

INDUSTRY MIX, WAGES, AND THE DIVERGENCE OF COUNTY INCOME IN PENNSYLVANIA

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Per capita incomes have diverged across Pennsylvania counties. County incomes may differ because of differences in industrial structures and because of differences in earnings within industries; a county may have a below-average income because its industry mix is comprised of low paying jobs or because county jobs pay low wages compared to the same jobs in other counties. A procedure developed by Hanna (1951) is utilized to separate income differences into these two components by constructing two counterfactual incomes for each county. The handful of high-income counties in Pennsylvania have favorable wages while the counties with incomes below the state average, although with employment mixes comparable to the overall state mix, tend to have workers who receive low wages relative to the state industry average. Wages are low in the relatively poor counties due to less investment in physical and human capital.

1. Introduction

The neoclassical growth model predicts convergence: poor regions will grow faster than rich regions so that living standards across all regions will eventually be the same, even though some may start out way behind. However, the experience of the economies of the 67 Pennsylvania counties has been divergence. Workers in the relatively rich counties earn a higher average income than those in the relatively poor ones and this income gap is widening. Total income per worker in the poorest Pennsylvania county, Sullivan, in the period 1969-71, was 59% of that per worker in the richest county, Philadelphia. By 1996-98, total earnings per worker in the poorest county, still Sullivan, were just 48% that of the richest county, now Montgomery, a suburb of Philadelphia. For 1969-71, the standard deviation of real total earnings per capita across Pennsylvania counties was \$3,476; in 1996-98, it was \$4,659. Barro and Sala-i-Martin (1995, p. 383) call this σ -divergence. This paper investigates the sources of this income divergence across Pennsylvania counties. Has income diverged because workers in the high-income counties are paid increasingly higher wages for the same jobs than workers in the low-income counties or because they are employed in higher paying jobs?

Kim (1998) argues that there are two sources of income differences in regional economies linked by trade: differences in industrial structures and in earnings within industries. A procedure developed by Hanna (1951) can be utilized to separate income differences into these two components. It involves constructing two counterfactual incomes for each region.

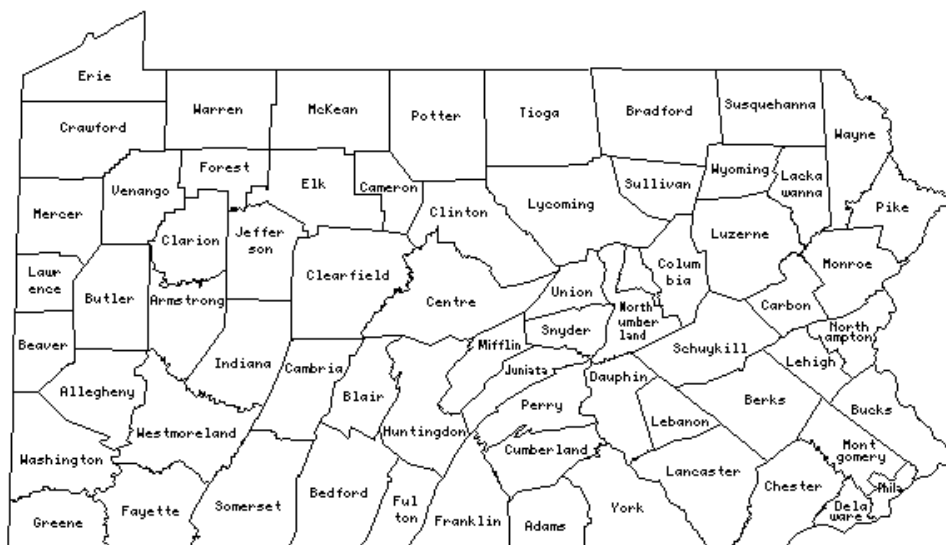
One hypothetical income is based on the assumption that all regions have identical industrial-mixes and identical wages in each of the industries. In this instance, all regional incomes per capita would be identical to the overall national average. The second hypothetical income per capita is based on the assumption that regions have different industrial structures but identical incomes per capita at the industry level. The industry income per capita for all regions is set equal to the national industry income per capita. The two hypothetical incomes per capita and the actual income per capita are then used to estimate industry-mix and wage effects. The difference between the two hypothetical incomes – industry-mix income and the overall national average – provides a measure of the income differences due to the divergence of regional industrial structures. The difference between the actual income per capita and the hypothetical industry-mix income provides a measure of the income differences due to divergence in wages (Kim 1998, p. 671).

