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REVIEW OF POPULATION ESTIMATES AND PROJECTIONS FOR NEBRASKA COUNTIES

Population projections and estimates have been published by the College of Business Administration's Bureau of Business Research at periodic intervals throughout the past decade. The projections were produced by the Bureau of Business Research (BBR) in 1973 and updated in 1976 to fill the needs of population data users involved in the planning of future needs for various facilities within the state.

The population projections used in this analysis are those published by BBR in 1976 in *Nebraska Population Projections II.* Since they comprise a comprehensive, statewide set of statistics produced in a systematic manner, these county projections have been widely used by planners and decision makers. The county projections were keyed to the projected state growth patterns published in the same volume, and relied heavily on past growth patterns of counties. A ratio of county to state allocation method was used.

Since the 1970 Census of Population and Housing, population estimates at the state and county level have been produced yearly by BBR in conjunction with the U.S. Bureau of the Census under the auspices of the Federal-State Cooperative Program for population estimates. An advantage of these estimates lies in the nationwide standardization of the techniques utilized. At the same time, this advantage belies an inherent disadvantage of the estimation techniques employed because Nebraska is a sparsely populated state and thus does not reflect many of the population patterns which characterize other states in the nation.

It is useful to both producers and users of the estimates and projections to know how accurately the techniques used reflect actual population changes which have occurred throughout the state in the past decade. With the availability of recent population counts it is possible to evaluate the accuracy of these estimates and projections. This review will focus on comparisons of the preliminary 1980 census counts at the state and county level to (1) medium series 1980 population projections at the state and county level produced by BBR, and (2) 1979 state and county population estimates produced under the auspices of the Federal-State Cooperative Program.

A ratio analysis was conducted to assess how accurately the 1980 projections and the 1979 estimates reflected actual population changes. The 1980 census figure was used as the denominator when calculating the ratios. Thus, if the ratio was greater than one it meant the population projection or estimate was higher than the 1980 census figure. In turn, if the ratio was less than one it indicated the population projection or estimate was less than the actual 1980 census figure. If the ratio equaled one the population projection or estimate was exactly the same as the 1980 census count. While in reality only one county (Merrick) had a population projection equal to the 1980 census figure, the ratios for many of the estimates and projections that were close to the 1980 census counts came out to be one due to rounding. The 1980 census figures, 1980 projections, 1979 estimates, and their corresponding ratios appear in Table 1 (p. 2).

For the state as a whole, both the 1980 projection and the 1979 estimate were higher than the 1980 census figure—indicating a faster rate of growth than actually occurred. The 1980 projection was 0.8 percent higher than the 1980 census figure and the 1979 estimate was 0.3 percent higher. Although the 1979 estimate is for nine months prior to the census date, there is little reason to suspect that this number would have changed much in that time. Both the projection and the estimate represent a very accurate estimate of Nebraska's population.

For projections at the county level, 36 (or 38.7 percent) of the counties had a projected population higher than the 1980 census, 56 (or 60.2 percent) had a projected population lower than the 1980 census, and 1 (or 1.1 percent) had a projected population equal to the 1980 census. In cases where the 1980 county projections were higher than the 1980 census figures, the largest discrepancies occurred for Arthur, Dodge, Douglas, Kimball, and Wayne counties. A slower rate of population decline was projected for Arthur and Kimball counties than actually occurred. In contrast to the increase in population projected for Wayne County, a decline in its population occurred from 1970 to 1980. This discrepancy is not surprising, given the erratic pattern of population growth and decline experienced by Wayne County from 1930 through 1980. The projections indicated a faster rate of population increase for Dodge and Douglas counties than actually occurred. This is consistent with the general trend depicted by the 1980 census of a slower rate of growth in metropolitan areas.

Nine Nebraska counties experienced considerably faster rates of growth than were projected. These are Box Butte, Brown, Chase, Lincoln, Morrill, Perkins, Rock, Sheridan, and Stanton counties. All of these counties, except Lincoln County, experienced a reversal of population declines exhibited previously. These discrepancies accurately reflect a weakness inherent to population projections—which is that they are largely based on past population trends. As a result, projections are unable to reflect changes in extraneous influences, such as economic factors, which are likely to affect population developments (continued on page 6)

