

# Estimating Core Unemployable And Workforce Non-Participants: A Study Of Rural Pennsylvania's Labor Force

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## ABSTRACT

*Rural unemployment rates persistently have run higher than the national average for many years. In addition, multiple studies have established that rural underemployment also remains a long-running problem. Unfortunately, it is not yet fully understood how the various factors contributing to rural unemployment and underemployment interact to adversely affect rural labor markets. The contribution of this paper is to gain insight as to the amount of slack labor force at the county level, focusing on the application to the labor force of rural Pennsylvania. By comparing the actual number of working-age adults presently not in a county's labor force (using data from the Bureau of Labor Statistics and the US Census) against an estimated number of core unemployable and workforce non-participants (Core NPW) individuals in the county we can generate estimates of the potential up-swing in employment for the regional labor market if participation rates were to become among the best in their national peer group. The study's methodology and findings provide guidance to policy makers in identifying regions most likely in need of greater assistance as to how to best spend scarce public dollars across various programs aimed at improving local labor markets.*

**Keywords:** Rural economics, employment, unemployment, measurement issues

## INTRODUCTION

Rural unemployment rates persistently have run higher than the national average for many years. In addition, multiple studies have established that rural underemployment also remains a long-running problem. Examples of earlier research documenting the rural underemployment and unemployment problem include work by Ham (1982) and Lichter and Costanzo (1987). Since 1990, a growing literature has examined rural labor market outcomes. Studies by Isserman and Rephann (1993), Hamrick (1997), and Jensen, Findis, and Wang (1999), among others, have identified several contributing factors to higher rural unemployment and underemployment. These factors include the declining importance of manufacturing and natural resource sectors, lagging educational attainment in rural areas, lower levels of public services support than in urban areas, and geographic isolation.

State government programs to reduce rural unemployment and underemployment reflect the above determinates of poor labor market outcomes. State economic development programs aimed at attracting or retaining employers in the state's rural counties are addressing the job demand side of rural labor markets. State support for education and skill training in rural areas is intended to increase the supply of higher skilled workers in these regions, thereby improving the quality of the labor supply in rural markets and hopefully stimulating greater demand for rural labor services. Lastly, there is a collection of government programs such as child care assistance, disability assistance, and transportation services that can be thought of as helping to eliminate barriers preventing potential workers from joining the labor force in rural areas.

Unfortunately, it is not yet fully understood how the various factors contributing to rural unemployment and underemployment interact to adversely affect rural labor markets. This lack of understanding regarding the most important determinates of rural unemployment and underemployment, and their interactive effects, complicates the targeting of scarce public tax dollars on programs most likely to improve rural labor markets. Moreover, given the diversity of what constitutes what is rural, it is important to be able to distinguish across the spectrum.

This paper introduces a methodology for peer group classification at the county levels, enabling comparisons of economic outcomes across peer groups. The methodology also generates plausible estimates of the total number non-employable, non-potential workers in a county. The methodology is applied to the rural regions Pennsylvania.

**METHODOLOGY OF STUDY**

Explained here is the process used to generate “peer group” counties for each Pennsylvania county, the method which can be applied to any county in the United States. These peer groups are used several times in the analysis that follows as a way of benchmarking the performance of rural Pennsylvania<sup>1</sup> counties against 3,108 counties in the contiguous United States. In addition, every county in the contiguous 48 states is assigned to one of 20 constructed peer groups based on similarities in their underlying industrial structure and their degree of urban or rural similarity. The performance of each rural Pennsylvania county versus its national peer group on several labor market outcomes is assessed. The outcomes across peer group counties are used to approximate (using US Census data) for each rural Pennsylvania county the number of “Core Unemployable and Not Participating in Workforce” (Core NPW) individuals in the county.

