Measuring wage dispersion: pay ranges reflect industry traits

Greatest wage dispersion occurs in industries with broad occupational staffing or with much incentive pay; high-paying industries, often heavily unionized, show less variation in earnings and a penchant for single job rates

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Wage rates in an industry can vary a great deal above and below the average wage for that industry. However, in another industry with a similar average wage, the range of pay rates can be small. What causes such different wage dispersions among industries? Using measures of relative dispersion, this analysis shows that industry characteristics such as degree of unionization, geographic location, occupational mix, and method of wage payment influence the amount of variation. Recent wage data for a cross-section of manufacturing and mining industries are examined in this article.

The Bureau's Industry Wage Survey program is especially suited to analysis of wage dispersion. Individual surveys provide straight-time hourly earnings data for a number of detailed occupations representing an industry's wage structure. Information is recorded on each establishment's location, collective bargaining status, and number of employees, as well as on its major product and production processes. In addition, sex and method of wage payment are recorded for individual workers.

Data for 43 manufacturing and six mining industries surveyed during 1973–78 are used in this analysis.[1] These narrowly defined industries, although not a probability sample of all industries, adequately represent the many kinds of manufacturing and mining activities in the United States.

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The data reveal substantial differences in the degree of wage dispersion among various industries, apparently governed by two competing groups of factors: (1) companywide bargaining and single job rates create low wage dispersion in industries such as glass containers and cigarettes; and (2) broad occupational staffing patterns and incentive pay systems tend to produce large wage spreads in industries such as meat products and men's suits. In general, high-paying industries, often highly unionized, show less variation in individual earnings than low-paying industries. Differences in pay levels among establishments are a dominant characteristic of industries with widely dispersed earnings.

Employee opportunities for increased pay take different forms that are related to the degree of industry wage dispersion. Uniformity of wages, as found in many high-paying industries, might discourage movement of workers between firms (that may pay the same rates set by union agreement). However, widely dispersed earnings, often in low-paying industries, may encourage workers to seek increased earnings through shifts to higher paying firms or to those using incentive pay systems.

In addition to individual workers, others who make decisions based on wage rate distributions include companies who set their wage levels at stipulated distances from an industry or area-wide average, market researchers testing the potential demand for new consumer products, and tax analysts estimating revenues from workers at different earnings levels.