Table 1
COMPARISON OF 1980 PRELIMINARY CENSUS FIGURES
WITH 1980 PROJECTIONS AND 1979 ESTIMATES
FOR NEBRASKA COUNTIES

County	1980 Census[1]	1980 Projection	1979 Estimate	Ratio of '80 Projection to '80 Census	Ratio of '79 Estimate to '80 Census
Adams	30,643	32,293	29,939	1.05	0.98
Antelope	8,688	8,345	8,971	0.96	1.03
Arthur	509	557	556	1.09	1.09
Banner	918	929	912	1.01	0.99
Blaine	859	811	867	0.94	1.01
Boone	7,383	7,611	7,372	1.03	1.00
Box Butte	13,688	9,465	13,154	0.69	0.96
Boyd	3,321	3,365	3,358	1.01	1.01
Brown	4,351	3,734	4,293	0.86	0.99
Buffalo	34,757	34,510	34,267	0.99	0.99
Burt	8,806	8,429	8,430	0.96	0.96
Butler	9,321	8,674	9,063	0.93	0.97
Cass	20,027	19,210	20,504	0.96	1.02
Cedar	11,357	10,988	11,515	0.97	1.01
Chase	4,749	3,827	4,855	0.81	1.02
Cherry	6,753	6,405	6,571	0.95	0.97
Cheyenne	10,024	10,327	10,427	1.03	1.04
Clay	8,124	8,165	7,777	1.01	0.96
Colfax	9,873	9,313	9,724	0.94	0.98
Cuming	11,669	11,976	11,994	1.03	1.03
Custer	13,827	12,979	13,573	0.94	0.98
Dakota	16,542	15,494	16,789	0.94	1.01
Dawes	9,639	10,078	9,101	1.05	0.94
Dawson	22,138	20,445	22,297	0.92	1.01
Deuel	2,452	2,496	2,420	1.02	0.99
Dixon	7,136	6,831	7,097	0.96	0.99
Dodge	35,851	38,935	35,662	1.09	0.99
Douglas	395,028	428,936	412,195	1.09	1.04
Dundy	2,830	2,660	2,739	0.94	0.97
Fillmore	7,899	7,506	8,112	0.95	1.03
Franklin	4,366	4,033	4,570	0.92	1.05
Frontier	3,645	3,709	3,992	1.02	1.10
Furnas	6,476	6,130	6,465	0.95	1.00
Gage	24,451	25,193	23,320	1.03	0.95
Garden	2,806	2,697	2,792	0.96	1.00
Garfield	2,359	2,202	2,593	0.93	1.10
Gosper	2,136	2,001	2,670	0.94	1.25
Grant	882	937	845	1.06	0.96
Greeley	3,448	3,644	3,744	1.06	1.09
Hall	47,651	47,709	46,779	1.00	0.98
Hamilton	9,226	9,051	9,038	0.98	0.98
Harlan	4,268	3,926	4,399	0.92	1.03
Hayes	1,370	1,406	1,501	1.03	1.10
Hitchcock	4,079	3,681	4,176	0.90	1.02
Holt	13,543	12,127	13,046	0.90	0.96
Hooker	985	969	986	0.98	1.00
Howard	6,719	6,764	6,919	1.01	1.03
Jefferson	9,818	9,623	10,138	0.98	1.03
Johnson	5,261	5,273	5,443	1.00	1.03
Kearney	7,013	6,760	6,851	0.96	0.98
Keith	9,339	8,816	10,142	0.94	1.09
Keya Paha	1,296	1,292	1,260	1.00	0.97
Kimball	4,880	5,478	4,813	1.12	0.99
Knox	11,456	10,705	11,070	0.93	0.97
Lancaster	192,718	198,917	186,481	1.03	0.97
Lincoln	36,422	32,499	37,388	0.89	1.03
Logan	979	1,017	1,062	1.04	1.08
Loup	853	894	954	1.05	1.12
Madison	31,419	30,384	30,316	0.97	0.96
McPherson	593	616	635	1.04	1.07
Merrick	8,946	8,946	8,566	1.00	0.96
Morrill	6,132	5,462	6,048	0.89	0.99
Nance	4,746	4,634	4,668	0.98	0.98
Nemaha	8,377	8,618	7,990	1.03	0.95
Nuckolls	6,738	6,806	6,652	1.01	0.99
Otoe	15,124	15,566	15,097	1.03	1.00
Pawnee	3,926	3,897	4,036	0.99	1.03
Perkins	3,626	3,166	3,636	0.87	1.00
Phelps	9,713	9,724	10,045	1.00	1.03
Pierce	8,479	8,475	8,485	1.00	1.00
Platte	28,842	28,731	28,687	1.00	0.99
Polk	6,338	5,923	6,213	0.93	0.98
Red Willow	12,611	12,473	12,702	0.99	1.01
Richardson	11,126	11,152	11,030	1.00	0.99
Rock	2,357	2,083	2,528	0.88	1.07
Saline	13,029	13,351	13,072	1.02	1.00
Sarpy	84,933	81,929	88,156	0.96	1.04
Saunders	18,749	17,502	17,723	0.93	0.95
Scotts Bluff	38,150	39,620	37,812	1.04	0.99
Seward	15,733	15,351	15,278	0.98	0.97
Sheridan	7,563	6,790	7,214	0.90	0.95
Sherman	4,219	4,332	4,369	1.03	1.04
Sioux	1,839	1,926	2,006	1.05	1.09
Stanton	6,531	5,862	6,409	0.90	0.98
Thayer	7,566	7,040	7,393	0.93	0.98
Thomas	972	969	1,155	1.00	1.19
Thurston	7,192	6,666	6,947	0.93	0.97
Valley	5,631	5,273	5,351	0.94	0.95
Washington	15,515	15,681	15,622	1.01	1.01
Wayne	9,706	10,841	9,542	1.12	0.98
Webster	4,862	4,812	4,874	0.99	1.00
Wheeler	1,056	1,054	1,085	1.00	1.03
York	14,781	14,020	14,630	0.95	0.99
Nebraska	1,570,006[2]	1,582,422	1,573,943	1.01	1.00