This study substitutes “county” for “regional” and “state” for “national” in the above description and calculates each county’s industry mix based on employment in 11 industries: farming, forestry and fishing, mining, construction, manufacturing, transportation, wholesale trade, retail trade, finance, services, and government. The industry mix is each industry’s share of total county employment. Industry earnings per worker are calculated by dividing total earnings in the industry by total employment in the industry. The percentage difference between county income per capita and the state average attributable to county industry mix is calculated by taking the difference between the log of the hypothetical industry-mix income per worker and the log of state aggregate income per worker. The percentage difference attributable to wages is found by taking the difference in logs between actual county income per worker and the hypothetical industry-mix income per worker. This decomposition procedure is not unique; La Croix (1999) demonstrates that a “wages” decomposition in which the second hypothetical income per capita is constructed under the assumption that regions have different per capita wages but identical industrial-mixes can produce different conclusions than the “industry-mix” decomposition described above.

2. Data

Pennsylvania is composed of 67 counties (Figure 1). State population was 11,741,000 in 1969, 12,002,329 in 1998. Philadelphia and Allegheny (which contains Pittsburgh) Counties accounted for 30% of the state population in 1969 and 23% in 1998. 70% of Pennsylvanians live in urban areas. The state capital, Harrisburg, is located in Dauphin County. While the state has experienced significant economic growth since 1969 at a rate close to that of the national economy, it has experienced a decline relative to neighboring states. The state’s economy has become less diversified with the service sector increasing in importance. While manufacturing employment was nearly 31% of statewide employment in 1969 compared to 14% in 1998, service employment rose from 18% to 33% over the same period. For 1998, the health services and state and local government sectors together account for over 20% of statewide total earnings.

Figure 1. Counties in Pennsylvania



This paper's interest is in determining the sources of the divergence of income from economic activity within the Pennsylvania counties, but the appropriate income measure is not available: a county-level version of gross domestic product. Personal income data is available on a county basis. But use of personal income is problematic if people work in one county and live in another or if people tend to own capital in other counties because the personal income accounts reported by the Commerce Department's Bureau of Economic Analysis assign income to the county in which the owner of the inputs resides not to the county in which the income was earned. For instance, Lackawanna County received 7,033 commuters, amounting to 6% of the county work force, from Luzerne County in 1990 while sending there 5,175 commuters. In addition, nearly 60,000 Delaware County residents worked in Philadelphia County, with an even larger number of Philadelphia commuters coming from out of state (Pennsylvania State Data Center website). Personal income also includes transfer payments, so it is not a good measure of county economic activity because it includes both unearned income and income earned outside the county.

The Bureau of Economic Analysis also tracks "total earnings by place of work". The present study uses this as the measure of county income because it attributes income to the county in which it was earned. Total earnings include wages and salaries, other labor income, contributions for social insurance, and proprietors' income. It excludes dividends, interest, rent, and transfer payments. Total earnings divided by total full and part-time employment yields total earnings per worker. Data for total earnings and employment by industry are taken from the Regional Economic Information System web page.¹ Table 1 summarizes the state-

¹ <<http://fisher.lib.virginia.edu/reis>>. The Bureau of Economic Analysis produces the REIS database.

wide data on industry mix and industry income per worker for the study periods: 1969-71, 1982-84, and 1996-98. A three-year average of the data is utilized to mitigate the effects of the business cycle.

3. Results

Table 2 summarizes the results of both decomposition procedures for 1969-71, 1982-84, and 1996-98. Column (1) provides each county's actual total earnings per worker in 1998 dollars. Counties are ordered by actual per worker earnings. The county "industry mix" income in column (2) is calculated by assuming all counties earn identical earnings equal to the state industry average. So while actual earnings per worker in Montgomery County in 1996-98 were \$40,946, county income would have been \$32,977 if its industry earnings structure had been the same as the state's. The "wages" income in column (5) is calculated assuming all counties have an employment mix identical to the state industry mix. The result measures earnings per worker if the county industry mix had been identical to the state mix, given the county wage structure. This hypothetical income was \$39,890 for Montgomery County in 1996-98. Columns (3) and (4) and (6) and (7) provide the results of the two decomposition procedures. The figures are the percentage difference between actual county earnings per worker and the statewide average attributable to the county employment mix and to its wage structure. According to the industry mix decomposition 0.7 percentage points of the difference between Montgomery County's actual income and the state average is due to the county's industry mix; 21.6 percentage points is due to its wages. Under this decomposition, high wages account for 97% [$21.6/(21.6 + 0.7)$] of the difference between Montgomery County's income per worker and the state average.