**Table 1: USDA Economic Research Service 2003 Urban Influence Codes**

Code	Description	Population per sq. mile (National averages)
1	In large metro area of 1+ million residents	558.0
2	In small metro area of less than 1 million residents	132.4
3	Micropolitan adjacent to large metro	54.7
4	Noncore adjacent to large metro	26.8
5	Micropolitan adjacent to small metro	51.4
6	Noncore adjacent to small metro with own town	23.5
7	Noncore adjacent to small metro no own town	5.6
8	Micropolitan not adjacent to a metro area	27.0
9	Noncore adjacent to micro with own town	16.7
10	Noncore adjacent to micro with no own town	6.7
11	Noncore not adjacent to metro or micro with own town	4.6
12	Noncore not adjacent to metro or micro with no own town	3.5

**Table 2: USDA Economic Research Service County Typology Codes (CTC)**

Abbreviation	Classification
Farm	Farming-dependent (none in Pennsylvania)
Mine	Mining-dependent
Manf	Manufacturing-dependent
Fsgov	Federal/state government-dependent
Serv	Services-dependent
Nonsp	Non-specialized

<sup>1</sup> This study uses the definition of rural as employed by the Center for Rural Pennsylvania which is based on population density. A county is rural when the number of persons per square mile within the county or school district is less than 274, which is the state average. When applying the definition to counties, 48 of Pennsylvania's 67 counties are considered rural. (See [http://www.ruralpa.org/rural\\_urban.html](http://www.ruralpa.org/rural_urban.html))

Table 3: Pennsylvania Counties within Peer Groups

Peer Group Number	Peer Group	Number of Counties in Peer Group	Pennsylvania Counties in Peer Group
1	UIC: 1 CTC: Nonspecialized	139	Armstrong, Beaver, Fayette, Washington
2	UIC: 1 CTC: Service	127	Allegheny, Bucks, Chester, Delaware, Montgomery, Philadelphia, Pike
3	UIC: 1 CTC: Manufacturing	98	Butler, Westmoreland
4	UIC: 2 CTC: Manufacturing	222	Berks, Erie, Lancaster, Lebanon, Lehigh, Lycoming, Mercer, Wyoming, York
5	UIC: 2 CTC: Federal or State government	111	Centre, Dauphin
6	UIC: 2 CTC: Non-specialized	193	Blair, Carbon, Luzerne, Northampton, Perry
7	UIC: 2 CTC: Service	98	Cambria, Cumberland, Lackawanna
8	UIC: 3 CTC: All	92	Indiana, Lawrence, Monroe, Venango
9	UIC: 4 CTC: All	123	Clarion, Greene
10	UIC: 5 CTC: Manufacturing	139	Adams, Bradford, Clinton, Columbia, Crawford, Franklin, Mifflin, Northumberland, Schuylkill, Warren
11	UIC: 5 CTC: Non-specialized	76	Clearfield, Somerset
12	UIC: 5 CTC: Farming, Mining, Federal or State Government, Service	86	Huntingdon, Montour, Union
13	UIC: 6 CTC: Manufacturing	15	Bedford, Tioga
14	UIC: 6 CTC: Farming, Mining, Federal or State Government, Service, or Non-specialized	207	Wayne
15	UIC: 7 CTC: Non-specialized	56	Sullivan, Susquehanna
16	UIC: 7 CTC: Farming, Mining, Federal or State Government, Service, or Manufacturing	126	Fulton, Juniata
17	UIC: 8 CTC: Manufacturing	69	Elk, McKean, Snyder
18	UIC: 9 CTC: Manufacturing	53	Cameron, Jefferson
19	UIC: 9 CTC: Non-specialized	77	Potter
20	UIC: 10 CTC: All	196	Forest

These peer groups were based on county classification codes designated by the United States Department of Agriculture's Economic Research Service. Two types of these codes were utilized, Urban Influence Codes (UIC) (Table 1) and 2004 County Typology Codes (CTC) (Table 2). The UIC is a measure of "population size, urbanization, and access to larger communities," and the CTC is a measure of economic dependence. UIC are numerical from 1 to 12 with 1 representing a county that is the most urban and a 12 representing a county that is the least urban. CTC are six mutually-exclusive categories of economic dependency including farming-dependent, mining-dependent, manufacturing-dependent, federal/state government-dependent, services-dependent, and non-specialized.