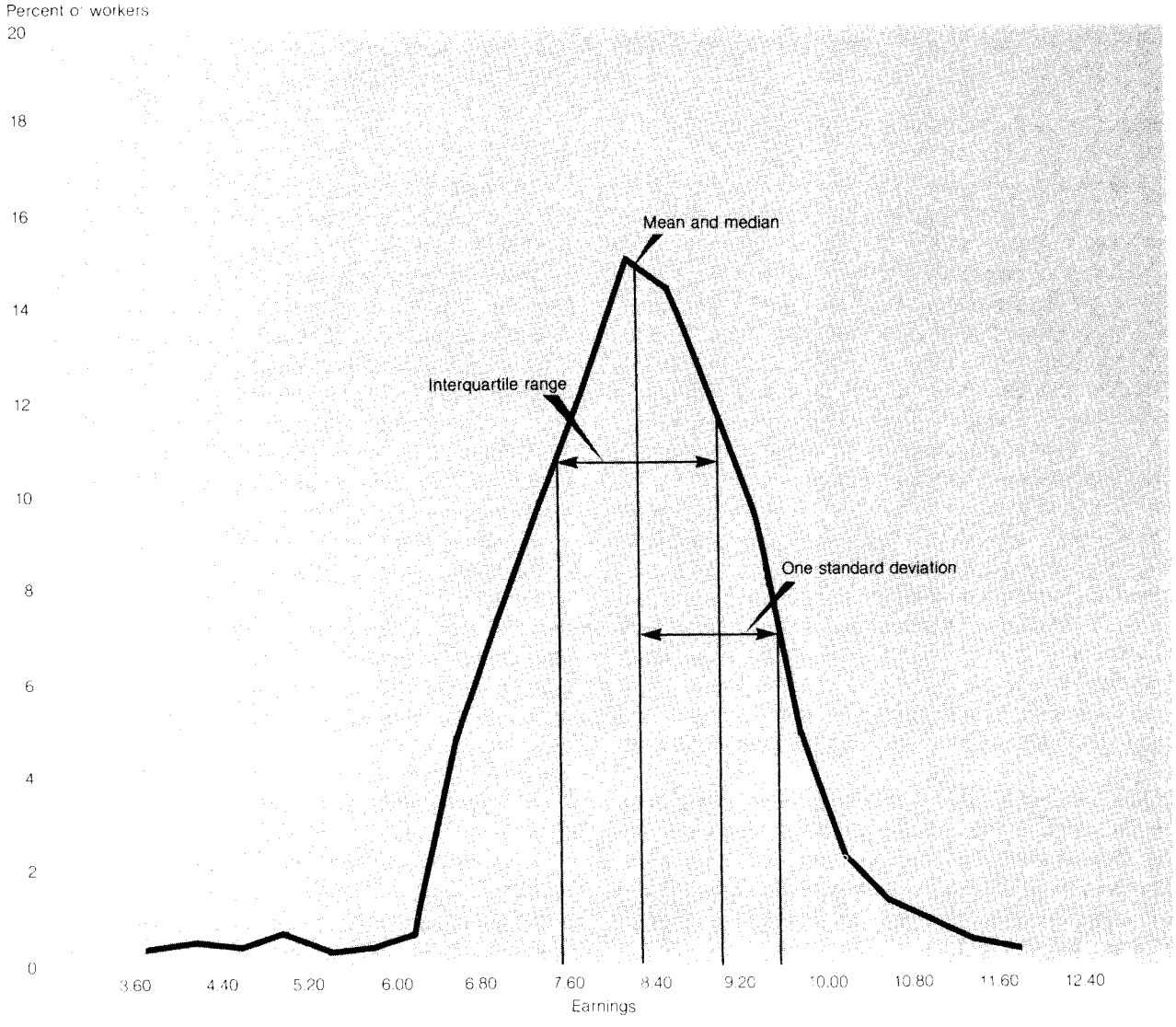
Analytical technique

Before defining the dispersion measures in this analysis, let us look at a full earnings distribution to find some of its key points. Chart 1 describes the wage distribution in basic steel, which corresponds closely to a "bell-shaped" curve; in fact, its mean and median value are exactly the same. Moreover, its first and third quartiles—the points above and below which a fourth of the workers fall—are each about equidistant from the median. The standard deviation can be thought of as the average distance (dispersion) of workers' earnings from the industry's mean. Typically, about two-thirds of the workers fall within plus or minus one standard deviation of the mean.

In this analysis of wage dispersion, two basic approaches are used: the spread in earnings for the central portion of the industry's distribution is related to the median value by the *index of dispersion*; and the variation of all wage rates in the distribution about the mean value is summarized by the *coefficient of variation*.

The index of dispersion is computed by dividing the interquartile range (the difference between the third and first quartiles) by the median (second quartile) and multiplying by 100. In the case of basic steel, it is $\$1.46/\$8.32 \times 100 = 18$. Obviously, the distribution of rates at the upper and lower fourth of the array has no

Chart 1. Distribution of hourly earnings of production workers in basic iron and steel, February 1978



influence on the index values. Further, the actual wage rates other than the three quartiles do not affect the dispersion index; this measure is determined only by the position of these quartiles, and not the shape of the distribution within the band. The median standardizes the index of dispersion, so that a distribution of relatively high rates may be compared with one of low rates. For example, if one industry has quartiles of $4.00, $4.50, and $5.00, and a second has quartiles of $8.00, $8.50, and $9.00, both would have an interquartile range of $1.00. The indexes of dispersion are 22 for the first industry and 12 in the second, indicating more relative dispersion in the lower paying industry.

The coefficient of variation is computed by dividing the standard deviation by the mean and multiplying by 100. The calculation for basic steel would be $1.25 ÷ $8.32 × 100 = 15. As with the dispersion index, a central value—the mean—is used to standardize the earnings dispersion for situations with varying pay levels.

Most of the analysis in this article relies on the coefficient of variation as a measure of dispersion. Using either the dispersion index or the coefficient of variation, however, will generally result in similar conclusions when comparing wage dispersion among industries or other economic units.[2] (See "technical note" that follows for a comparison of how the two measures may differ.) The primary advantage of the coefficient of variation approach is that total variation in earnings around the mean can be measured and then, broken into two component parts—earnings variations *among* and *within* establishments.

Ranking wage spreads

Two sets of dispersion rates by industry are shown in table 1. Indexes of dispersion were, with few exceptions, higher than coefficients of variation, but both measures yielded similar rankings of industries based on Spearman tests.[3] Industries with the least degree of earnings variation included motor vehicle manufacturing, several mining groups, petroleum refining, and cellulosic fibers. The most dispersed earnings were reported in semiconductors and men's suit and coat manufacturing.

