Inequality, Employment, and Migration in Oregon: a regression-based decomposition

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Introduction

Income inequality has attracted significant popular and academic attention in recent years. While popular treatment of the topic in the United States has largely focused on overall trends and political implications, many scholars have taken a more focused approach. A common method of researching inequality is to decompose inequality into the components that have an effect on it. It is also common to focus analysis on a particular region due to the wide variations in what impacts inequality that have thus far been observed.

There are numerous possible benefits of this type of analysis. First, it could help policymakers identify responses to cases in which high inequality is determined to be damaging. Additionally it can explain why inequality has generally increased despite efforts to contain it, which could have a wide array of other implications as well as explain regional differences in inequality. The degree to which inequality is seen as a problem to be corrected rather than a necessary or unavoidable fact of life is controversial. Identifying the contributors to inequality can shed light on the extent to which inequality is a bi-product of positive trends (there is considerable evidence that GDP growth and technological advancement contribute to inequality for example (Parrado and Kandel, 2010), which would point to little cause for worry or policy responses. On the other hand, if it turns out that inequality is largely tied to unintended policy effects, poverty, or decreased social mobility, then one could reasonably conclude that action to reduce income inequality is desirable.

Overall inequality in the United States and inequality in urban areas have attracted the most analysis. This is largely justified as urban areas have seen both higher and faster growing inequality in recent decades, and high urban inequality likely has a higher chance of contributing to social unrest. However, rural areas are often affected by inequality trends that diverge significantly from urban areas (Wu, Perloff, and Golan, 2006). Additionally, many areas of concentrated poverty in the United States are primarily rural (such as the Mississippi delta and Appalachia) and rural areas see higher poverty rates on average. This makes rural inequality of particular consequence to those interested in the relationship between poverty and inequality. A similar issue is that of inequality between urban and rural areas. As economic activity continues concentrate in urban areas, many in rural areas have become concerned for the economic future of their communities as many move to urban areas in search of job opportunities and typical sources of rural employment decline.

Literature on inequality decomposition points to a wide regional variation in both the components and effects of income inequality. This paper aims to focus on trends in Oregon counties as part of the common approach to study inequality decomposition on a localized basis. While inequality in Oregon is roughly average for the United States, it is one of the highest among western states and has significant regional variation in internal inequality. (Rahe, Worcel, Ruffenach, and Etuk, 2015). Additionally, rural poverty and the urban-rural disparity is particularly stark as both population and economic activity concentrates in the Portland metro area. Rural Oregon is also notable because of its historic reliance on a single industry (logging) which has seen a major decline in recent decades.

One possible component of inequality this paper aims to focus on is the role of employment trends. An idea that is gaining prominence is that inequality is related to the decline in traditional 'middle income' jobs such as manufacturing (Richardson, 1995). The theory is that as middle wage paying jobs are less prominent in the economy, inequality increases as high-income earners and low-earning service employees dominate the labor market. As traditional middle wage jobs in rural Oregon are associated with the logging industry (and to a lesser extent manufacturing), it is possible that its decline has played a role in increasing inequality. Another factor of interest is the role of migration, particularly that from rural to urban areas. It has been shown that inequality has been a major driver of rural migration in other parts of the world (Lipton , 1980), and this paper aims to determine whether it has been the case in Oregon. This paper analyzes migration and employment trends, urban-rural differences, and their respective impacts on income inequality in Oregon from 1990 to 2010.

Literature review

Previous literature about localized inequality in the United States has largely focused on overall trends or inequality in urban areas. However, Wu, Perloff, and Golan (2006) find that on a state level, inequality in rural and urban areas is only loosely correlated Additionally, they find significant policy related differences in which factors contribute to urban and rural inequality, notably that taxes reduce inequality more in urban areas while transfer programs are more effective in rural areas. Glaeser, Resseger, and Tobio (2008) address the causes and effects of inequality in urban areas and find that over the past 20 years, the root of urban inequality in the United States has shifted from being largely a function of poverty to being determined by the presence of the very wealthy today. In Oregon, by contrast, rural areas have lower inequality largely due to an absence of high-income earners according to Rahe, Worcel, Ruffenach, and Etuk (2015). A popular theory about inequality in rural areas is that it is largely driven by Hispanic population growth. Parrado and Kandel (2010) find no evidence for this and conclude instead that changes in rural inequality between the years 1990 and 2000 are better explained by economic expansion and population growth.