The national data was first sorted based on their Urban Influence Code (UIC). No Pennsylvania counties fell in UIC 11 or 12, so these were ignored. Next, within each of the 10 UIC groupings a data sort was done based on the County Typology Code (CTC). Counts were then taken to assess the number of counties in each group when they were based on both UIC and CTC. Some groups were found to be too small on their own, and for those groups, one or more CTC within a UIC were combined to form the peer group. Three UIC (3, 4, and 10) were small enough that all of their CTC were combined into one group.

Each Pennsylvania county was placed into one of 20 different constructed peer groups containing from 53 to 222 counties drawn from the set of counties in the 48 contiguous states. The combinations of the UIC and CTC codes used to create each peer group are reported in Table 3 along with the Pennsylvania counties in each peer group and the number of total counties in each peer group. Note that not all US counties will appear in a peer group because some have an 11 or 12 UIC or have a 1-10 UIC with a CTC that is not included in the peer groups to which Pennsylvania counties belong.<sup>2</sup>

### **ESTIMATES OF THE CORE UNEMPLOYABLE**

One concern when evaluating current rural labor market outcomes in Pennsylvania, and elsewhere, is the extent to which a lack of job skills, or a mismatch between job skills and job demand, has rendered a significant portion of the rural populace essentially unemployable. While it would be quite useful to have accurate estimates of the size of these “core unemployable” cohorts in each county, there are many challenges in estimating such numbers. At any point in time, the working-age adults not employed in a county can be classified into one of three categories: those lacking the job skills needed to obtain employment, those having the needed job skills who are temporarily unemployed (often referred to as “frictionally” unemployed), and those who for whatever reason have employable job skills but simply are not going to be drawn into the labor force. It is only the first of these three categories that fits the notion of “core unemployable”, but the size of the other two groups also clearly impact the maximum possible employment for a county given the size of its working-age populace.

Given the difficulties inherent in untangling the above three categories of not employed working-age adults, an alternative definition: “Core Not Potential Workers” or “Core NPW” is employed. Core NPW is defined as the lowest ratio feasible for a county of its not employed working-age adults to its total working-age population. Core NPW will be the sum of the true core unemployable, the minimum feasible frictional unemployment rate, and the minimum cannot be drawn into the labor force. The Core NPW for a county depends upon county characteristics such as its underlying industrial structure and its degree of geographic isolation.

By comparing the actual number of working-age adults presently not in a county’s labor force against this estimated Core NPW, this study provides estimates of the potential up-swing in employment for rural Pennsylvania counties if their labor market participation rates were to become among the best in their national peer group. The study’s findings provide guidance to policy makers as to how to best spend scarce public dollars across the various programs aimed at improving rural labor markets.

Core NPW approximations of each Pennsylvania county is generated as follows. Based upon the creation of the twenty national county peer groups described in the appendix, the 90<sup>th</sup> percentile value of its peer group’s age-adjusted employment to population ratio is calculated for each Pennsylvania county. This 90<sup>th</sup> percentile value is regarded as a realistic estimate of the “best the county can expect to do” given its underlying characteristics. Hence, the Core NPW estimate becomes 1 – 90<sup>th</sup> percentile value for employment to population ratio multiplied by the county’s working-age population. These estimates are presented in Table 4 for each county. Note that for Franklin, Dauphin, Lancaster, Lebanon, and Montgomery counties the estimated Core NPW slightly exceeds the actual count of adults not working because those four counties slightly exceeded the 90<sup>th</sup> percentile within their respective peer groups. All other Pennsylvania counties were below the 90<sup>th</sup> percentile of their peer group.

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<sup>2</sup> Those readers interested in knowing exactly which counties are used to benchmark the performance of a particular county may request a copy of the table of US counties by peer group from the authors.

