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## Regional Differences in Per Capita Farm and Nonfarm Income

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*Establishment of parity prices by way of the unit of purchasing power approach—the concept on which the parity formula is now based—may not adequately reflect parity of incomes and living standards for farmers. This is true especially if the norm or base period is far back in the past, and if radical changes have occurred in the demand for, and the cost structures of, many farm commodities. Recognition of such limitations has led to a second general approach to the measurement of parity—a formula that involves parity income, with prices derived from this formula. The income approach received Congressional recognition, and resulted in a definition of parity income in the Soil Conservation and Domestic Allotment Act of 1936, revised in the Agricultural Act of 1938. Later, it was replaced with a definition in the Agricultural Act of 1948 that was substantially different. This parity concept centers generally on the relation between the incomes of farm people and those of nonfarm people. In the measurement of such parity two basic approaches have been used. One involves the maintenance of a historical income ratio that would provide farmers with incomes and living standards proportionate to those of nonfarmers; the other would establish the standard of equal incomes or living standards as between farmers and nonfarmers. In the first approach, the ratio of farm to nonfarm income in recent years has been at parity or above, compared with the historical base of 1910–14. The second approach, on the other hand, yields a very substantial differential as between farm and nonfarm incomes, although differences in the purchasing power of the farm dollar versus the nonfarm dollar would probably narrow the gap appreciably. This paper bears on the second of these approaches, that is, the comparison of income differences, especially with respect to the regional variations between the incomes of farm-operator families and those of the nonfarm population.*

INCOME COMPARISONS between the total farm population, which includes hired workers, and the nonfarm population, are usually based on U.S. totals regularly published by the Farm Income Branch of the Agricultural Marketing Service in the July issue of the *Farm Income Situation*. Only for 1949 have comparisons been made of the per capita income of persons in farm-operator households only, with income of the nonfarm population. However, the Survey of Farmers' Expenditures in 1955 provided data on which estimates of the per capita income of

farm-operator households for a more recent year could be developed, not only for the United States but also for the major geographical regions.

Regional data for 1955 shed considerable light upon the variability in income differences among regions. They permit analysis of the influences of the individual regional differences upon the average difference for the United States as a whole, and they open to question the adequacy of the measurement of the difference between farm and nonfarm per capita incomes when only data for the United States as a whole are employed

TABLE 1.—Regional distribution of farm-nonfarm income differences, 1955

Region	Income per capita		Difference	Population of operator households	Total "gap" col. (3) × col. (4)
	Nonfarm	Farm			
	Dollars	Dollars	Dollars	Thousands	Thousand dollars
Northeast.....	2, 175	1, 218	957	1, 420	1, 359
East North Central.....	2, 182	1, 082	1, 100	3, 003	3, 303
West North Central.....	1, 861	957	904	3, 301	2, 984
South Atlantic.....	1, 521	879	642	3, 533	2, 268
East South Central.....	1, 366	751	615	3, 105	1, 910
West South Central.....	1, 577	1, 121	456	2, 318	1, 057
Mountain.....	1, 726	1, 353	373	725	271
Pacific.....	2, 215	2, 575	-360	840	-302
United States.....			1 704	18, 245	12, 850

<sup>1</sup> Computed by dividing U.S. total gap by total population of farm-operator households.

Sources: Estimates of nonfarm income, per capita, consist of estimated total personal income of the entire population, both farm and nonfarm, as shown in the *Survey of Current Business*, August 1958, U.S. Dept. of Commerce, less estimated farm-operator family income, divided by the Bureau of the Census estimate of total population July 1, 1955 (excluding armed forces overseas) less estimated population in farm-operator households.

Per capita income of farm-operator households consists of (1) the net income of farm operators from farming, as reported in the *Farm Income Situation*, FIS-175, September 1959, plus (2) the off-farm income of farm-operator families, based on data reported in the *Survey of Farmers' Expenditures 1955*, December 1956, U.S. Department of Agriculture, and U.S. Department of Commerce, divided by the estimated population of farm-operators' households, as reported in the *Survey of Farmers' Expenditures, 1955*.

in deriving such a measurement.

The greatest difference between per capita farm and nonfarm incomes in 1955 was in the East North Central Region; farm income per capita in that region fell short of nonfarm income by \$1,100 (table 1). In sharp contrast, farm-operator families in the Pacific Region had a per capita income that actually exceeded nonfarm income by \$360. For the most part, this reflected the comparatively large-scale farm operations and the relatively small farm population in that region.