In certain instances, the two dispersion measures were dissimilar in rank or value. The coefficients of variation for the women's hosiery and men's and boy's shirts industries, for example, were 21 and 22, respectively, indicating a moderate amount of dispersion. Their indexes of dispersions were 30 and 31, however—relatively high in comparison with other industries. The dispersion index in effect ignores a certain amount of wage compression brought about by the concentration of workers at the lower end of the array, below the first quartile. Thirteen percent of the women's hosiery and 24 percent of the shirts industry production workers earned within 5 cents of the applicable Federal minimum wage when the surveys were last conducted. The median-based dispersion index suggests that these industries have as much relative dispersion as, for example, meatpacking—an industry which is not influenced by the minimum wage and which has one of the highest coefficients of variation (29) among those reported.

At the other end of the earnings array, the lead and zinc mining industry has some "hidden" dispersion in the upper one-fourth of its earnings distribution. Miners, primarily paid on an incentive basis, had earnings that were usually scattered throughout that upper portion. As a result, the industry's dispersion index value of 18 ranks relatively low (although second highest among the mining segment); but, its coefficient of variation (26) is among the upper third of those reported.

Rankings of the coefficients of variation were compared with rankings of such characteristics as industry pay level, unionization, and the use of single-rate pay systems. Based on Spearman rank correlation tests, the degree of dispersion is inversely related to these factors.[4]

Table 2 portrays the inverse relationship found between dispersion and pay levels for 28 industries. Only the meatpacking and motor vehicle parts industries were in the top third of rankings of both industry pay levels and dispersion, and none of the industries fell into the bottom third of both categories. Consistent with the Spearman test, a clustering occurred for industries with the highest pay levels and the lowest coefficients of variation.

Industries with low dispersion rates were, as expected, highly unionized. There were, however, other highly unionized industries with broadly dispersed earnings—such as men's suits, leather tanning, and gray iron (except pipe and fittings) foundries. The latter industries had substantial proportions of workers under incentive pay plans. Four industries with coefficients of variation of 10 or less (underground coal, iron and copper mining, and petroleum refining), in addition to being virtually 100 percent unionized, were marked by almost complete mechanization of production processes and, therefore, a virtual absence of worker control over output. As a result, time rates are paid almost exclusively in these industries, producing low wage dispersion.

Industries with high dispersion rates were invariably those using pay plans other than single-rate systems. Men's suits, with the second highest coefficient of variation, had four-fifths of its production workers covered by union agreements—most of them by a single nationwide contract. Nevertheless, seven-tenths of the workers were paid under individual piecework plans. Further, dispersion is affected by regional differences that have not been eliminated by the nationwide contract that specifies only minimum occupational wage rates.

Semiconductors, the most highly dispersed industry, has relatively little unionization (two-fifths) and sub-