Table 4: Core Not Potential Workers (NPW) for 2004

County	15-64 Years Population	Total Employment	Total Adults Not Working	Estimated Number Core NPW
<i>Urban</i>				
Allegheny	815,849	610,081	205,768	176,509
Beaver	114,800	85,105	29,695	27,594
Berks	259,328	187,209	72,119	54,387
Bucks	417,303	324,205	93,098	90,283
Chester	315,751	239,311	76,440	68,313
Cumberland	150,805	114,931	35,874	30,930
Dauphin	167,607	129,336	38,271	40,684
Delaware	364,450	266,998	97,452	78,849
Erie	186,891	131,944	54,947	39,195
Lackawanna	135,678	99,316	36,362	27,827
Lancaster	314,286	256,189	58,097	65,913
Lebanon	80,837	66,832	14,005	16,953
Lehigh	213,479	160,654	52,825	44,771
Luzerne	204,343	147,308	57,035	41,273
Montgomery	510,334	405,204	105,130	110,411
Northampton	189,929	138,439	51,490	38,361
Philadelphia	966,804	584,547	382,257	209,168
Westmoreland	240,515	174,959	65,556	52,837
York	270,255	206,542	63,713	56,679
<i>Rural</i>				
Adams	66,438	50,800	15,638	14,992
Armstrong	46,564	31,422	15,142	11,192
Bedford	32,529	22,323	10,206	7,102
Blair	82,940	62,176	20,764	16,752
Bradford	40,532	30,816	9,716	9,146
Butler	120,602	89,400	31,202	26,494
Cambria	96,225	62,911	33,314	19,736
Cameron	3,585	2,473	1,112	659
Carbon	40,282	28,136	12,146	8,136
Centre	106,277	69,088	37,189	25,797
Clarion	27,964	19,398	8,566	5,753
Clearfield	54,871	38,705	16,166	10,821
Clinton	24,989	17,726	7,263	5,639
Columbia	44,628	31,556	13,072	10,070
Crawford	58,843	39,730	19,113	13,278
Elk	21,994	16,623	5,371	3,789
Fayette	94,032	60,762	33,270	22,602
Forest	3,239	2,020	1,219	222
Franklin	87,275	71,586	15,689	19,694
Fulton	9,637	7,214	2,423	1,574
Greene	27,525	16,155	11,370	5,663
Huntingdon	31,411	20,265	11,146	7,498
Indiana	61,889	41,974	19,915	13,145
Jefferson	29,618	21,019	8,599	5,448
Juniata	15,048	12,471	2,577	2,458
Lawrence	59,202	41,594	17,608	12,574
Lycoming	78,536	56,971	21,565	16,471
McKean	29,220	20,643	8,577	5,034
Mercer	77,000	52,319	24,681	16,149
Mifflin	29,118	21,359	7,759	6,571
Monroe	108,837	72,876	35,961	23,116
Montour	11,487	8,504	2,983	2,742
Northumberland	60,418	43,228	17,190	13,633

Table 4: Core Not Potential Workers (NPW) for 2004 (continued)

County	15-64 Years Population	Total Employment	Total Adults Not Working	Estimated Number Core NPW
<i>Rural continued</i>				
Perry	30,553	23,058	7,495	6,171
Pike	36,053	22,882	13,171	7,800
Potter	11,409	8,096	3,313	1,626
Schuylkill	96,278	65,753	30,525	21,725
Snyder	25,703	18,916	6,787	4,428
Somerset	52,042	37,062	14,980	10,263
Sullivan	4,077	2,962	1,115	763
Susquehanna	27,593	20,520	7,073	5,165
Tioga	27,671	20,053	7,618	6,041
Union	30,409	16,817	13,592	7,259
Venango	36,674	25,035	11,639	7,789
Warren	27,658	20,215	7,443	6,241
Washington	134,791	95,814	38,977	32,399
Wayne	32,067	23,043	9,024	5,606
Wyoming	18,966	13,402	5,564	3,978

The differences between the actual number of adults not working and the estimated Core NPW for many rural Pennsylvania counties suggests that many of the non working adults should not be regarded as Core NPW. A more accurate understanding of the potential gains for each Pennsylvania county from improving its ranking relative to its peer group can be seen in Table 5. The information in Table 5 indicates the change in county employment for 2004 if the county's age-adjusted employment to population ratio had been at the indicated percentile ranking for its national peer group. Negative values in a cell entry mean that the county's actual 2004 employment to population (from Bureau of Labor Statistics sources) ratio exceeded the indicated percentile ranking for its peer group. Counties are sorted by their 2004 employment to population ratio.