The income differential or gap was largest in the North, and smallest in the West; the gap in the South was in between. The fact that the gap was largest in the northern regions reflects for the most part the relatively high degree of industrialization there and the consequent high level of nonfarm income compared with the other regions, with the exception, of course, of the Pacific Region. In that area, not only was per capita income of nonfarm persons highest; the per capita income of farm-operator households was also the highest by far.

TABLE 2.—Relationship between income from farming and off-farm sources of farm population, 1955, by regions

Region	Total net farm income	Income from off-farm sources	Total income	Column (2) ÷ column (3)	Population of farm-operator households	Total net farm income per capita	Off-farm income per capita
	Million dollars	Million dollars	Million dollars		Thousands	Dollars	Dollars
Northeast.....	826.7	902.7	1,729.4	0.522	1,419.9	582	636
East North Central.....	1,987.4	1,261.4	3,248.8	.388	3,003.0	662	420
West North Central.....	2,357.2	802.8	3,160.0	.254	3,300.6	714	243
South Atlantic.....	1,814.6	1,290.2	3,104.8	.416	3,532.7	514	365
East South Central.....	1,331.3	999.3	2,330.6	.429	3,105.0	429	322
West South Central.....	1,417.2	1,182.0	2,599.2	.455	2,317.7	611	510
Mountain.....	666.0	315.9	981.9	.322	725.5	918	435
Pacific.....	1,367.0	796.3	2,163.3	.368	840.1	1,627	948
United States.....	11,767.4	7,550.6	19,318.0	.391	18,244.5	645	414

Note: See table 1 for sources of data.



## Industrialization Provides Off-Farm Income Supplements

Another aspect of the regional differences in the farm-nonfarm income gap is the extent to which farm families in the various regions have been supplementing their incomes from farming with income from off-farm sources (table 2).

Where per capita income from farming is low, dependence upon nonfarm sources of income generally is high, as can be seen in table 2. Per capita income from farming in the Northeast was low and income from off-farm sources accounted for 52 percent of the total per capita income of farm-operator households. In the South Atlantic and East South Central Regions, per capita farm income was also low and income from off-farm sources accounted for 42 and 43 percent, respectively, of total income. In the Pacific, Mountain, and West North Central Regions, on the other hand, per capita farm incomes were relatively high, and in these regions income from off-farm sources was relatively low.

While there appears to be an inverse correlation between the level of farm income and the percentage of total income obtained from off-farm sources, the extent to which farm families in the various regions were able to supplement their incomes from nonfarm sources depended largely upon the availability of job opportunities. In the Pacific and Northeast Regions, for example, industry is heavily concentrated. Farm families' income from nonfarm sources in these regions was greater than farm family income from such sources in any other region. On the other hand, the relatively low level of industrialization in the West North Central, South Atlantic, and East South Central Regions limited the ability of farm families to supplement their incomes from farming.

### Use of U.S. Aggregates Biases Gap Measurement

With respect to the influences of regional differences upon the average difference for the United States as a whole, regional data also point up the biases contained in estimates of the farm-nonfarm income gap for the United States as a whole derived from aggregative figures. Because of the lack of detailed geographical estimates of income differences, the farm-nonfarm gap for the United

TABLE 3.—*Comparison of farm and nonfarm income per capita in 1955 using aggregative data for the United States*

Item	Total income	Total population	Income per capita
	<i>Million dollars</i>	<i>Thousand</i>	<i>Dollars</i>
Nonfarm.....	287, 280	146, 058	1, 967
Farm.....	19, 318	18, 245	1, 059
Difference.....	-----	-----	908

See table 1 for sources of data.

States is usually measured as shown in table 3. This method involves using aggregative figures for the United States. For 1955, the gap is seen to be \$908 per capita, indicating that an additional \$16.6 billion would have been required in 1955 to provide the 18.2 million persons in farm-operator households the same average income as nonfarm persons.

Computation of the average gap for the United States using detailed geographical data, however, points up the upward bias contained in the average derived by use of United States figures—a bias introduced by the variability in the size of the farm population relative to the nonfarm population in each region.

As table 1 shows, the total deficiency for the United States, was (1) \$12,850 million when estimated by using regional data, compared with (2) an estimated deficiency of \$16,566 million when computed by using United States totals—a difference of about \$3.7 billion.