[1] Preliminary, subject to revision.

[2] Nebraska's population contains 5,279 persons who cannot at this time be allocated to regions, counties, or cities.

Figure 1
COUNTIES FOR WHICH 1980 PROJECTIONS HAD A 5.0 PERCENT OR MORE DEVIATION FROM THE 1980 CENSUS

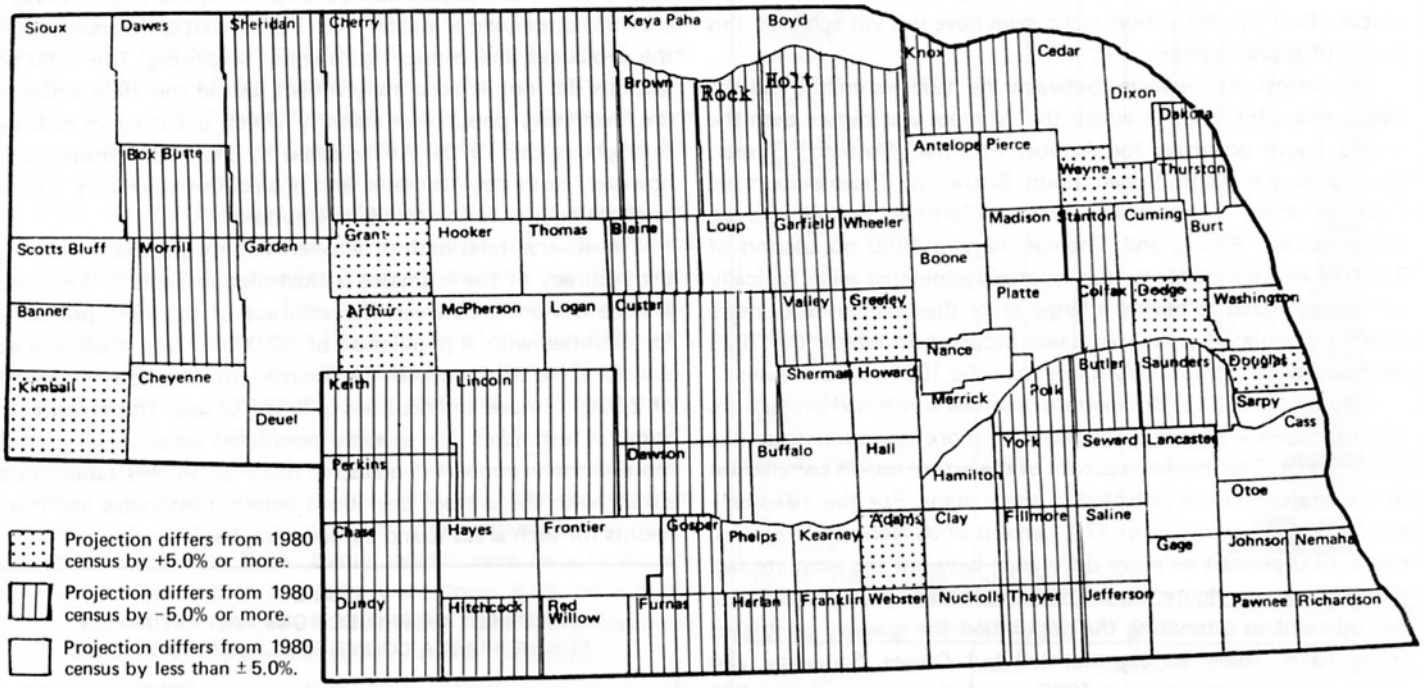
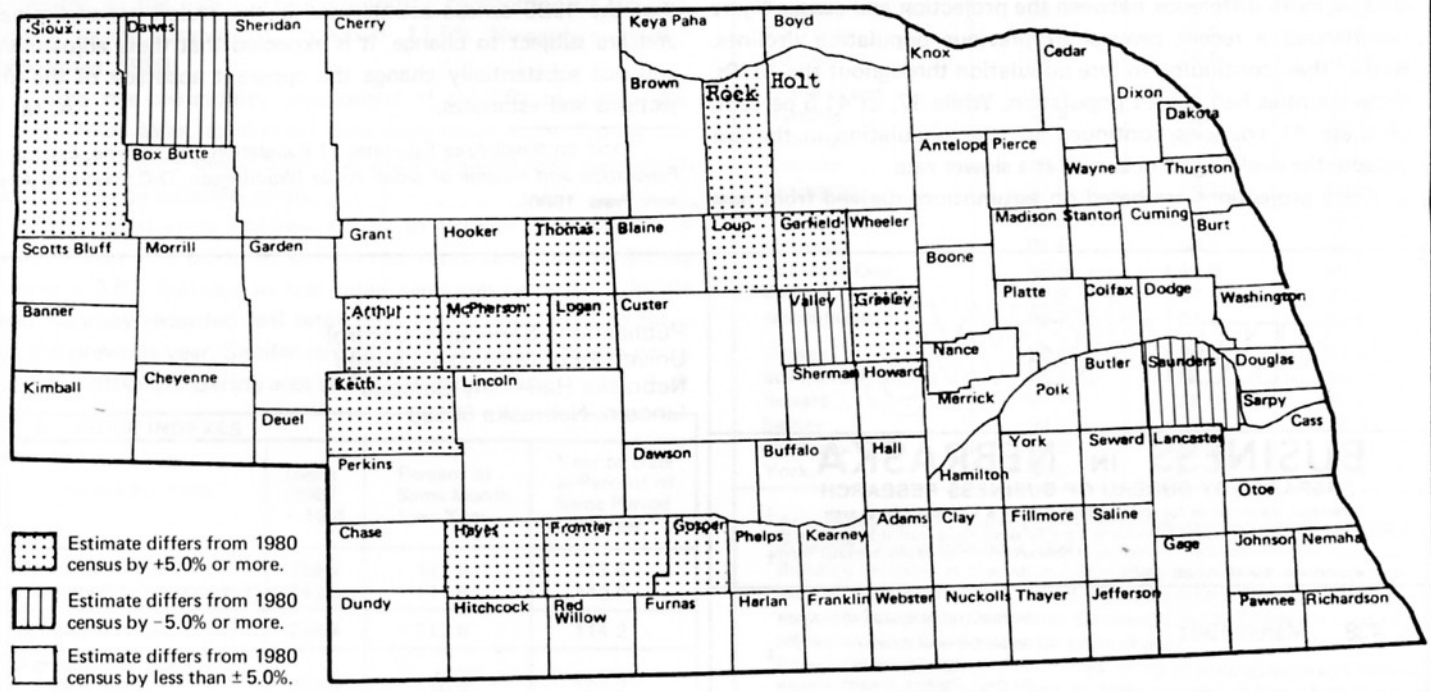


Figure 2
COUNTIES FOR WHICH 1979 ESTIMATES HAD A 5.0 PERCENT OR MORE DEVIATION FROM THE 1980 CENSUS



Review and Outlook

November 1980 was another month of little change in the Nebraska economy. Major economic indicators for the state suggest a slight increase in real output. The non-agricultural index of physical volume output was up 0.3% in November over the October 1980 level, but caution is advised in interpreting these data for cash farm marketings for Nebraska and the United States were unavailable when this article was written.[1] The increase in the non-agricultural component of the state's economy was led by advances in construction and manufacturing.