Table 5: Job Creation if Counties Perform at Peer Group Percentiles 2004

County	Emp/Pop Ratio	Jobs Created at Percentile				
		90th	80th	70th	60th	50th
<i>Urban</i>						
Lebanon	82.7%	-2,948	-5,986	-7,493	-8,993	-9,849
Lancaster	81.5%	-7,816	-19,625	-25,485	-31,318	-34,645
Montgomery	79.4%	-5,281	-14,502	-20,850	-25,987	-30,434
Bucks	77.7%	2,815	-4,726	-9,916	-14,117	-17,753
Dauphin	77.2%	-2,413	-5,574	-8,608	-10,650	-14,325
York	76.4%	7,034	-3,121	-8,159	-13,175	-16,036
Cumberland	76.2%	4,944	1,408	-123	-1,517	-3,625
Chester	75.8%	8,127	2,422	-1,506	-4,684	-7,435
Lehigh	75.3%	8,054	32	-3,948	-7,910	-10,170
Allegheny	74.8%	29,259	14,518	4,369	-3,843	-10,952
Beaver	74.1%	2,101	442	-773	-2,340	-3,452
Delaware	73.3%	18,603	12,018	7,485	3,816	641
Lackawanna	73.2%	8,535	5,353	3,976	2,721	825
Northampton	72.9%	13,129	5,969	3,209	-615	-3,885
Westmoreland	72.7%	12,719	4,609	-26	-2,833	-6,014
Berks	72.2%	17,732	7,988	3,153	-1,660	-4,406
Luzerne	72.1%	15,762	8,059	5,090	976	-2,542
Erie	70.6%	15,752	8,729	5,245	1,776	-202
Philadelphia	60.5%	173,089	155,620	143,594	133,862	125,438

Table 5: Job Creation if Counties Perform at Peer Group Percentiles 2004 (continued)