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While overall inequality in the United States attracts considerable attention, the detailed study of inequality decomposition and sectoral divides is largely focused internationally in development literature. The large urban-rural income disparity in China in particular has inspired study of the components of rural inequality. Wan and Zou (2005) use household level data to decompose rural inequality in China and find that geography and capital are the most significant factors. Liu (2006) analyses inequality in rural China on a regional basis and finds that trends in rural inequality often do not match the overall trend. More importantly, Liu identifies that inequalities between provinces in China are more serious than inequality within regions. This conclusion is supported by Yang (1999), who notes that China has seen income inequality rise faster than anywhere in the world and decomposes Chinese inequality into inequality within rural areas, inequality within urban areas, and sectoral disparity. He finds that the urban-rural sectoral inequality is largely responsible for this increase and it is aided by certain urban-biased policies employed by the Chinese government. Ding (2002) analyses the effects of growth, allocative efficiency, and government policies on the urban-rural income disparity in China. Key findings are that the disparity in China is growing but the rate of growth is slowing. More wealthy provinces have a smaller gap, gains from labor productivity are associated with a larger gap (not for consumption however), and the effectiveness of economic growth in affecting consumption is a fairly significantly negatively correlated with an urban-rural income gap.

Evidence from China suggests that often inequality within rural areas can miss much of how rural areas are affected by income inequality if incomes are significantly lower than in urban areas. India is another country that saw this gap grow rapidly, especially during the 1990's.

Chamarbagwala (2010) finds that during the 1990's this disparity narrowed for the top and bottom income quintiles in India but grew for the middle three. Additionally, the gap in returns to education grew for all quintiles except the highest. While the rural poor caught up in terms of labor market characteristics, economic reforms increased the gap in terms of returns to these characteristics. On the other hand, the rural rich lag far behind their urban counterparts in terms of labor markets. In the United States, rural areas have higher poverty rates (Miller and Rowley, 2002), but have lower income inequality (Wu, et al., 2006). However, the urban-rural gap is not close to as stark as it is in developing countries.

While the relationship between inequality and migration in the rural United States is unclear, these two factors are clearly heavily connected in rural areas in the developing world . Lipton (1980) finds that on a micro level inequality is a large driver of migration in developing countries and that its after effects (primarily remittances) increase inequality further both between and within regions. Migration does not equalize urban and rural sectors although it does have a smoothing effect. Literature on the net effect of migration on inequality is mixed, suggesting a relationship that is highly sensitive to regional differences. In a case study from Nicaragua, Barham and Boucher (1998) support the positive relationship found by Lipton (1980). On the other hand, Adams and Alderman (1992) find a neutral effect in Pakistan, and Zhu and Luo (2014) find a negative effect in rural China.

The possible tie between employment shifts and income inequality is another factor that could have distinctive effect on rural areas. Valetta (1997) analyzes the hypothesis that movement from middle-wage goods producing to service jobs was responsible for the increase in inequality in the 1980's . He finds this shift does increase wage disparity in the lower-end of the income spectrum, although effects are highly sensitive to control for income, gender, and part time work. Skill-biased technical change, or the change in technology that "favors skilled over unskilled labor by increasing its relative productivity," is tied to the debate on inequality by increasingly popular theories that technical progress only benefits a sub-group of workers and therefore increases wage inequality (Violante, 2001). On the other hand, Card and DiNardo (2002) argue that this theory ignores the stabilization of wage inequality during the 1990's despite rapidly improving computer technology and that age, gender, and race dynamics are far more important determinants of wage inequality. Glaeser, et al. (2008) determine that roughly one third of urban inequality in the united states is explained by inequality in skills which is in turn best explained by patterns in schooling and immigration. The idea that the prevalence of 'middle income' jobs play a role in inequality is supported Nielsen and Alderson (1997) who find that manufacturing employment in U.S counties reduces income inequality.