Why the difference? If breakdowns or comparisons by States or counties were available, would the estimated deficiency be reduced even more?

### Source of Bias Hidden in Population Weights

In attempting to find some answers let us investigate the makeup of these measurements of gap. The computation of a simple average gap from aggregative figures, whether for a region (an aggregation of States or counties) or for the United States (an aggregation of regions, States, or counties) implies the summation of the non-farm incomes for each geographical component divided by the summation of the nonfarm population, from which is subtracted the sum of farm

incomes divided by the summation of farm population for each geographical component.

In symbols, this is

$$I_{U.S.} = \frac{\sum_{i=1}^n Y_i}{\sum_{i=1}^n P_i} - \frac{\sum_{i=1}^n X_i}{\sum_{i=1}^n b_i}, \text{ where}$$

$I_{U.S.}$  = U.S. average gap computed by use of U.S. totals.

$Y_i$  = Total nonfarm income of the  $i$ th geographical component;

$P_i$  = Total nonfarm population of the  $i$ th geographical component;

$X_i$  = Total income of farm-operator households of the  $i$ th geographical component; and

$b_i$  = Total population of farm-operator households of the  $i$ th geographical component.

Assuming three geographical subdivisions this may be written as

$$(2) \quad I_{U.S.} = \frac{Y_1 + Y_2 + Y_3}{P_1 + P_2 + P_3} - \frac{X_1 + X_2 + X_3}{b_1 + b_2 + b_3},$$

The right hand member is equivalent to

$$(3) \quad \left[ \frac{Y_1}{P_1 + P_2 + P_3} - \frac{X_1}{b_1 + b_2 + b_3} \right] + \left[ \frac{Y_2}{P_1 + P_2 + P_3} - \frac{X_2}{b_1 + b_2 + b_3} \right] + \left[ \frac{Y_3}{P_1 + P_2 + P_3} - \frac{X_3}{b_1 + b_2 + b_3} \right]$$

Now let us look at the component for any one region, say, the first. This may be written as

$$(4) \quad \left[ \frac{Y_1}{P_1} \right] \left[ \frac{P_1}{P_1 + P_2 + P_3} \right] - \left[ \frac{X_1}{b_1} \right] \left[ \frac{b_1}{b_1 + b_2 + b_3} \right].$$

This indicates that a region's contribution to a simple average for all regions combined depends on (1) the per capita nonfarm income in that region, (2) the ratio of that region's nonfarm population to the total nonfarm population for all regions combined, (3) the per capita farm family income in that region, and (4) the ratio of that region's farm population to the total farm population for all regions combined.

Turning now to the United States average difference computed by use of the regional data, we have

$$(5) \quad \bar{I}_{U.S.} = \frac{\left[ \frac{Y_1}{P_1} - \frac{X_1}{b_1} \right] b_1 + \left[ \frac{Y_2}{P_2} - \frac{X_2}{b_2} \right] b_2 + \left[ \frac{Y_3}{P_3} - \frac{X_3}{b_3} \right] b_3}{b_1 + b_2 + b_3}$$

This in essence is an average of regional differences weighted by the proportion of total farm population residing in each region. Its meaning is straightforward. It is an average per capita difference, which, when multiplied by the total population will yield an estimate of the total dollar deficiency consistent with the existing variations in the gap among regions. In other words, it measures the total amount of *additional income* needed to equalize farm and nonfarm dollar incomes in *each region*.

Again taking a component of this United States average for the first region we get from (5) above.

$$(6) \quad \left[ \frac{Y_1}{P_1} - \frac{X_1}{b_1} \right] \frac{b_1}{b_1 + b_2 + b_3} = \left[ \frac{Y_1}{P_1} \right] \left[ \frac{b_1}{b_1 + b_2 + b_3} \right] - \left[ \frac{X_1}{b_1} \right] \left[ \frac{b_1}{b_1 + b_2 + b_3} \right]$$

Subtracting this from (4) above, yields

$$(7) \quad \left[ \frac{Y_1}{P_1} \right] \left[ \frac{P_1}{P_1 + P_2 + P_3} - \frac{b_1}{b_1 + b_2 + b_3} \right]$$

Here we have the source of the differences in the measurement of the United States average gap between per capita income of nonfarm persons and that of farmers arising from the use of the aggregative data, on the one hand, and regional data, on the other. It lies in the weighting of the nonfarm per capita income for each region in computing the U.S. average.