County	Emp/Pop Ratio	Jobs Created at Percentile				
		90th	80th	70th	60th	50th
<i>Rural</i>						
Juniata	82.9%	119	-413	-1,136	-1,483	-2,285
Franklin	82.0%	-4,005	-5,233	-7,655	-9,327	-10,161
Adams	76.5%	646	-289	-2,132	-3,406	-4,040
Bradford	76.0%	570	0	-1,125	-1,902	-2,289
Elk	75.6%	1,582	513	33	-462	-998
Perry	75.5%	1,324	172	-272	-887	-1,413
Blair	75.0%	4,012	885	-320	-1,990	-3,418
Fulton	74.9%	849	508	45	-177	-691
Susquehanna	74.4%	1,908	725	238	-38	-1,195
Butler	74.1%	4,708	641	-1,683	-3,090	-4,686
Montour	74.0%	241	0	-182	-459	-818
Snyder	73.6%	2,359	1,109	549	-30	-656
Mifflin	73.4%	1,188	779	-29	-587	-865
Warren	73.1%	1,202	813	45	-485	-749
Sullivan	72.7%	352	177	105	64	-107
Lycoming	72.5%	5,094	2,143	679	-779	-1,610
Tioga	72.5%	1,577	532	-223	-846	-1,550
Wayne	71.9%	3,418	2,232	1,482	429	-751
Northumberland	71.5%	3,557	2,706	1,030	-128	-705
Somerset	71.2%	4,717	2,159	415	-353	-1,454
Washington	71.1%	6,578	4,630	3,204	1,363	58
Jefferson	71.0%	3,151	2,480	779	18	-588
Potter	71.0%	1,687	1,004	720	339	32
Clinton	70.9%	1,624	1,273	579	100	-138
Columbia	70.7%	3,002	2,374	1,135	280	-146
Wyoming	70.7%	1,586	874	520	168	-33
McKean	70.6%	3,543	2,123	1,485	827	116
Clearfield	70.5%	5,345	2,648	809	0	-1,161
Lawrence	70.3%	5,034	3,063	2,354	1,309	366
Carbon	69.8%	4,010	2,491	1,906	1,095	402
Clarion	69.4%	2,813	2,019	1,413	463	-216
Cameron	69.0%	453	371	165	73	0
Bedford	68.6%	3,104	1,876	988	256	-572
Schuylkill	68.3%	8,800	7,445	4,773	2,928	2,008
Venango	68.3%	3,850	2,629	2,189	1,542	958
Mercer	67.9%	8,532	5,639	4,203	2,774	1,959
Indiana	67.8%	6,770	4,710	3,968	2,876	1,891
Crawford	67.5%	5,835	5,007	3,374	2,246	1,684
Armstrong	67.5%	3,950	3,277	2,784	2,148	1,697
Monroe	67.0%	12,845	9,222	7,917	5,996	4,264
Cambria	65.4%	13,578	11,322	10,345	9,456	8,110
Centre	65.0%	11,392	9,387	7,464	6,169	3,838
Fayette	64.6%	10,668	9,309	8,314	7,030	6,119
Huntingdon	64.5%	3,648	2,989	2,492	1,733	752
Pike	63.5%	5,371	4,720	4,271	3,908	3,594
Forest	62.4%	997	802	669	565	448
Greene	58.7%	5,707	4,925	4,329	3,394	2,725
Union	55.3%	6,333	5,695	5,214	4,479	3,529

Particularly for those rural counties with the lower 2004 employment to population ratios, substantial employment gains would be possible simply by moving above the 50<sup>th</sup> or 60<sup>th</sup> percentile of their national peer group. With the probable exception of Centre County, whose results are skewed by the many university students (Penn

State University), the lower sorted rural counties on this list are those counties most likely to have appreciable underutilized labor available in their county labor markets.

## CONCLUSION

In order to gauge the potential amount of labor that could be drawn into each rural counties labor force if sufficient labor demand existed, estimates are generated of the size of the “Core Not Potential Workers” by county. These estimates are based on the upper range of labor market outcomes within the relevant national peer group for each rural Pennsylvania county. On this basis, many rural counties within the state could expand their workforce considerably above their existing working-age population base as 15 of 48 rural counties have a “Total Adults Not Working” value more than 50 percent larger than their Core NPW (found by taking the ratio of these two values for each county found in Table 4). These counties, in ascending order of underutilized labor, are: Indiana, Mercer, Snyder, Fulton, Monroe, Jefferson, Wayne, Cameron, Cambria, Pike, McKean, Union, Greene, Potter, and Forest.

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## REFERENCES

1. Ham, J.C., 1982 “Estimation of a Labour Supply Model with Censoring Due to Unemployment and Underemployment”, *Review of Economic Studies* 49(157), pp. 335-354.
2. Hamrick, K.S. 1997, “Rural Labor Markets Often Lead Urban Markets in Recessions and Expansions”, *Rural Development Perspectives*, 12(3).
3. Isserman, A., and T. Rephann. 1993. “Geographical and Gender Differences in Labor Force Participation: Is There an Appalachian Effect?” *Growth and Change* 24 (Fall): 539-578.
4. Jensen, L., J. Findeis, Q. Wang. 1999. “Labor Supply and Underemployment in the Southern United States.” Paper for Southern Regional Science Association, April 16, 1999, Richmond, VA.
5. Lichter, D. and J. Costanzo. 1987. “Non-metropolitan Underemployment and Labor Force Composition”, *Rural Sociology* 52 (Fall): 329-344.