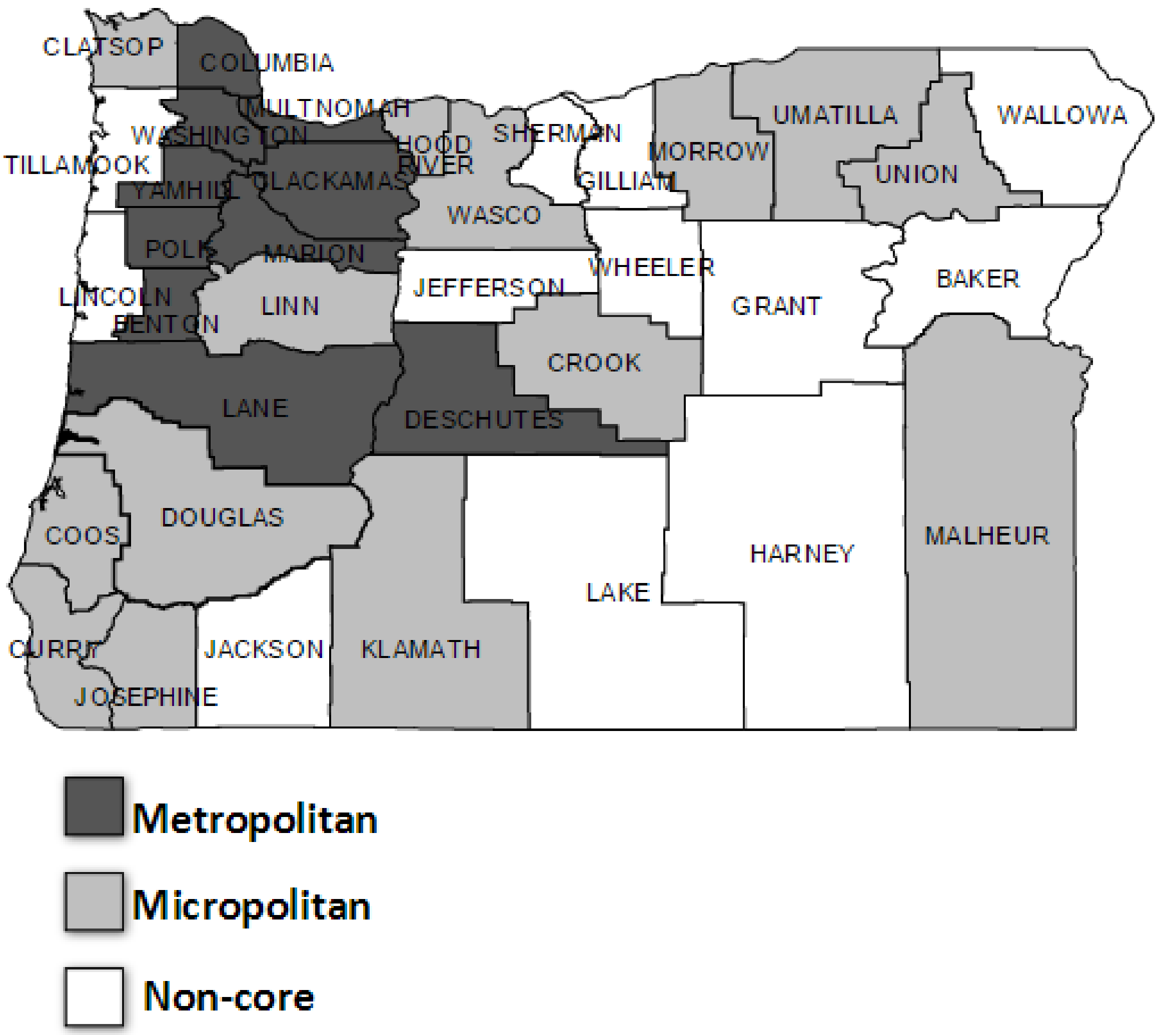
Overall income inequality in the United States has attracted considerable political attention and scholars have responded with numerous panel data analyses to account for both cross-sectional and time-series effects. Moller, Nielsen, and Alderson (2009) find that 33% of the variation in U.S inequality between 1970 and 2000 istime-series , 37% is cross-sectional across counties, and 30% is cross-sectional across states. Some key correlations are that union density, a higher minimum wage and the size of the public sector have a negative effect on inequality across time. On the other hand, changes in public welfare and education spending are significant but the size of the effects are relatively small. Nielsen and Alderson (1997) conclude that female labor force participation reduces inequality, as does manufacturing employment. The effect of the percentage of the population over the age of 65 switches direction between 1970 and 1990, and unemployment has an ambiguous effect. Daly and Wilson (2013) reject previous findings on the relationship between inequality and mortality in the U.S, finding a negative correlation instead.

Little research has been done on inequality in Oregon specifically. Rural poverty in Oregon has attracted some attention with employment shifts often named as the culprit as the state's economy continues to consolidate around the Portland metro area (Eckholm, 2006) and children in rural counties are significantly more likely to grow up in poverty (Hammond, 2009). However, inequality and poverty do not appear to be strongly related in rural Oregon. Income inequality in Oregon overall is slightly below the nation's average, but one of the highest among western states (Rahe, et al., 2015). This paper analyzes which components contribute the most to inequality in Oregonian counties and in particular determine the significance of industry shifts in employment and migration.

