Green Skills and Green Potential Prevalence: An Application to Appalachia

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Introduction

Public policy and social investment incentivize reduced carbon emissions and greater resource efficiency in a green economy. The shift toward a greener economy will induce changes in the labor market. New industries and jobs will emerge that are linked to the green economy. Energy-intensive and polluting industries will reallocate or scale down their operations while the expansion of environmentally friendly industries increases. This decreases employment in non-green jobs (Mulatu and Wossink, 2014; Kahn and Mansur, 2013) while increasing employment in environmentally sustainable industries. These structural change in the labor market will result in both a change in the **types** of occupations and the **skills** demanded within existing occupations. It is important to know which occupation, industry, and geographic regions will struggle with a green transition. This information provides policymakers with a framework of information to craft and address regional disparities and to make more informed decisions of how and where to train the future workforce.

Research Goal

- To create a measure that summarizes a region's green job skill capital.
- To create a measure of labor market vulnerability to a green labor market transition.

Data

In this project, we use Occupational data and employment data from O *NET. O *NET is database developed by the US Department of Labor. The dataset contains detailed occupation-level information on the tasks and skills involved as well as a list of tasks that are unique to green jobs. The most recently available national data containing occupational composition comes from the American Community Survey (ACS) 2019-1 year data.

Methodology

We first construct Green Potential for each occupation by applying Natural Language Processing and clustering. Then following Rutzer's (2020) methodology, we apply machine learning techniques to identify the skills needed for smooth transitioning of occupations. We then merge these occupations with occupation data from the American Community Survey (ACS) to create a green job skill matrix for each community.

Construct Green Potential

This indicator represents the ease of transitioning into a green economy. A higher value of G means that occupation has a higher ratio of green tasks over all tasks required for this job.

Figure 1: Work Flow of Constructing Occupational Green Potential

Table 1: Constructing a Cluster Greenness Score

Cluster	Vector of Tasks	Total Tasks in Cluster	Number of Green Tasks in cluster	Cluster Greenness score
1	Task 1, Task 2, Task 20, Task 51, Task 52, Task 1001, Task 12,298, Task 12,999	8	2	0.25
2	Task 6, Task 7,Task 8, Task 9, Task 8000	5	3	0.6
3	Task 14, Task 15, Task 16, Task 17	3	0	0
4	Task 33, Task34	2	1	0.5

Table 2 Green Task Potential of Occupations

Occupation	# of necessary tasks	Tasks	Cluster	Cluster Greenness score	Occupation Green Task Potential Score
civil engineer	2	Task 1	1	0.25	0.85
civil engineer	2	Task 6	2	0.6	0.85
economist	4	Task 1	1	0.25	1.35
economist	4	Task 6	2	0.6	1.35
economist	4	Task 14	3	0	1.35
economist	4	Task 33	4	0.5	1.35

Results

By linking our Green Potential Index driven by the O*NET data and the occupation data from ACS, we can conduct our analysis at the PUMAs level, the lowest level of geographic identifier available in the ACS, and map the Green Potential geographically.

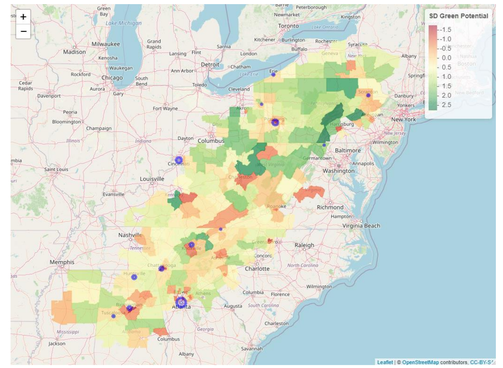

Figure 2: Green Potential by PUMA, Appalachia

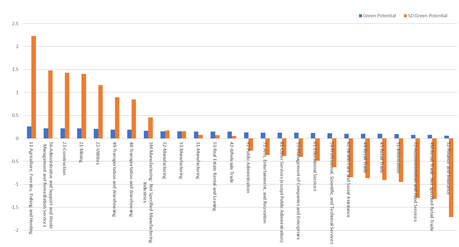

Figure 3: Green Potential by NAICS, Appalachia

Future Plan

Future Extensions will build on this measure to construct a skill distance index. A skill distance measure will estimate how far a regions skill capital is from a hypothetical amount of green skill capital. It is a measure of labor market vulnerability to transitioning to a green economy.