In those regions where the proportion of the nonfarm population to the total nonfarm population for all regions is high relative to the proportion of the farm population to the total farm population for all regions, the per capita nonfarm income will receive a heavier weight in the United States average when it is computed by the aggregative method. Where the reverse is true the weight will be lighter. And where they are equal there will be no difference in weight as between the two methods.

As can be seen from (7), these differences will be greater, the higher the absolute level of nonfarm income per capita in a given region.



TABLE 4.—*Comparison of regional contributions to computed United States average difference between per capita nonfarm and farm income, using two methods of computation*

Region	Ratio of regional non-farm population to U.S. nonfarm population	Ratio of regional population of farm households to U.S. population of farm households	Per capita income		Contribution to estimated United States average gap		Estimated bias in aggregative U.S. average
			Nonfarm	Farm	Using aggregative method	Using regional differences	
	<i>Percent</i>	<i>Percent</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Northeast.....	0.3037	0.0778	2,175	1,218	566	74	+492
East North Central.....	.2101	.1646	2,182	1,082	280	181	+99
West North Central.....	.0792	.1809	1,861	957	-26	164	-190
South Atlantic.....	.1091	.1936	1,521	879	-4	124	-128
East South Central.....	.0580	.1702	1,366	751	-49	105	-154
West South Central.....	.0914	.1270	1,577	1,121	2	58	-56
Mountain.....	.0359	.0398	1,726	1,353	8	15	-7
Pacific.....	.1126	.0461	2,215	2,575	131	-17	+148
United States.....	100.0000	100.0000	-----	-----	908	704	+204

### Regional Distribution of Bias

Table 4 reveals the extent of biases and their distribution by region, when the computation of the United States average differences or gap in per capita nonfarm and farm income is made by use of United States totals only. Some explanation of the data in some of the columns may be in order, at this point, to make the meaning of the table clearer.

Columns (1) and (2) are simply the proportions of total United States nonfarm and farm populations, respectively, in each region. Columns (3) and (4) are the per capita incomes for each region. Columns (5) and (6) under "Contributions to United States average gap," show the estimated dollars per capita contributed by each region to the United States average computed by the aggregative and regional difference methods. Thus, in column (5), we have expression (4) above computed for each region. That is, each entry for a region is (1) the per capita nonfarm income multiplied by the ratio of nonfarm population in that region to total United States nonfarm population, less (2) the per capita income of farm-operator households multiplied by the ratio of the farm population in that region to the total United States farm population. The sum of these computations yields the United States average gap, as computed by use of aggregative United States figures. These are the regional contributions implied by the aggregative method.

In column (6) we have expression (6) above computed for each region. It consists of nonfarm income per capita less the farm income per capita, multiplied by the farm population ratios for each region.

Column (7) which is the difference between columns (5) and (6) shows the estimated "bias" in the United States average gap resulting from the computation of the United States average by use of United States totals. The differences shown in column (7) could also have been obtained by substitution in expression (7) above, which we have found is the difference for each region implied by the two methods. Thus, for the Northeast Region we find that the substantial density of nonfarm population in that area relative to the farm population, combined with the high dollar level of nonfarm income per capita results in an extreme upward bias in that region's contribution to the U.S. average computed by use of aggregative figures. Upward biases are also reflected for the Pacific and East North Central Regions for the same reasons. In all other regions, downward biases are the rule primarily because of the relatively higher density of farm populations in those regions.

### Regional Data Would Minimize Bias

One clear implication of these results is the necessity for greater geographical detail in per capita income data in order to properly gage the magnitude of the disparity in income between

farm operators and persons in nonfarm occupations for the country as a whole. As a minimum goal, estimates at a regional level on a current year basis should be aimed at. Of course, biases may be present even in regional measures because such estimates are themselves aggregates of State estimates. However, tests with limited data available for 1955 indicate that if a comparison were made on a State-by-State basis rather than on a

regional basis, the U.S. average gap estimated by use of aggregate figures for the U.S. would be reduced by about the same amount as that indicated by the regional data. Considering the additional cost of collecting and analyzing State data, therefore, regional data appear to be quite adequate to measure the average gap between the income of persons on farms and those not on farms for the U.S. as a whole.

Region	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	295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