Data

The urban-rural distinction in Oregon is particularly stark, with its few urban areas seeing incomes and employment opportunities grow much faster than the vast, sparsely populated areas which have long relied on diminishing natural-resource industries (Crandall & Webber, 2005). While many rural Oregonians move to the Portland metro area or elsewhere in search of better employment opportunities, the sectors in which the remaining population work can be expected to play a particularly crucial role in determining both the level and distribution of incomes in rural areas. To analyze these trends, this paper utilizes a panel dataset for the 36 Oregon counties with data for the years 1990,2000, and 2010 . These are divided into 11'metro', 14 'micropolitan' and 11 'non-core ' counties as classified by the Office of Management and Budget . Metropolitan counties are those that contain an urbanized area of more than 50,000 people or are economically tied to urban counties in terms of commuting. Micropolitan counties are centered around urban areas of 10,000-50,000 people, while non-core counties are those that fail to meet either of these criteria and tend to be rural in nature (Rahe, Worcel, Ruffenach, and Etuk,2015). These divisions of Oregon counties are displayed on the map below.

Figure 1: Map of Metropolitan, Micropolitan, and Noncore counties in Oregon.



Source: County categories from the Office of Management and Budget: retrieved from "USDA Economic Research Service - What Is Rural?" http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural.aspx. Map created with Smartdraw CI.

Income inequality is measured using the gini coefficient. This index defines inequality on a scale of zero to one, with zero representing perfect equality. Gini is the most commonly used measure of income inequality although it is worth noting that many scholars opt to combine it with other measures of inequality due to its limitations. These include a lack of accounting for wealth inequality and insensitivity to inequalities within certain areas of the income spectrum. Particularly relevant to the study of rural inequality is the gini coefficient's small sample bias which reports lower levels of inequality for sparsely populated regions (Maio, 2007). This paper uses historical gini coefficients for Oregon counties calculated by the U.S census. Gini coefficients for each county over the 1990-2010 time period as well as averages for the three key types of counties discussed in this paper are shown in table 1 below.

Table 1. Gini by County: 1990-2010

Gini by County	1990	2000	2010	Average
Baker	0.408	0.414	0.450	0.424
Benton	0.442	0.459	0.472	0.458
Clackamas	0.411	0.426	0.440	0.425
Clatsop	0.414	0.433	0.443	0.430
Columbia	0.392	0.396	0.380	0.389
Coos	0.416	0.448	0.448	0.437
Crook	0.385	0.410	0.379	0.391
Curry	0.417	0.443	0.447	0.436
Deschutes	0.410	0.434	0.430	0.424
Douglas	0.396	0.411	0.414	0.407
Gilliam	0.404	0.394	0.381	0.393
Grant	0.391	0.417	0.436	0.415
Harney	0.399	0.419	0.414	0.411
Hood River	0.393	0.418	0.405	0.406
Jackson	0.433	0.449	0.442	0.441
Jefferson	0.399	0.388	0.427	0.405
Josephine	0.431	0.456	0.453	0.447
Klamath	0.420	0.443	0.440	0.434
Lake	0.409	0.436	0.454	0.433
Lane	0.429	0.449	0.454	0.444
Lincoln	0.407	0.426	0.449	0.427
Linn	0.395	0.403	0.405	0.401
Malheur	0.447	0.444	0.419	0.437
Marion	0.407	0.418	0.422	0.416

Morrow	0.400	0.391	0.403	0.398
Multnomah	0.439	0.446	0.468	0.451
Polk	0.425	0.401	0.410	0.412
Sherman	0.448	0.414	0.397	0.419
Tillamook	0.417	0.441	0.439	0.432
Umatilla	0.416	0.408	0.408	0.410
Union	0.419	0.431	0.454	0.435
Wallowa	0.399	0.442	0.419	0.420
Wasco	0.431	0.402	0.419	0.418
Washington	0.383	0.407	0.417	0.402
Wheeler	0.459	0.412	0.436	0.436
Yamhill	0.440	0.402	0.425	0.422
Metropolitan Counties	0.419	0.425	0.433	0.426
Micropolitan Counties	0.412	0.422	0.421	0.419
Non-core Counties	0.414	0.421	0.432	0.422

Source: Gini data 2010 from U.S. Census Bureau; 2006-2010 American Community Survey;
Generated using American FactFinder; < http://factfinder.census.gov>

Overall, this shows relatively small differences in Gini between the three types of counties overall. Consistent with the overall trend is metropolitan counties having the highest inequality, while micropolitan, or counties that contain and mix of urban and rural attributes, have the lowest. The counties themselves have a larger variation, with Columbia county having the lowest Gini with a 0.389 average. While Columbia is considered part of the Portland-Vancouver-Hillsboro metropolitan area, this is consistent with the wider trend of counties with the lowest inequality being mixed-urban and rural areas with commuter towns on the outskirts of a large metropolitan area. Benton county had the highest inequality with an average of 0.458 which is consistent with the trend of college towns (Corvallis being the home of Oregon State University) having relatively high inequality (U.S Census Bureau)

Employment trends are quantified with data on the number of employed individuals in each major industry groups as defined by the North American Industrial Classification System

(NAICS).[1] These are converted into a percentage of total employed persons in each county which yields a percentage distribution of industry employment. This is to adjust for the highly variable populations of Oregon counties as well as define industry trends by their growth or decline relative to other industries rather than in terms of raw numbers. These classifications serve to categorize employment data into broad industry groups that play distinct roles in the economy. While an often used alternative method is to group employment by occupation, industry groupings are better suited for the analysis of noted trends in Oregon's economy such as the relative decline of natural resource and growth of service-industry jobs. Employment in each of these sectors in Oregon in each of the three discussed years is shown in figure 2.

