economic Panel Study, Germany, 2000.

Income Distribution Survey, Sweden, 1992.

Income Distribution Survey, Sweden, 2000.

March Current Population Survey, United States, 1991.

March Current Population Survey, United States, 2000.

Table 1

Disposable Income Per Capita by Household Head's Industry of Employment, Australia

	1991	2000	% Diff	
Ratios (All Households)				
P90all/P10all	3.99	4.44	11.3%	
P50all/P90all	0.45	0.53	16.1%	
P50all/P10all	2.20	2.34	6.3%	
Ratios (By Industry of Head)				
P50const/P50all	0.99	0.99	0.4%	
P50manuf/P50all	1.07	1.10	3.0%	
P50trade/P50all	1.11	1.06	-4.8%	
P50const/P90all	0.55	0.52	-4.1%	
P50manuf/P90all	0.59	0.58	-1.6%	
P50trade/P90all	0.61	0.56	-9.1%	*
P50const/P10all	2.17	2.32	6.7%	
P50manuf/P10all	2.36	2.58	9.5%	*
P50trade/P10all	2.44	2.47	1.2%	
Number of Observations				
Construction	511	467		
Manufacturing	985	742		
Trade	1,348	806		
All	6,842	6,029		

Source: Luxembourg Income Study data base.
*Differences in Ratios are Statistically Significant at .10 level or less.

Table 2

Disposable Income Per Capita by Household Head's Industry of Employment, Canada

	1991	2000	% Diff	
Ratios (All Households)				
P90all/P10all	4.11	4.40	7.1%	
P50all/P90all	0.44	0.54	21.7%	
P50all/P10all	2.26	2.37	4.7%	
Ratios (By Industry of Head)				
P50const/P50all	0.93	1.11	18.9%	*
P50manuf/P50all	1.04	0.99	-5.0%	*
P50trade/P50all	0.96	1.08	12.2%	*
P50const/P90all	0.51	0.59	16.3%	*
P50manuf/P90all	0.57	0.53	-7.1%	*
P50trade/P90all	0.53	0.58	9.7%	*
P50const/P10all	2.10	2.62	24.5%	*
P50manuf/P10all	2.36	2.35	-0.6%	
P50trade/P10all	2.18	2.55	17.4%	*
Number of Observations				
Construction	1,515	3,701		
Manufacturing	2,735	2,155		
Trade	2,394	2,193		
All	17,355	24,975		

Source: Luxembourg Income Study data base.
*Differences in Ratios are Statistically Significant at .10 level or less.

Table 3

Disposable Income Per Capita by Household Head's Industry of Employment, Finland

	1991	2000	% Diff	
Ratios (All Households)				
P90all/P10all	2.43	2.81	15.4%	
P50all/P90all	0.62	0.63	2.1%	
P50all/P10all	1.63	1.76	8.5%	
Ratios (By Industry of Head)				
P50const/P50all	1.01	1.01	-0.1%	
P50manuf/P50all	1.04	1.10	5.7%	*
P50trade/P50all	1.01	1.05	3.8%	
P50const/P90all	0.68	0.63	-6.2%	*
P50manuf/P90all	0.69	0.69	-0.7%	
P50trade/P90all	0.68	0.66	-2.4%	
P50const/P10all	1.64	1.78	8.3%	*
P50manuf/P10all	1.69	1.94	14.7%	*
P50trade/P10all	1.64	1.85	12.6%	*
Number of Observations				
Construction	1,053	789		
Manufacturing	1,890	1,731		
Trade	828	965		
All	10,138	8,960		

Source:Luxembourg Income Study data base.
*Differences in Ratios are Statistically Significant at .10 level or less.

Table 4

Disposable Income Per Capita by Household Head's Industry of Employment, Germany

	1991	2000	% Diff	
Ratios (All Households)				
P90all/P10all	2.87	3.14	9.4%	
P50all/P90all	0.59	0.58	-1.4%	
P50all/P10all	1.69	1.84	8.6%	
Ratios (By Industry of Head)				
P50const/P50all	0.93	0.93	0.2%	
P50manuf/P50all	1.03	1.03	-0.1%	
P50trade/P50all	0.95	0.94	-1.2%	
P50const/P90all	0.55	0.55	-0.5%	
P50manuf/P90all	0.61	0.60	-0.9%	
P50trade/P90all	0.56	0.55	-1.9%	
P50const/P10all	1.58	1.72	8.8%	
P50manuf/P10all	1.75	1.90	8.5%	*
P50trade/P10all	1.60	1.72	7.4%	
Number of Observations				
Construction	218	387		
Manufacturing	991	1,076		
Trade	143	377		
All	2,970	4,526		

Source: Luxembourg Income Study data base.
*Differences in Ratios are Statistically Significant at .10 level or less.