Table 1. Wage dispersion statistics for selected industries, 1973–78

SIC code	Industry title	Survey date	Number of workers	Mean wage	Coefficent of variation	Proportion of interplant variation	Index of dispersion
1011	Iron mining	July 1977	19,103	$7.10	10	13	16
1021	Copper mining	Oct. 1977	20,210	7.60	9	10	11
1031	Lead and zinc mining	Oct. 1977	5,277	6.23	26	30	18
1094	Uranium, radium and vanadium mining	Oct. 1977	9,000	6.89	25	48	27
1211	Underground coal mines	Jan. 1976	94,411	6.96	7	22	14
1211	Surface coal mines	Jan. 1976	33,979	6.88	19	76	22
2011	Meatpacking	Mar. 1974	118,319	4.64	29	75	32
2013	Prepared meat products	Mar. 1974	46,945	4.38	27	78	35
2071	Candy and other confectionery products	Aug. 1975	40,286	3.60	28	67	40
2111	Cigarettes	May 1976	32,826	5.71	15	8	21
221,8	Cotton textiles	May 1975	152,025	3.08	17	13	25
222,8	Manmade textiles	May 1975	136,437	3.07	17	25	25
223,8	Wool textiles	May 1975	13,122	3.17	19	48	23
2251	Women's hosiery	July 1976	23,805	3.00	21	17	29
2252	Hosiery, except women's	July 1976	23,913	3.05	22	15	32
226	Textile dyeing and finishing	June 1976	51,458	3.82	23	47	24
2311	Men's and boys' suits and coats	Apr. 1976	64,105	3.97	32	31	45
2321	Men's and boys shirts	May 1978	85,442	3.29	22	25	31
2327	Men's and boys separate trousers	May 1978	55,017	3.46	23	27	32
2511	Wood household furniture (except upholstered)	Nov. 1974	122,350	3.05	27	69	32
2611	Pulp mills	Summer 1977	8,016	7.23	18	31	29
2621	Paper mills	Summer 1977	98,860	6.47	19	51	26
2631	Paperboard mills	Summer 1977	41,030	6.59	22	47	32
2653	Corrugated and solid fiber boxes	Mar. 1976	61,912	4.65	20	61	25
281	Industrial chemicals	June 1976	129,952	6.28	19	77	26
2823	Cellulosic fibers	Aug. 1976	10,830	4.45	12	38	15
2824	Noncellulosic fibers	Aug. 1976	51,963	5.18	18	54	24
2851	Paints and varnishes	Nov. 1976	27,647	5.10	23	75	27
2911	Petroleum refining	Apr. 1976	63,289	7.38	10	38	13
3079	Miscellaneous plastics products	Sept. 1974	236,413	3.24	27	44	38
3111	Leather tanning and finishing	Mar. 1973	16,677	3.41	25	44	34
3141	Nonrubber footwear	Apr. 1975	105,583	2.98	29	21	40
3221	Glass containers	May 1975	62,591	4.63	18	8	18
3229	Other pressed or blown glassware	May 1975	28,328	4.32	22	18	22
3251	Brick and structural clay tile	Sept. 1975	15,375	3.35	26	63	36
3253	Ceramic wall and floor tile	Sept. 1975	5,215	3.41	22	56	28
3255	Clay refractories	Sept. 1975	7,585	4.78	23	48	26
3259	Clay sewer pipe	Sept. 1975	4,349	4.06	24	34	24
331	Basic iron and steel	Feb. 1978	345,163	8.32	15	35	18
3321	Gray iron foundries, except pipe and fittings	Nov. 1973	97,371	4.43	25	65	39
3321	Gray iron pipe and fittings foundries	Nov. 1973	17,982	3.72	20	42	27
3322	Malleable iron foundries	Nov. 1973	20,087	4.68	21	38	26
3323	Steel foundries	Nov. 1973	49,954	4.12	22	46	26
336	Nonferrous foundries	May 1975	54,432	4.45	26	63	36
3441	Fabricated structural steel	Nov. 1974	63,741	4.55	25	75	35
3711	Motor vehicles	Dec. 1973	611,428	5.54	—	—	4
3714	Motor vehicle parts and accessories	Apr. 1974	149,237	4.65	26	75	37
3674	Semiconductors and related devices	Sept. 1977	52,956	4.52	35	62	62
3731	Shipbuilding	Sept. 1976	104,015	5.66	18	60	20

stantial geographic dispersion. In addition, semiconductors is a relatively new industry within which companies are still developing internal wage structures. Method of pay, again, seems to be the most important influence on dispersion; here, through the use of rate-range pay plans.

Certain groups of related industries prove to be quite different in their dispersion characteristics when examined closely. The mining sector, for example, produces some striking contrasts. First, among four metal mining industries, two have low coefficients of variation (iron and copper) and two are quite high (lead-zinc and uranium). Iron and copper are extracted predominantly from open pit (surface) mines. Accordingly, workers in these industries have less control over production, and are much less likely to receive incentive pay. By contrast, a substantial proportion of workers in lead-zinc and uranium mining—typically underground miners—are paid incentives that lead to dispersed earnings.

In coal mining, the situation is reversed: underground coal has somewhat less dispersion than does surface coal mining. Underground coal workers, virtually all unionized, are covered by a master national agreement. In contrast, most surface coal agreements, covering three-fifths of the industry, are companywide, not nationwide. Thus, almost all of the dispersion in underground coal mining results from differences within establishments. The coefficient of variation is low in underground coal because the master agreement sets only a few rates to cover all occupations. In surface coal, however, there are pay differences among establishments, and these, in fact, more than offset differences within firms.