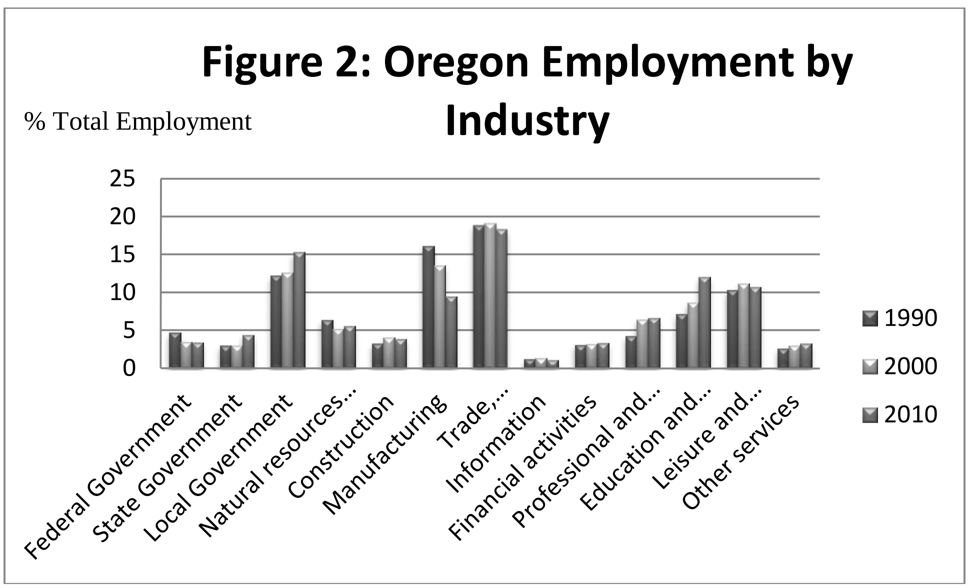


Figure 2: Oregon Employment by Industry

Source: Employment by industry data from Bureau of Labor Statistics; "Quarterly Census of Employment and Wages." <http://www.bls.gov/cew/datatoc.htm.>

This data confirms the often discussed sharp decline in manufacturing employment over this time period. In Oregon as a whole Manufacturing declined from 16% in 1990 to 9.5% of total employment in 2010. Also noteworthy is the increase in professional and business services employment as well as education and health services employment. While logging has suffered a

[1] The industry groupings used in this paper are: Federal government; state government; local government; natural resources and mining; construction; manufacturing; trade, transport, and public utilities; information; financial activities; professional and business services; education; leisure and hospitality; and other services.

long decline in recent years, natural resource and mining employment as a whole did not experience the dramatic drop that is often described, even rebounding slightly from 2000 to 2010. Relevant to the central question of this paper is average pay in each of the aforementioned industry categories which are shown below in table 2.

Table 2: Average Annual Pay (2014 Dollars) by Industry: 1990-2010

NAICS Industry Category	1990	2000	2010	Average
Federal Government	47,938	55,666	59,661	54,422
State Government	42,564	46,875	38,037	42,492
Local Government	35,467	38,333	40,033	37,945
Natural resources and mining	33,352	33,221	31,324	32,632
Construction	39,591	41,786	41,817	41,065
Manufacturing	44,258	47,845	46,348	46,151
Trade, transportation, and utilities	31,218	32,268	33,781	32,423
Information	35,405	43,543	45,227	41,392
Financial activities	31,456	36,142	38,890	35,496
Professional and business services	35,705	36,500	39,425	37,210
Education and health services	30,527	33,710	37,348	33,862
Leisure and hospitality	13,204	15,914	15,650	14,923
Other services	18,959	22,903	23,020	21,627
Average	33,819	37,285	37,736	36,280

Source: Average pay by Industry data from Bureau of Labor Statistics;
"Quarterly Census of Employment and Wages."
<http://www.bls.gov/cew/datatoc.htm.>

The low-paying service jobs that are often associated with increased inequality are best described by the leisure and hospitality and other services categories. Average annual pay for these is far below that of other categories. High income earners are few and are distributed among these categories, meaning that Federal government and manufacturing, sectors commonly associated with middle-paying jobs are actually among the highest paying of these categories.