Table 5

Disposable Income Per Capita by Household Head's Industry of Employment, Sweden

	1991	2000	% Diff	
Ratios (All Households)				
P90all/P10all	2.75	2.93	6.5%	
P50all/P90all	0.56	0.61	7.5%	
P50all/P10all	1.77	1.78	0.4%	
Ratios (By Industry of Head)				
P50const/P50all	1.08	1.05	-3.3%	
P50manuf/P50all	1.06	1.06	-0.1%	
P50trade/P50all	1.00	1.00	0.0%	
P50const/P90all	0.70	0.64	-8.8%	*
P50manuf/P90all	0.68	0.64	-5.8%	*
P50trade/P90all	0.65	0.61	-5.8%	*
P50const/P10all	1.92	1.86	-2.9%	
P50manuf/P10all	1.88	1.89	0.3%	
P50trade/P10all	1.78	1.78	0.4%	
Number of Observations				
Construction	1,016	631		
Manufacturing	2,049	2,087		
Trade	1,224	1,219		
All	10,729	10,072		

Source: Luxembourg Income Study data base.
*Differences in Ratios are Statistically Significant at .10 level or less.

Table 6

Disposable Income Per Capita by Household Head's Industry of Employment, United States

	1991	2000	% Diff
Ratios (All Households)			
P90all/P10all	6.02	5.36	-10.9%
P50all/P90all	0.48	0.49	1.1%
P50all/P10all	2.89	2.60	-9.9%
Ratios (By Industry of Head)			
P50const/P50all	0.96	0.92	-4.3%
P50manuf/P50all	1.13	1.48	30.7% *
P50trade/P50all	0.90	0.94	4.1%
P50const/P90all	0.46	0.45	-3.2% *
P50manuf/P90all	0.54	0.72	32.2% *
P50trade/P90all	0.43	0.45	5.2%
P50const/P10all	2.79	2.41	-13.8% *
P50manuf/P10all	3.27	3.85	17.8% *
P50trade/P10all	2.60	2.44	-6.3% *
Number of Observations			
Construction	1,045	3,417	
Manufacturing	2,175	6,080	
Trade	2,062	6,013	
All	12,758	38,574	

Source: Luxembourg Income Study data base.
*Differences in Ratios are Statistically Significant at .10 level or less.

Table 7

Summary of Percent Changes in Net Disposable Income per Capita

	Australia	Canada	Finland	Germany	Sweden	U.S.
Ratios (All Households)						
P90all/P10all	11.3%	7.1%	15.4%	9.4%	11.3%	-10.9%
P50all/P90all	16.1%	21.7%	2.1%	-1.4%	16.1%	1.1%
P50all/P10all	6.3%	4.7%	8.5%	8.6%	6.3%	-9.9%
Ratios (By Industry of Head)						
P50const/P50all	0.4%	18.9% *	-0.1%	0.2%	0.4%	-4.3%
P50manuf/P50all	3.0%	-5.0% *	5.7% *	-0.1%	3.0%	30.7% *
P50trade/P50all	-4.8%	12.2% *	3.8%	-1.2%	-4.8%	4.1%
P50const/P90all	-4.1%	16.3% *	-6.2% *	-0.5%	-4.1%	-3.2% *
P50manuf/P90all	-1.6%	-7.1% *	-0.7%	-0.9%	-1.6%	32.2% *
P50trade/P90all	-9.1% *	9.7% *	-2.4%	-1.9%	-9.1% *	5.2%
P50const/P10all	6.7%	24.5% *	8.3% *	8.8%	6.7%	-13.8% *
P50manuf/P10all	9.5% *	-0.6%	14.7% *	8.5% *	9.5% *	17.8% *
P50trade/P10all	1.2%	17.4% *	12.6% *	7.4%	1.2%	-6.3% *

Source:Tables 1 through 6.

*Change in measure of position statistically significant at 10 percent level or less.