[1] The chart at the bottom of the page estimates physical volume by using changes in the non-agricultural sectors only, and will be revised when cash farm marketing data are available.

While cash farm marketing receipts were not available, note that prices received by Nebraska farmers increased 3.3% in November over month-earlier levels, compared with 4.6% nationally on a seasonally adjusted basis. Unadjusted prices were down -1.1%, compared with a 1.5% increase nationally. On a year-to-year basis (November 1979-November 1980), prices received by Nebraska farmers were up 11.8%, compared with 10.9% nationally. Prices paid by farmers increased 12% over this same interval.

One of the stronger sectors of the Nebraska economy during November 1980 was the construction sector. This index was up 2.7% above the October level, although it remains well below the year-previous level. The construction sector, like other elements of the Nebraska economy, apparently (continued on page 5)

Notes for Tables 1 and 2: (1) The "distributive" indicator represents a composite of wholesale and retail trade; transportation, communication and utilities; finance, insurance, and real estate; and selected services. (2) The "physical volume" indicator and its components represent the dollar volume indicator and its components adjusted for price changes using appropriate price indexes—see Table 5, page 5.

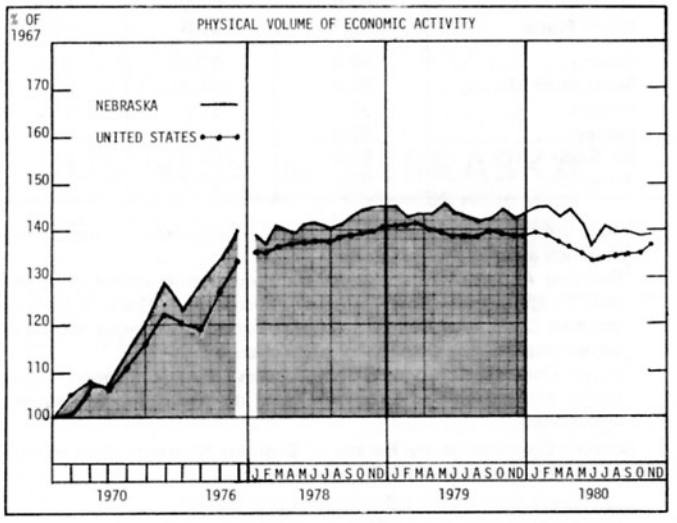
ECONOMIC INDICATORS: NEBRASKA AND UNITED STATES

1. CHANGE FROM PREVIOUS YEAR

November 1980	Current Month as Percent of Same Month Previous Year		1980 Year to Date as Percent of 1979 Year to Date	
Indicator	Nebraska	U.S.	Nebraska	U.S.
Dollar Volume	NA	NA	NA	NA
Agricultural	NA	NA	NA	NA
Nonagricultural	105.0	108.5	106.6	108.8
Construction	87.9	96.8	76.8	101.0
Manufacturing	108.4	108.9	111.3	109.3
Distributive	105.4	109.4	107.9	109.7
Government	103.9	108.2	105.3	107.3
Physical Volume	NA	NA	NA	NA
Agricultural	NA	NA	NA	NA
Nonagricultural	94.2	97.3	95.1	96.7
Construction	79.9	88.0	69.1	91.0
Manufacturing	96.1	97.0	98.3	95.6
Distributive	93.6	97.2	95.0	96.5
Government	98.3	101.0	98.4	101.6

2. CHANGE FROM 1967

Indicator	Percent of 1967 Average	
	Nebraska	U.S.
Dollar Volume	NA	NA
Agricultural	NA	NA
Nonagricultural	351.5	334.5
Construction	254.5	308.6
Manufacturing	371.1	299.9
Distributive	362.7	359.0
Government	330.8	322.6
Physical Volume	NA	NA
Agricultural	NA	NA
Nonagricultural	141.1	137.2
Construction	82.6	100.2
Manufacturing	163.9	132.5
Distributive	141.6	140.1
Government	137.2	150.3