Finally, Migration inflows and outflows are measured by address changes filed on tax returns observed by the Internal Revenue Service. These are combined to calculate net migration and adjusted as a percentage of the county's population. This variable is included to identify any trends in which migration could be tied to inequality. For example, if middle income earners consistently migrate from rural areas to cities in search of job opportunities, this could be expected to have an effect on income inequality in rural counties. . Summary statistics on the Oregon counties panel dataset are displayed below in table 3.

Table 3. Oregon Counties 1990-2010 Summary Statistics

Variable	Observations	Mean	Std. Dev	Min	Max
Gini	108	0.422	0.022	0.379	0.472
Federal Government Employment	108	3.847	3.959	0.423	19.048
State Gov Employment	108	3.450	2.948	0.000	15.970
Local Goc Employment	108	13.357	6.378	0.000	34.935
Natural Resource Employment	108	5.687	4.563	0.000	22.922
Construction Employment	108	3.717	2.217	0.000	18.506
Manufacturing Employment	108	13.032	7.302	0.000	34.544
Trade, Transport, and Utilities Employment	108	18.741	4.199	9.559	35.928
Information Employment	108	1.197	0.819	0.000	3.904
Financial Activites Employment	108	3.183	1.579	0.000	7.178
Professional and Business Services Employment	108	5.750	4.581	0.000	34.384
Education Employment	108	9.278	4.349	0.000	18.761
Leisiure and Hospitality Employment	108	10.706	4.423	3.539	29.019
Other Services Employment	108	2.952	1.109	0.000	5.264
Migration	108	0.346	1.178	-3.504	4.525

Source: Gini data 1990-2000 from US Census Bureau, Data Integration Division.
"Historical Income Tables for Counties - U.S Census Bureau.
<https://www.census.gov/hhes/www/income/data/historical/county/.>
Gini data 2010 from U.S. Census Bureau; 2006-2010 American Community Survey; Generated using American FactFinder; < http://factfinder.census.gov>
Emplyoment by Industry data from Bureau of Labor Statistics; "Quarterly Census of Employment and Wages." <http://www.bls.gov/cew/datatoc.htm.>
Migration data from Internal Revenue Service; SOI Tax Stats - Migration Data. https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data

Regression Results and Analysis

This paper utilizes a fixed-effects model to capture both cross-sectional and time-series effects on the dependent gini coefficient variable. The aforementioned explanatory variables are the percentage of employed individuals working in each of the thirteen NAICS classified industries and net migration as a percentage of a county's population. Year dummy variables capture the time-series effects of variables not included in the model, while county dummy variables capture unspecified cross-sectional effects. This regression measures the effects of the explanatory variables on the Gini coefficient in Oregon as a whole with no urban-rural distinction. Due to heteroskedasticity the results are corrected using White standard errors. The fixed effects regression model is shown below and the heteroskedasticity-corrected results are displayed in table 4; the full results including the county dummy variables can be found in the appendix.

$$\widehat{\mathbf{Gini}}_{\mathbf{i,t}}\boldsymbol{\beta}_{\mathbf{1}}\mathbf{Yr}\widehat{\mathbf{2000}}_{\mathbf{i,t}} + \boldsymbol{\beta}_{\mathbf{2}}\mathbf{Yr}\widehat{\mathbf{2010}}_{\mathbf{i,t}} + \boldsymbol{\beta}_{\mathbf{3}}\widehat{\mathbf{Fed}}_{\mathbf{i,t}} + \cdots + \boldsymbol{\beta}_{\mathbf{16}}\mathbf{Mig}_{\mathbf{i,t}} + \boldsymbol{\beta}_{\mathbf{17}}\,\mathbf{County}_{\mathbf{i,t}} + \mathbf{a}_{\mathbf{i,t}} + \mathbf{u}_{\mathbf{i,t}}$$