Table 1. State Data Summary

	1996-98		1982-84		1969-71	
	Distribution of Labor by Industry (%)	Industry Earnings per Worker (\$ per year)	Distribution of Labor by Industry (%)	Industry Earnings per Worker (\$ per year)	Distribution of Labor by Industry (%)	Industry Earnings per Worker (\$ per year)
Farming	1.2	9,451	1.7	10,443	1.8	18,242
Forestry	0.9	17,199	0.5	16,908	0.3	25,873
Mining	0.4	55,836	0.9	59,199	0.8	44,029
Construction	5.1	35,412	4.4	36,393	4.8	43,102
Manufacturing	14.5	47,151	20.9	40,250	29.4	36,649
Transportation	4.8	46,314	4.9	44,173	5.6	41,363
Wholesale	4.3	42,052	4.7	37,403	4.3	38,654
Retail Trade	17.2	16,819	16.7	17,509	15.0	21,451
Finance	7.5	33,949	6.7	22,692	5.8	24,805
Services	32.7	29,428	25.4	25,310	18.7	25,546
Government	11.4	39,399	13.2	34,613	13.5	31,382
Total	100.0	32,732	100.0	30,192	100.0	31,250

Notes: Dollar amounts are in 1998 dollars. The source for employment and earnings by industry is the Regional Economic Information System web page.

Table 2. Decomposition of County Income Differences: 1996-98

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Actual Earnings per Worker (\$/year)	Industry Mix: Earn- ings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages	Wages: Earnings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages
Montgomery	40,946	32,977	0.7	21.6	39,890	2.6	19.8
Philadelphia	40,819	32,574	-0.5	22.6	39,819	2.5	19.6
Chester	39,781	32,329	-1.2	20.7	39,895	-0.3	19.8
Allegheny	36,865	31,998	-2.3	14.2	38,886	-5.3	17.2
Delaware	35,566	31,822	-2.8	11.1	37,688	-5.8	14.1
Montour	35,408	30,641	-6.6	14.5	31,606	11.4	-3.5
Lehigh	35,144	33,363	1.9	5.2	34,256	2.6	4.5
Dauphin	32,789	33,965	3.7	-3.5	31,397	4.3	-4.2
State Average	32,732						
Berks	32,031	33,356	1.9	-4.1	31,546	1.5	-3.7
Cumberland	31,417	32,477	-0.8	-3.3	31,170	0.8	-4.9
Bucks	31,309	32,101	-1.9	-2.5	31,801	-1.6	-2.9
York	30,274	33,642	2.7	-10.6	28,725	5.3	-13.1
Lancaster	29,146	33,096	1.1	-12.7	28,438	2.5	-14.1
Northampton	29,122	33,171	1.3	-13.0	28,681	1.5	-13.2
Wyoming	28,966	33,703	2.9	-15.1	25,747	11.8	-24.0
Greene	28,946	35,116	7.0	-19.3	22,123	26.9	-39.2
Washington	28,913	32,758	0.1	-12.5	28,503	1.4	-13.8
Erie	28,738	33,347	1.9	-14.9	27,954	2.8	-15.8
Elk	28,587	37,151	12.7	-26.2	23,550	19.4	-32.9
Beaver	28,261	32,883	0.5	-15.1	27,258	3.6	-18.3
Indiana	28,142	32,944	0.6	-15.8	25,327	10.5	-25.6
Luzerne	28,122	33,229	1.5	-16.7	27,570	2.0	-17.2
Butler	27,961	33,376	1.9	-17.7	26,752	4.4	-20.2
Union	27,589	32,671	-0.2	-16.9	26,160	5.3	-22.4
Lackawanna	27,542	32,800	0.2	-17.5	27,487	0.2	-17.5
Westmoreland	27,538	32,673	-0.2	-17.1	27,257	1.0	-18.3
Blair	27,266	32,865	0.4	-18.7	26,781	1.8	-20.1
McKean	27,168	34,854	6.3	-24.9	24,519	10.3	-28.9
Fulton	27,150	33,709	2.9	-21.6	23,049	16.4	-35.1
Warren	26,559	33,082	1.1	-22.0	25,467	4.2	-25.1
Centre	26,402	33,540	2.4	-23.9	26,245	0.6	-22.1
Lycoming	26,258	33,047	1.0	-23.0	26,287	-0.1	-21.9