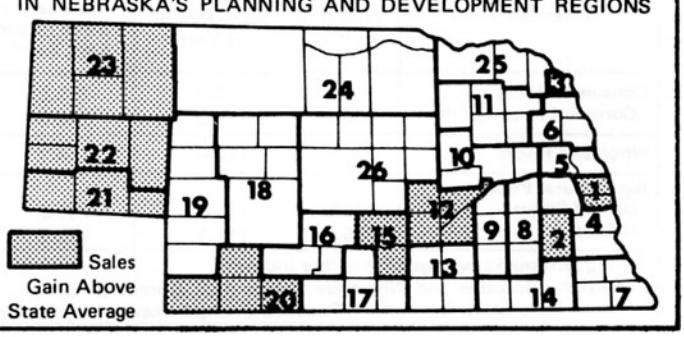


3. NET TAXABLE RETAIL SALES OF NEBRASKA REGIONS AND CITIES (Adjusted for Price Changes)

Region Number and City	City Sales*	Sales in Region*	
	Nov. 1980 as percent of Nov. 1979	Nov. 1980 as percent of Nov. 1979	Year to date'80 as percent of Year to date'79
The State	94.7	93.7	91.0
1 Omaha	91.5	91.5	92.6
Bellevue	93.8		
2 Lincoln	99.9	98.4	93.0
3 So. Sioux City	97.5	90.4	87.9
4 Nebraska City	93.3	89.5	84.0
5 Fremont	88.7	86.8	86.3
Blair	85.1		
6 West Point	82.4	91.2	80.9
7 Falls City	92.8	87.3	84.9
8 Seward	93.9	87.8	85.8
9 York	82.3	82.3	87.6
10 Columbus	89.7	89.2	85.9
11 Norfolk	89.6	88.2	83.9
Wayne	89.0		
12 Grand Island	93.9	90.9	91.8
13 Hastings	94.6	95.5	88.4
14 Beatrice	92.2	92.3	86.9
Fairbury	83.6		
15 Kearney	99.4	99.6	90.7
16 Lexington	88.2	90.9	88.2
17 Holdrege	90.9	88.9	89.3
18 North Platte	88.1	84.3	83.5
19 Ogallala	86.1	99.2	88.6
20 McCook	95.6	93.7	91.9
21 Sidney	103.8	90.8	94.1
Kimball	80.4		
22 Scottsbluff/Gering	98.4	101.8	92.4
23 Alliance	92.6	91.5	91.1
Chadron	86.1		
24 O'Neill	94.1	90.4	85.0
25 Hartington	81.1	88.7	82.3
26 Broken Bow	105.5	93.2	86.8

* State totals include sales not allocated to cities or regions. The year-to-year ratios for city and region sales may be misleading because of changes in the portion of unallocated sales. Region totals include, and city totals exclude, motor vehicle sales. Sales are those on which sales taxes are collected by retailers located in the state. Compiled from data provided by Nebraska Department of Revenue.

1980 YEAR TO DATE AS PERCENT OF 1979 YEAR TO DATE IN NEBRASKA'S PLANNING AND DEVELOPMENT REGIONS



(continued from page 4)

bottomed in June 1980 and has been slowly increasing since then.

Nebraska's manufacturing sector recorded a gain of 1.7% in November 1980, compared with October 1980. The index has moved up 2.6% since the June 1980 lows but, like the construction sector, this segment of the economy remains below year-previous levels. The November increases in the manufacturing and construction sectors were the first substantial increases in these sectors since the July rebound and may indicate that the Nebraska economy is poised for further advances.

While construction and manufacturing recorded monthly increases, output in the distributive sector declined 0.2%. Physical volume output in the distributive sector has changed little since the July 1980 increase. The index for the distributive sector stands at 141.6, down from 141.8 recorded in July 1980. It is above the 1980 lows but remains below November 1979 levels.

Once again the government sector recorded no change in output. The index was unchanged at 137.2, which is less than 2% below the November 1979 level.

Retail sales in Nebraska continued their lackluster performance in November 1980. Unadjusted for price changes, non-motor vehicle sales were up 5.6%. Motor vehicle sales have been very slow nationally, and in Nebraska were down 6.2% on a dollar volume basis November 1979 to November 1980. Combined retail sales were up 4.5% on an unadjusted or dollar volume basis.

Considering the serious distortions in the consumer price index (CPI), it is questionable how meaningful are price adjustments using this deflator. Recent discussion has centered on the distortions introduced by weighting more heavily the rapidly rising components of the index and the influence of interest rates on the housing component of the consumer price index. Deflating by using the commodity component of the consumer price index removes the problem of housing, but does not make allowance for the fact that more rapidly rising goods are more heavily weighted in the index. The commodity component of the consumer price component increased 11.5% November 1979 - November 1980.