t= 1990,2000,2010
i= rural Oregon counties

Table 4. Fixed Effects Model Results: White's Standard Errors

Variable	Coefficient	S. E.	z-Statistic	p-Value
Dependent Variable: Gini Coefficient				
Constant	0.671	0.075257	8.91	< 2.2e-16
yearcdYR2000	0.001	0.0074813	0.16	0.8767091
yearcdYR2010	-0.002	0.013037	-0.14	0.8904771
Federal Gov Employment	-0.005	0.0022981	-1.97	0.0493014
State Gov Employment	0.001	0.0032941	0.24	0.8111649
Local Gov Employment	-0.002	0.0010336	-1.54	0.1234094
Natural Resource Employment	-0.004	0.002092	-1.74	0.0815768
Construction Employment	0.001	0.001886	0.53	0.5971577
Manufacturing Employment	-0.003	0.000983	-2.60	0.0092999
Trade, Transport, and Utilities Employment	-0.004	0.0019202	-2.17	0.0296825
Information Employment	0.006	0.0058518	1.07	0.2831524
Financial Activities Employment	-0.010	0.0043041	-2.28	0.0228002
Professional and Business Services Employment	-0.001	0.001618	-0.70	0.4822314
Education Employment	0.000	0.0014931	-0.05	0.957128
Leisure and Hospitality Employment	-0.004	0.0019159	-1.94	0.0520356
Other Services Employment	-0.001	0.0064404	-0.09	0.9315631
Migration	0.002	0.0028793	0.69	0.4874557
R-squared	0.8498			
Adjusted R-squared	0.713			
F-statistic	6.212			

p-Value of F-statistic	1.20E-10

Source: Gini data 1990-2000 from US Census Bureau, Data Integration Division.
"Historical Income Tables for Counties - U.S Census Bureau.
<https://www.census.gov/hhes/www/income/data/historical/county/.>
Gini data 2010 from U.S. Census Bureau; 2006-2010 American Community Survey; Generated using American FactFinder; < http://factfinder.census.gov>
Emplyoment by Industry data from Bureau of Labor Statistics; "Quarterly Census of Employment and Wages." <http://www.bls.gov/cew/datatoc.htm.>
Migration data from Internal Revenue Service; SOI Tax Stats - Migration Data.
https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data

This regression suggests significant employment effects on income inequality in Oregon overall. At the 5% level statistically significant explanatory variables that reduce inequality include federal government employment, trade, transport and utilities employment, and financial activities employment. Federal government employment had the highest average pay over the 1990-2010 time period and a significant effect on inequality, which is consistent with the role of the public sector described by Moller, et, al (2009). However, no evidence for a State and Local government employment effect on inequality is found. Consistent with Nielsen and Alderson (1997), manufacturing employment is found to be significant at the 1% level. This result presents the strongest evidence for the theory of manufacturing employment decline being representative of a decline in middle income jobs and a subsequent widening of the income distribution.

While Natural resource employment is significant at the 10% level, sufficient evidence for an overall effect on inequality is lacking. Similarly significant only at the 10% level is leisure and hospitality employment which is notable due to it being by far the lowest-paying of the NAICS sectors discussed in this paper. Leisure and hospitality employment can also be considered a proxy for the types of low-paying service jobs that have been frequently discussed as a possible contributor to income inequality. No evidence for a link between migration and inequality in Oregon is found.

Potential significant differences in the effects of these variables on inequality between urban and rural areas are analyzed by adding interaction terms to the original fixed effects regression. Interaction variables are added for each variable with micropolitan counties as defined by the Office of Management and Budget as well as non-core counties with metropolitan as the base. When corrected for Heteroskedasticity this regression yields no significant results and therefore they are not included. While this paper finds significant evidence for certain types of employment having an effect on inequality, there is no evidence that these effects differ significantly between metropolitan, micropolitan, and non-core counties. Likely related to this lack of an observed significant difference is the aforementioned finding that gini differences between urban and rural counties are relatively small. While it is true that large urban areas tend to have significantly higher inequality, the majority of metropolitan counties in Oregon are characterized by medium sized cities, suburbanization, and/or mixed urban and rural characteristics that do not point to especially high income inequality.

Conclusion

This paper aims to empirically evaluate a certain common narrative about the development of income inequality in Oregon. This refers to declines in employment in industries that once supported the middle class, mainly manufacturing and natural resources coupled with an increase in service employment that have been associated with increased income equality. Due to a much higher reliance on this industries in rural areas and a lack of new employment opportunities, rural areas may experience 1: A distinct effect of these trends on inequality and 2. Ties between these trends and migration as those previously employed in these industries migrate to cities in search of new employment opportunities. Significant evidence for the first portion of this theory is found in this paper as certain industries, manufacturing in particular, are found to have a significant negative effect on inequality in Oregon. On the other hand, no evidence is found that these trends manifest themselves differently in rural areas, and no link to migration is found.

The broad analysis of these trends using county distinctions on the other hand is likely to miss key distinctions between urban and rural areas. First, with the exception of Multnomah county and Portland, all Oregon counties, even those specified as metropolitan or micropolitan, contain significant rural areas which are missed by the analysis. Second, county classifications consider urban counties to be those that contain an urban area of more than 50,000 people, meaning that differences between small and very large cities are not captured. Further research with more specific data would likely have a better chance of indentifying how these trends have affected rural areas. This paper's findings support previous theories that manufacturing employment reduces inequality, however, there is much research to be done on the meaning of this trend, in particular how it relates to technological change and wider employment trends.