1996-98, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Actual Earnings per Worker (\$/year)	Industry Mix: Earn- ings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages	Wages: Earnings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages
Schuylkill	26,207	34,440	5.1	-27.3	24,903	5.1	-27.3
Venango	26,187	33,414	2.1	-24.4	24,878	5.1	-27.4
Lebanon	26,171	32,570	-0.5	-21.9	25,680	1.9	-24.3
Franklin	25,995	32,602	-0.4	-22.6	25,212	3.1	-26.1
Mercer	25,800	32,255	-1.5	-22.3	25,848	-0.2	-23.6
Potter	25,755	34,123	4.2	-28.1	22,131	15.2	-39.1
Lawrence	25,742	32,014	-2.2	-21.8	26,146	-1.6	-22.5
Crawford	25,710	33,187	1.4	-25.5	24,454	5.0	-29.2
Clarion	25,310	33,164	1.3	-27.0	23,506	7.4	-33.1
Bradford	25,206	32,492	-0.7	-25.4	24,989	0.9	-27.0
Clinton	25,188	33,373	1.9	-28.1	23,336	7.6	-33.8
Cambria	25,184	32,037	-2.1	-24.1	25,124	0.2	-26.5
Mifflin	25,141	33,341	1.8	-28.2	24,254	3.6	-30.0
Monroe	25,090	31,674	-3.3	-23.3	25,318	-0.9	-25.7
Northumberland	24,856	33,540	2.4	-30.0	23,452	5.8	-33.3
Jefferson	24,775	34,189	4.4	-32.2	22,928	7.7	-35.6
Cameron	24,762	38,474	16.2	-44.1	19,267	25.1	-53.0
Columbia	24,679	32,777	0.1	-28.4	24,714	-0.1	-28.1
Armstrong	24,593	32,441	-0.9	-27.7	23,430	4.8	-33.4
Clearfield	24,536	32,325	-1.3	-27.6	24,071	1.9	-30.7
Somerset	24,500	32,571	-0.5	-28.5	23,025	6.2	-35.2
Snyder	24,329	32,642	-0.3	-29.4	23,627	2.9	-32.6
Huntingdon	23,805	32,079	-2.0	-29.8	23,122	2.9	-34.8
Fayette	23,311	31,440	-4.0	-29.9	23,797	-2.1	-31.9
Adams	23,077	32,261	-1.4	-33.5	22,713	1.6	-36.5
Carbon	22,879	33,294	1.7	-37.5	22,405	2.1	-37.9
Tioga	22,632	32,556	-0.5	-36.4	21,691	4.2	-41.1
Wayne	22,205	30,614	-6.7	-32.1	22,904	-3.1	-35.7
Bedford	22,123	31,604	-3.5	-35.7	21,800	1.5	-40.6
Forest	21,653	33,971	3.7	-45.0	20,239	6.8	-48.1
Susquehanna	21,319	31,634	-3.4	-39.5	20,631	3.3	-46.2
Pike	20,562	30,281	-7.8	-38.7	22,904	-10.8	-35.7
Juniata	20,418	32,380	-1.1	-46.1	19,830	2.9	-50.1
Perry	20,351	30,225	-8.0	-39.6	20,384	-0.2	-47.4
Sullivan	19,850	31,675	-3.3	-46.7	20,329	-2.4	-47.6
Average for Counties Below State Average			0.6	-25.0		4.2	-28.5

Table 2. Decomposition of County Income Differences: 1982-84

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Actual Earnings per Worker (\$/year)	Industry Mix: Earn- ings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages	Wages: Earnings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages
Philadelphia	35,428	29,821	-1.2	17.2	40,670	-13.8	29.8
Allegheny	33,912	29,399	-2.7	14.3	37,966	-11.3	22.9
Beaver	33,158	31,360	3.8	5.6	30,418	8.6	0.7
Montgomery	32,130	29,714	-1.6	7.8	35,528	-10.1	16.3
Greene	31,789	36,333	18.5	-13.4	21,943	37.1	-31.9
Dauphin	31,136	30,954	2.5	0.6	32,342	-3.8	6.9
Lehigh	31,093	30,742	1.8	1.1	30,820	0.9	2.1
Delaware	30,583	28,995	-4.0	5.3	34,687	-12.6	13.9
Indiana	30,268	33,863	11.5	-11.2	26,461	13.4	-13.2
State Average	30,192						
Chester	29,845	29,528	-2.2	1.1	32,132	-7.4	6.2
Elk	29,818	33,339	9.9	-11.2	25,873	14.2	-15.4
Montour	29,735	28,491	-5.8	4.3	21,723	31.4	-32.9
Northampton	29,641	31,663	4.8	-6.6	28,583	3.6	-5.5
Venango	29,306	31,795	5.2	-8.2	26,569	9.8	-12.8
Cumberland	29,221	29,797	-1.3	-2.0	29,719	-1.7	-1.6
Cambria	29,183	31,231	3.4	-6.8	27,644	5.4	-8.8
Westmoreland	29,123	30,343	0.5	-4.1	27,327	6.4	-10.0
Washington	29,072	31,134	3.1	-6.9	27,901	4.1	-7.9
Mercer	29,030	29,834	-1.2	-2.7	28,549	1.7	-5.6
Butler	28,973	30,774	1.9	-6.0	26,488	9.0	-13.1
Bucks	28,919	29,751	-1.5	-2.8	28,753	0.6	-4.9
Erie	28,835	30,411	0.7	-5.3	27,729	3.9	-8.5
Berks	28,719	30,647	1.5	-6.5	29,685	-3.3	-1.7
York	28,637	31,371	3.8	-9.1	26,740	6.9	-12.1
Armstrong	28,477	31,415	4.0	-9.8	24,399	15.5	-21.3
Jefferson	28,207	32,655	7.8	-14.6	24,420	14.4	-21.2
Wyoming	27,580	31,160	3.2	-12.2	19,033	37.1	-46.1
Clarion	27,578	32,134	6.2	-15.3	24,439	12.1	-21.1
Warren	27,542	30,882	2.3	-11.4	23,511	15.8	-25.0
Clearfield	27,206	32,499	7.4	-17.8	26,165	3.9	-14.3
Fayette	26,737	29,581	-2.0	-10.1	28,453	-6.2	-5.9
Lancaster	26,657	30,181	0.0	-12.4	26,358	1.1	-13.6
Lycoming	26,409	30,640	1.5	-14.9	25,215	4.6	-18.0