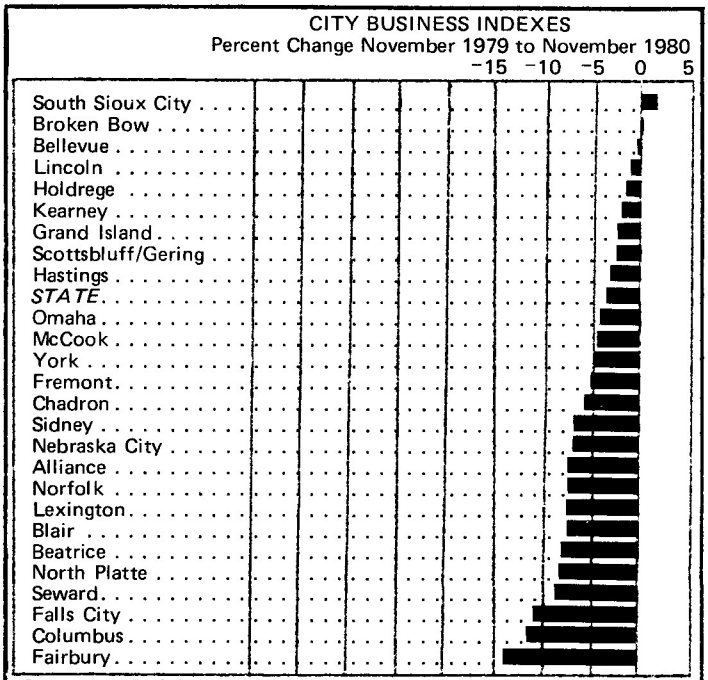
Using the commodity component of the CPI to deflate Nebraska retail sales, total retail sales were down 6.3%. Non-motor vehicle sales were down 5.3% and motor vehicle sales were down 15.9% in price adjusted terms.

Retail sales were notably strong in Broken Bow where the index recorded a 5.5% increase in real retail sales, and in Sidney where a 3.8% increase in real retail sales was recorded. Lincoln and Kearney recorded real retail sales nearly equivalent to those of the previous year. Similar strength in retail sales was also noted in the Scottsbluff/Gering area and South Sioux City. D. E. P.

5. PRICE INDEXES

November 1980	Index (1967 = 100)	Percent of Same Month Last Year	Year to Date as Percent of Same Period Last Year*
Consumer Prices	256.2	112.6	113.6
Commodity component	242.5	111.5	112.3
Wholesale Prices	278.4	112.6	114.2
Agricultural Prices			
United States	275.0	110.9	101.2
Nebraska	285.0	111.8	102.2

*Using arithmetic average of monthly indexes.
Sources: Consumer and Wholesale Prices: U.S. Bureau of Labor Statistics; Agricultural Prices: U.S. Department of Agriculture.



Source: Table 3 (page 4) and Table 4 below.

4. NOVEMBER CITY BUSINESS INDICATORS

The State and Its Trading Centers	Percent of Same Month a Year Ago: Employment[1]	Building Activity[2]	Power Consumption[3]
The State	98.5	85.3	95.5
Alliance	97.3	54.9	102.1
Beatrice	99.1	42.1	95.5
Bellevue	98.8	188.1	98.2
Blair	98.0	100.0	107.2
Broken Bow	98.5	70.5	88.3
Chadron	97.2	145.3	95.0
Columbus	97.3	32.4	99.2
Fairbury	98.9	26.0	85.2
Falls City	98.9	25.0	100.8
Fremont	106.0	56.6	101.3*
Grand Island	98.1	123.6	106.3
Hastings	99.4	88.6	86.7
Holdrege	98.6	191.4	84.4
Kearney	98.9	77.4	90.9
Lexington	97.9	76.7	62.2
Lincoln	97.0	104.4	96.9
McCook	98.4	64.9	96.8
Nebraska City	98.8	47.9	89.9
Norfolk	97.9	67.6	97.5
North Platte	98.7	61.6	89.5
Omaha	98.8	95.6	97.6
Scottsbluff/Gering	95.4	104.3	96.7
Seward	97.1	39.6	85.2
Sidney	99.3	17.4	94.5
So. Sioux City	98.8	191.4	84.4
York	98.9	203.2	81.4

[1] As a proxy for city employment, total employment for the county in which a city is located is used.
[2] Building Activity is the value of building permits issued as spread over an appropriate time period of construction. The U.S. Department of Commerce Composite Construction Cost Index is used to adjust construction activity for price changes.
[3] Power Consumption is a combined index of consumption of electricity and natural gas except in cases marked * for which only one is used.