Appendix

Table 3. Full Fixed Effects Model Results: White's Standard Errors

Variable	Coefficient	S. E.	z-Statistic	p-Value
Dependent Variable: Gini Coefficient				
Constant	0.671	0.075257	8.91	< 2.2e-16
yearcdYR2000	0.001	0.0074813	0.16	0.8767091
yearcdYR2010	-0.002	0.013037	-0.14	0.8904771
Federal Gov Employment	-0.005	0.0022981	-1.97	0.0493014
State Gov Employment	0.001	0.0032941	0.24	0.8111649
Local Goc Employment	-0.002	0.0010336	-1.54	0.1234094
Natural Resource Employment	-0.004	0.002092	-1.74	0.0815768
Construction Employment	0.001	0.001886	0.53	0.5971577
Manufacturing Employment	-0.003	0.000983	-2.60	0.0092999
Trade, Transport, and Utilities Employment	-0.004	0.0019202	-2.17	0.0296825
Information Employment	0.006	0.0058518	1.07	0.2831524
Financial Activites Employment	-0.010	0.0043041	-2.28	0.0228002
Professional and Business Services Employment	-0.001	0.001618	-0.70	0.4822314
Education Employment	0.000	0.0014931	-0.05	0.957128
Leisiure and Hospitality Employment	-0.004	0.0019159	-1.94	0.0520356
Other Services Employment	-0.001	0.0064404	-0.09	0.9315631
Migration	0.002	0.0028793	0.69	0.4874557
CountyBenton	-0.039	0.02139	-1.81	0.0705668
CountyClackamas	0.010	0.02456	0.41	0.6788413
CountyClatsop	0.009	0.023324	0.39	0.6946199
CountyColumbia	-0.028	0.029874	-0.94	0.3463037
CountyCoos	0.007	0.021361	0.30	0.760853
CountyCrook	-0.018	0.026005	-0.69	0.4901007
CountyCurry	0.021	0.019783	1.06	0.290125
CountyDeschutes	-0.005	0.023344	-0.23	0.8204576
CountyDouglas	-0.018	0.01335	-1.37	0.1698446
CountyGilliam	-0.154	0.041039	-3.76	0.0001726
CountyGrant	0.002	0.024808	0.07	0.9417009
CountyHarney	0.004	0.021826	0.19	0.8522799
CountyHood River	-0.007	0.045428	-0.16	0.8702974
CountyJackson	0.010	0.018541	0.55	0.5838283
CountyJefferson	-0.032	0.030085	-1.06	0.2885297
CountyJosephine	0.013	0.015603	0.85	0.3947435
CountyKlamath	0.007	0.013505	0.50	0.614419
CountyLake	0.039	0.028589	1.38	0.1685417
CountyLane	-0.007	0.01704	-0.40	0.6914539
CountyLincoln	0.021	0.034039	0.61	0.5429053
CountyLinn	-0.034	0.020546	-1.67	0.0949115
CountyMalheur	0.002	0.038523	0.05	0.9623391
CountyMarion	-0.054	0.044081	-1.23	0.219185
CountyMorrow	0.009	0.047928	0.19	0.8478858
CountyMultnomah	0.024	0.023462	1.03	0.3016155
CountyPolk	-0.045	0.038408	-1.17	0.2415423

CountySherman	0.028	0.039457	0.70	0.4830894
CountyTillamook	0.001	0.019468	0.06	0.9521845
CountyUmatilla	-0.022	0.022389	-0.96	0.3348272
CountyUnion	-0.017	0.029221	-0.58	0.5620136
CountyWallowa	0.012	0.018542	0.67	0.5040282
CountyWasco	0.000	0.034942	-0.01	0.9928504
CountyWashington	-0.032	0.030715	-1.05	0.2930887
CountyWheeler	-0.142	0.047393	-3.00	0.0026602
CountyYamhill	-0.006	0.029831	-0.22	0.8285972
R-squared	0.8498			
Adjusted R-squared	0.713			
F-statistic	6.212			
p-Value of F-statistic	1.20E-10			

Source: Gini data 1990-2000 from US Census Bureau, Data Integration Division. "Historical Income Tables for Counties - U.S Census Bureau. <https://www.census.gov/hhes/www/income/data/historical/county/.>

Gini data 2010 from U.S. Census Bureau; 2006-2010 American Community Survey; Generated using American FactFinder; < http://factfinder.census.gov>

Emplyoment by Industry data from Bureau of Labor Statistics; "Quarterly Census of Employment and Wages." <http://www.bls.gov/cew/datatoc.htm.>

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