1982-84, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Actual Earnings per Worker (\$/year)	Industry Mix: Earn- ings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages	Wages: Earnings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages
Blair	26,036	30,803	2.0	-16.8	24,844	4.7	-19.5
Luzerne	26,001	30,925	2.4	-17.3	28,516	-9.2	-5.7
Lebanon	25,988	30,334	0.5	-15.5	24,667	5.2	-20.2
Somerset	25,968	31,083	2.9	-18.0	25,969	0.0	-15.1
Cameron	25,886	31,602	4.6	-19.9	22,038	16.1	-31.5
Franklin	25,882	30,342	0.5	-15.9	23,171	11.1	-26.5
Lawrence	25,851	29,600	-2.0	-13.5	26,758	-3.5	-12.1
McKean	25,823	33,278	9.7	-25.4	23,340	10.1	-25.7
Clinton	25,493	30,949	2.5	-19.4	23,966	6.2	-23.1
Mifflin	25,425	30,609	1.4	-18.6	23,682	7.1	-24.3
Centre	25,270	30,335	0.5	-18.3	26,579	-5.0	-12.7
Monroe	25,199	29,333	-2.9	-15.2	24,265	3.8	-21.9
Union	25,091	29,618	-1.9	-16.6	25,193	-0.4	-18.1
Bradford	25,061	29,197	-3.4	-15.3	20,035	22.4	-41.0
Lackawanna	24,796	30,571	1.2	-20.9	26,735	-7.5	-12.2
Northumberland	24,602	31,226	3.4	-23.8	22,888	7.2	-27.7
Crawford	24,263	29,461	-2.5	-19.4	23,374	3.7	-25.6
Schuykill	23,075	32,396	7.0	-33.9	21,946	5.0	-31.9
Tioga	22,843	28,791	-4.8	-23.1	27,035	-16.9	-11.0
Huntingdon	22,774	29,535	-2.2	-26.0	22,959	-0.8	-27.4
Columbia	22,621	30,741	1.8	-30.7	22,821	-0.9	-28.0
Forest	22,078	30,984	2.6	-33.9	16,774	27.5	-58.8
Fulton	22,048	28,160	-7.0	-24.5	24,117	-9.0	-22.5
Bedford	21,932	28,216	-6.8	-25.2	22,268	-1.5	-30.4
Carbon	21,684	31,046	2.8	-35.9	22,381	-3.2	-29.9
Snyder	21,452	29,249	-3.2	-31.0	20,728	3.4	-37.6
Adams	21,407	29,364	-2.8	-31.6	21,854	-2.1	-32.3
Potter	20,654	29,009	-4.0	-34.0	19,091	7.9	-45.8
Wayne	20,572	28,542	-5.6	-32.7	20,296	1.3	-39.7
Juniata	19,015	29,648	-1.8	-44.4	20,281	-6.4	-39.8
Pike	18,860	27,701	-8.6	-38.4	22,047	-15.6	-31.4
Susquehanna	18,770	29,376	-2.7	-44.8	16,655	12.0	-59.5
Perry	18,622	27,591	-9.0	-39.3	20,607	-10.1	-38.2
Sullivan	18,463	29,953	-0.8	-48.4	18,453	0.1	-49.2
Average for Counties Below State Average			0.0	-18.6		4.2	-22.4