Source: Compilation by Bureau of Business Research from reports of private and public agencies.

(continued from p. 1)

in a particular locale. For example, it is impossible to forecast with accuracy the impact of Burlington Northern on Alliance (which affects Box Butte County), or the building of a power plant in Sutherland on Lincoln County. Projection techniques have not yet achieved this degree of sophistication.

The largest discrepancies between the 1979 estimates and the 1980 census for cases in which the estimate was higher than the census figure occurred for Arthur, Frontier, Garfield, Gosper, Greeley, Hayes, Keith, Logan, Loup, Sioux, and Thomas counties. Eight of these 11 counties—Arthur, Garfield, Gosper, Hayes, Logan, Loup, Sioux, and Thomas—have a 1980 population of 2,500 or less. Estimates for such sparsely populated areas typically are characterized as having a larger error than estimates for more densely populated areas. No cases occurred in which the 1979 estimates were substantially lower than the 1980 census figures.

Figures 1 and 2 (p. 3) illustrate counties which had projections and estimates with a ±5.0 percent or more deviation from the 1980 census. The greater accuracy of the estimates—in comparison to the projections—is reflected in these maps. For the 1979 estimates, only 16 counties, or 17.2 percent of all Nebraska counties, had a ±5.0 percent or more difference between the estimate and the 1980 census figure. As would be expected—given the difficulties inherent in estimating the population for sparsely populated areas—13 of these 16 counties (all but Dawes, Saunders, and Valley counties) registered a 1980 population of less than 2,500 people. As producers of population estimates are well aware, there is an inverse relationship between county population size and accuracy of the estimates.

Forty-one, or 44.1 percent, of all Nebraska counties had a ±5.0 percent or more deviation between the 1980 projection and 1980 census figure. This is a considerably larger number of counties with a ±5.0 percent or more deviation than occurred for the 1979 estimates. Fifteen of the 41 counties that had a ±5.0 percent or more difference between the projection and census figure experienced a recent reversal of previous population declines. Rather than continuing to lose population throughout the 1970s, these counties had gained population. While 17, or 41.5 percent, of these 41 counties continued to lose population in the last decade, the decline had occurred at a slower rate.

Since projections are based on assumptions derived from past population trends for an area and would not be as sensitive as estimates (which are based on data representing people, such as births, deaths, school enrollment, social security recipients, and so on) to current population developments, the large number of counties displaying a greater than 5.0 percent difference between the projected and census figure is not surprising. The 1980 projections did not as accurately reflect, as did the 1979 estimates, the increasing population stability which occurred in Nebraska throughout the 1970s. As indicated by the 1980 census figures, however, both the estimates and projections were very accurate in denoting population trends in Nebraska.

The inverse relationship between county population size and the accuracy of the estimates is illustrated in Table 2. While there is little deviation between the accuracy of the 1980 projections for counties with a population of 50,000 or less, there is a substantial difference between the accuracy of estimates for counties of 2,500 or more and counties of 2,500 or less. The percent deviation of estimates for sparsely populated areas versus that for more densely populated areas, as depicted in this table, is consistent with the average deviations between estimates and census counts for such areas found by demographers.[1]

Table 2
ACCURACY OF PROJECTIONS AND ESTIMATES
FOR NEBRASKA COUNTIES CLASSIFIED BY SIZE

County Population	Ratio of '80 Projection to '80 Census	Ratio of '79 Estimate to '80 Census	Percent Difference '80 Projection to '80 Census	Percent Difference '79 Estimate to '80 Census
2,500 or less	0.9886	1.0723	−1.1	7.2
2,501 to 10,000	0.9710	0.9963	−2.9	−0.4
10,001 to 50,000	0.9817	0.9905	−1.8	−1.0
Over 50,000	1.0552	1.0210	5.5	2.1

Overall, the estimates and projections represent a very accurate estimate of Nebraska's population. While it should be remembered that the 1980 census counts used in this review are preliminary and are subject to change, it is expected that these adjustments will not substantially change the apparent accuracy of the projections and estimates.

A. M. R.

[1] Panel on Small-Area Estimates of Population and Income, *Estimating Population and Income of Small Areas* (Washington, D.C.: National Academy Press, 1980).

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