Table 2. Decomposition of County Income Differences: 1969-71

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Actual Earnings per Worker (\$/year)	Industry Mix: Earn- ings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages	Wages: Earnings per Worker (\$/year)	Percentage Attribut- able: Industry Mix	Difference to Wages
Philadelphia	34,554	30,967	-0.9	11.0	42,312	-20.3	30.3
Allegheny	34,548	30,996	-0.8	10.9	38,646	-11.2	21.2
Beaver	33,803	32,730	4.6	3.2	33,634	0.5	7.4
Montgomery	33,401	31,312	0.2	6.5	36,510	-8.9	15.6
Delaware	31,932	30,609	-2.1	4.2	34,621	-8.1	10.2
Chester	31,792	30,837	-1.3	3.1	34,371	-7.8	9.5
Bucks	31,457	31,107	-0.5	1.1	31,873	-1.3	2.0
Northampton	31,330	32,713	4.6	-4.3	32,358	-3.2	3.5
Mercer	31,286	31,573	1.0	-0.9	31,906	-2.0	2.1
State Average	31,250						
Lehigh	31,231	31,573	1.0	-1.1	34,827	-10.9	10.8
Butler	31,199	31,366	0.4	-0.5	32,674	-4.6	4.5
Dauphin	30,952	30,976	-0.9	-0.1	33,386	-7.6	6.6
Westmoreland	30,944	31,546	0.9	-1.9	33,334	-7.4	6.5
Venango	30,554	31,776	1.7	-3.9	31,229	-2.2	-0.1
York	30,531	32,012	2.4	-4.7	34,213	-11.4	9.1
Erie	30,490	31,532	0.9	-3.4	32,312	-5.8	3.3
Greene	30,192	32,885	5.1	-8.5	25,829	15.6	-19.1
Washington	30,189	31,736	1.5	-5.0	31,689	-4.8	1.4
Cambria	30,010	31,980	2.3	-6.4	31,215	-3.9	-0.1
Warren	29,925	30,794	-1.5	-2.9	31,586	-5.4	1.1
Elk	29,621	32,954	5.3	-10.7	28,971	2.2	-7.6
Lancaster	29,460	31,008	-0.8	-5.1	31,247	-5.9	0.0
Berks	28,916	31,670	1.3	-9.1	32,065	-10.3	2.6
Indiana	28,887	31,569	1.0	-8.9	32,921	-13.1	5.2
Clarion	28,776	31,718	1.5	-9.7	31,662	-9.6	1.3
Montour	28,571	30,834	-1.3	-7.6	27,412	4.1	-13.1
Armstrong	28,564	31,589	1.1	-10.1	29,598	-3.6	-5.4
Lawrence	28,483	30,920	-1.1	-8.2	31,206	-9.1	-0.1
Cumberland	28,427	30,692	-1.8	-7.7	29,234	-2.8	-6.7
Franklin	28,314	30,700	-1.8	-8.1	28524	-0.7	-9.1
Blair	28,169	31,996	2.4	-12.7	29,100	-3.2	-7.1
Mifflin	28,089	31,610	1.1	-11.8	29,048	-3.4	-7.3
Cameron	27,964	33,224	6.1	-17.2	30,934	-10.1	-1.0
Clinton	27,759	31,531	0.9	-12.7	40,282	-37.2	25.4
Monroe	27,664	29,966	-4.2	-8.0	28,880	-4.3	-7.9

1969-71, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lebanon	27,607	31,297	0.2	-12.5	27,649	-0.2	-12.2
Centre	27,534	30,637	-2.0	-10.7	31,931	-14.8	2.2
Wyoming	27,271	31,531	0.9	-14.5	27,659	-1.4	-12.2
Clearfield	27,187	31,907	2.1	-16.0	31,141	-13.6	-0.4
Lycoming	27,114	31,766	1.6	-15.8	29,339	-7.9	-6.3
Crawford	27,080	30,620	-2.0	-12.3	29,029	-6.9	-7.4
Fayette	27,075	30,694	-1.8	-12.5	32,035	-16.8	2.5
Jefferson	26,579	31,772	1.7	-17.8	28,979	-8.6	-7.5
McKean	26,530	32,179	2.9	-19.3	29,148	-9.4	-7.0
Luzerne	26,163	32,033	2.5	-20.2	29,945	-13.5	-4.3
Lackawanna	26,056	31,523	0.9	-19.0	30,019	-14.2	-4.0
Union	25,981	29,895	-4.4	-14.0	28,182	-8.1	-10.3
Snyder	25,479	30,639	-2.0	-18.4	27,116	-6.2	-14.2
Tioga	25,417	29,551	-5.6	-15.1	28,427	-11.2	-9.5
Bradford	25,320	29,797	-4.8	-16.3	25,238	0.3	-21.4
Northumberland	24,943	31,964	2.3	-24.8	27,683	-10.4	-12.1
Schuykill	24,574	32,585	4.2	-28.2	27,868	-12.6	-11.5
Somerset	24,335	30,672	-1.9	-23.1	28,311	-15.1	-9.9
Forest	24,139	31,789	1.7	-27.5	22,417	7.4	-33.2
Columbia	24,067	31,844	1.9	-28.0	25,076	-4.1	-22.0
Bedford	23,623	29,830	-4.7	-23.3	26,959	-13.2	-14.8
Huntingdon	23,487	31,222	-0.1	-28.5	25,910	-9.8	-18.7
Pike	23,291	29,543	-5.6	-23.8	25,439	-8.8	-20.6
Adams	23,177	30,080	-3.8	-26.1	27,428	-16.8	-13.0
Carbon	22,810	32,185	2.9	-34.4	26,124	-13.6	-17.9
Potter	22,806	29,828	-4.7	-26.8	28,225	-21.3	-10.2
Wayne	22,456	29,450	-5.9	-27.1	25,358	-12.2	-20.9
Susquehanna	21,650	29,280	-6.5	-30.2	23,532	-8.3	-28.4
Perry	21,398	29,019	-7.4	-30.5	30,720	-36.2	-1.7
Fulton	21,161	29,332	-6.3	-32.7	29,371	-32.8	-6.2
Juniata	20,789	29,793	-4.8	-36.0	24,265	-15.5	-25.3
Sullivan	20,306	30,187	-3.5	-39.6	30,451	-40.5	-2.6
Average for Counties							
Below State Average			-0.4	-15.3		-9.5	-6.7

Notes: Amounts are in 1998 dollars. The hypothetical county "industry mix" income in column (2) is calculated by assuming all counties earn identical earnings equal to the state industry average. The percentage difference between county income per capita and the state average attributable to county industry mix in column (3) equals the difference between the log of the hypothetical "industry-mix" income per worker and the log of state aggregate income per worker. The percentage difference attributable to wages reported in column (4) is found by taking the difference in logs between actual county income per worker and the hypothetical industry-mix income per worker. The hypothetical county "wages" income in column (5) is calculated assuming all counties have an employment mix identical to the state industry mix. The percentage difference between county income per capita and the state average attributable to industry mix reported in column (6) is found by taking the difference in logs between actual county income per worker and the hypothetical "wages" income per worker. The percentage difference attributable to wages given in column (7) equals the difference between the log of the hypothetical "wages" income per worker and the log of state aggregate income per worker. The source for state and county earnings and employment by industry is the Regional Economic Information System web page.

The two decomposition procedures differ slightly on the details but offer up the same conclusions. First, counties with incomes per worker above the state average mostly have favorable wage structures. Workers in these high-income counties earn more for the same job than do those in the low-income counties. For example, in 1996-98, high wages accounted for at least 88% [$19.8/(2.6 + 19.8)$] of Montgomery County's income differential. Of the 26 observations on counties with above-average incomes at least 21 had favorable wage structures, with high wages definitely accounting for 100% of the income differential for 12 of them.

A second firm conclusion is that Pennsylvania counties with below average incomes are relatively poor not because of unfavorable industrial structures consisting of low paying jobs but because of low wages. For the 1996-98 period, every county with an income below the state average had an unfavorable wage structure. Just one low-income county had favorable wages under both decomposition procedures in any study period. Low wages account for an increasing proportion of the typical county's income differential. The unfavorable wage gap for the typical low-income county has grown from 15.3 percentage points in 1969-71 to 18.6 in 1982-84 to 25 percentage points in 1996-98. According to the industry mix decomposition, low wages accounted for 102% [$-25.0/(0.6 - 25.0)$] of the difference between earnings per worker in the typical low-income county and the state average in 1996-98 compared to 100% [$-18.6/(0.0 - 18.6)$] in 1982-84 and 97% [$-15.3/(-0.4 - 15.3)$] for 1969-71.

Wages are also the key to the divergence of county incomes. The wage advantage relative to the state average of the high-income counties has been growing: from 6.5 percentage points in 1969-71 to 21.6 percentage points in 1996-98 for Montgomery County and from 11.0 to 22.6 percentage points for Philadelphia over the same period using the industry mix decomposition. The wage disadvantage of the lowest-income counties has also grown: from being responsible for 39.6 percentage points of Sullivan County's income differential in 1969-71 to 46.7 percentage points in 1996-98.

The "wages" income in Column (5), derived assuming that counties have identical industry mixes, measures differences in county income due solely to relative county wages. The standard deviation of the wages income across Pennsylvania counties has risen from \$3,688 for 1969-71 to \$4,598 in 1982-84 to \$4,850 in 1996-98. While county earnings structures have become more dissimilar over time county employment mixes, although diverging between 1969-71 and 1982-84, are now becoming more alike. The standard deviation of the industry mix incomes in Column (2), which assumes identical county industry earnings per worker, was \$974 in 1969-71, \$1,489 in 1982-84, and \$1,297 in 1996-98.

The importance of wages rather than jobs in the evolution of county incomes is evident in the cases of the eight counties that moved above or below the state average income over the entire study period. Three counties moved from below to above the state average income: Lehigh, Montour, and Dauphin Counties. More high paying state government jobs is the source of Dauphin County's improvement while higher wages are the reason for the other two counties' relative rise. All five counties that dropped below the state income average suffered steep reversals in their wage structures. Low wages account for 56 to 100% of the difference between these counties' income per capita and the state average in 1996-98.

4. Sources of Relative Wage Deterioration

The handful of Pennsylvania counties with earnings per worker above the state average mostly has favorable wages. The counties with incomes below the state average, although they have employment mixes comparable to the overall state mix, tend to have workers who receive low wages relative to the state industry average. The growing divergence between the incomes of the high- and low-income counties is a result of a sharp decline in the relative wages earned by workers in the low-income counties. Table 3 shows the changes between 1969-71 and 1996-98 in the county industry wage relative to the state industry wage for the four largest sectors for the six poorest counties. This is calculated by taking the county industry wage and dividing by the state industry wage, which gives the county wage as a percentage of state industry earnings. The figures provided in the table are the percentage point change in the county wage as a percentage of state industry earnings between 1969-71 and 1996-98. A negative number indicates that county industry earnings have deteriorated relative to the state industry wage. These counties have seen especially steep drops in relative per worker earnings in the retail trade and service sectors.

Three are three possible explanations for these growing wage differences. First, the use of broad industrial sectors may attribute greater importance to wages in explaining county income differences than is warranted. Differences in county industry earnings per capita may be due to differences in county industrial structures at a finer industry level.

Second, labor productivity in the relatively poor counties may have fallen relative to the state as a whole because these counties have had less investment in physical capital. Investment per worker is estimated for each county by dividing new capital expenditures for various years by manufacturing employment. Capital expenditures for each county are found in various editions of the *Pennsylvania Statistical Abstract* and the Census Bureau's *Economic Census*. The six poorest counties, Sullivan, Perry, Juniata, Pike, Susquehanna, and Forest, are among the bottom ten counties in average annual investment per worker. Statewide investment per worker averaged \$3,123. Perry County, at \$1,073, had the highest investment per worker among the six poor counties. The correlation between average annual investment per worker and county per capita income is 0.42.

Third, labor productivity in the relatively poor counties may have fallen relative to the state as a whole because workers in these counties have relatively less human capital. The proportion of the county population of persons 25 years and over who have a bachelor's degree or higher is used as a proxy for the rate of accumulation of human capital. The correlation between this measure of human capital and per capita county income is 0.72. Sullivan and Juniata Counties are among the five counties with the smallest proportion of college graduates. The proportion of college graduates in each of the eight relatively rich counties is above the statewide average.

5. Conclusions

Low wages, not a concentration of low-paying jobs, is the problem facing low-income Pennsylvania counties. On average, low wages account for 90% of the income differential of the five lowest-income counties in 1996-98. Making the industry mix of these counties comparable to the state mix will raise county per capita income only 3.3% for Sullivan County.

Table 3. Changes in County Industry Wage Relative to the State Industry Wage for Selected Sectors, 1996-98 – 1969-71

	Manufacturing	Retail Trade	Services	Government
Sullivan	-0.0	0.0	-7.4	8.0
Perry	8.0	-25.0	-30.7	5.6
Juniata	4.3	-15.7	-19	4.8
Pike	4.2	-7.4	-26.3	16.6
Susquehanna	-17.6	-19.1	-18.9	4.8
Forest	-12.4	-18.2	-9.9	8.1

Notes: The table shows the changes between 1969-71 and 1996-98 in the county industry wage relative to the state industry wage for the four largest sectors for the six poorest counties. This is calculated by taking the county industry wage and dividing by the state industry wage, giving the county wage as a percentage of state industry earnings. Numbers in the table are the percentage point change in the county wage as a percentage of state industry earnings between 1969-71 and 1996-98. A negative number indicates that county industry earnings have deteriorated relative to the state industry wage.

To achieve noticeable income gains, wages for all jobs in the low-income counties need to be improved. Instead, wages across Pennsylvania counties continue to diverge. The source of the growing wage divergence is investment in both physical and human capital; relatively poor counties have invested less in new physical capital and have a small proportion of college graduates in the labor force.

Real per capita incomes have fallen over the past 30 years in the six poorest counties. What are the necessary ingredients to stimulate development in the poorer counties? An emphasis on increasing labor productivity is crucial. While extending tax breaks to encourage investment in distressed areas may increase physical capital per worker, human capital accumulation is more strongly correlated with per capita income. Education is in the domain of policymakers. Six of the eight counties with incomes above the state average have a community college. None of the six poorest counties does. In fact, there are 19 community colleges in Pennsylvania. None of the 23 lowest income counties has a community college.

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