Components of dispersion

Table 1 shows the percentage of total wage variation attributable to differences among establishments. The

Table 2. Relationship between ranking of coefficients of variation and average hourly earnings, selected industries, 1973–78

Coefficient of variation in industry wages	Average hourly earnings [1]		
	$5.28 or less	$5.31–$7.14	$7.37 or more
Low (Under 20)		Corrugated boxes Glass containers Noncellulosic fibers Paper mills	Cigarettes Copper mining Iron mining Petroleum refining Shipbuilding
Medium (20 to 23)	Hosiery, n.e.c.[2] Men's shirts Men's trousers Textile dyeing Women's hosiery	Glassware, n.e.c.[2]	Malleable iron foundries Paperboard mills
High (24 or more)	Candy Footwear Men's suits Plastics	Fabricated steel Leather tanning Nonferrous foundries Prepared meat Semiconductors	Meatpacking Motor vehicle parts

[1] Gross hourly earnings of production workers in February 1979.
[2] Not elsewhere classified.

interplant proportion of variation was highest (at least 75 percent) for surface coal mining, motor vehicle parts, meat products, industrial chemicals, paints and varnishes, and fabricated structural steel. It was lowest (15 percent or less) for cigarettes, glass containers, cotton textiles, iron and copper mining, and hosiery (except women's). The difference between the interplant proportion of variation and 100 percent equals the percent of wage variation within plants.

Industry patterns. In general, the higher the proportion of interplant variation in an industry, the greater its overall wage dispersion as measured by the coefficient of variation.[5] Table 3 illustrates this relationship; for example, 10 of the 15 industries grouped as having the highest coefficients of variation were also in the upper third for the proportion of interplant variation.

The characteristics of several industries were examined to determine why earnings variation in some primarily stems from differences in pay within rather than among establishments. Low interplant variation was present in industries with one or more of the following dominant features:[6] geographic concentration (cigarettes, hosiery, and cotton textiles); companywide bargaining (glass containers, iron mining, copper mining, and cigarettes); prevalence of incentive pay (nonrubber footwear and hosiery); and broad range of occupational skills (cigarettes, glass containers, iron mining, and copper mining).

In addition, a low interplant value would be expected for an industry with few establishments.[7] For example, cigarettes, with 13 plants, ties for the lowest interplant value among industries studied. The pulp industry, comprised of only 19 mills nationwide, has an interplant value of 31, compared with 51 for paper mills and 47 for paperboard mills, two larger related industries with coefficients of variation and several other characteristics similar to the pulp industry. The same kind of relationship can be found for the cellulosic (12 plants) and noncellulosic (48 plants) fibers industries, with coefficients of variation of 12 and 18, and interplant values of 38 and 54, respectively.

Few establishments in an industry are not sufficient to produce low interplant variation. The cotton textile industry, with 800 plants, had a much lower interplant value (25) than wool, with 87 firms and an interplant value of 48. Cotton industry wages have little variation among plants, in part, because of geographic concentration—nine-tenths of the industry is in the Southeast, four-fifths in North Carolina alone. In contrast, wool industry employment is split about evenly between the Southeast and New England—two regions with quite different pay levels.

The four clay products industries had similar coefficients of variation but differing interplant values, ranging from 34 for clay sewer pipe to 63 for brick and clay tile. Clay sewer pipe had more geographic concentration and a higher proportion of incentive workers than the other branches—two factors associated with higher intraplant variation. By contrast, brick and clay tile plants were found in most parts of the country and had

Table 3. Relationship between rankings of coefficient of variation and degree of interplant variation in industry wages, 1973–78

Coefficient of variation in industry wages	Interplant variation in industry wages as a percent of total variation		
	Low (Under 32 percent)	Medium (33–54 percent)	High (56 percent or more)
Low (Under 20)	Cigarettes Copper mining Textiles (except wool) Glass containers Iron mining Pulp mills Underground coal	Basic steel Cellulosic fibers Noncellulosic fibers Petroleum refining Wool textiles Paper mills	Chemicals Shipbuilding Surface coal
Medium (20 to 23)	Glassware, n.e.c.[1] Hosiery, n.e.c.[1] Men's shirts Men's trousers Women's hosiery	Gray iron pipe Malleable iron foundries Paperboard mills Refractories Steel foundries Textile dyeing	Ceramic tile Corrugated boxes Paints
High (24 or more)	Footwear Lead and zinc mining Men's suits	Clay sewer pipe Leather tanning Plastics Uranium mining	Brick Candy Fabricated steel Furniture Gray iron, except pipe Meatpacking Motor vehicle parts Nonferrous foundries Prepared meat Semiconductors

[1] Not elsewhere classified.

relatively fewer incentive workers than the other clay products groups. This geographic dispersion is to be expected because of the relatively high cost of shipping the finished products and the availability of raw materials (mostly clay) in most areas.

Work force differences. Within individual occupations, earnings variations primarily reflected pay differences among establishments, regardless of the interplant variation for the overall industry. In the four industries with broad skill ranges and low interplant variation, for example, individual occupations exhibited relatively little earnings variation (coefficients of variation rarely exceeded 10); but, this small variation resulted primarily from interplant pay differences. Exceptions included certain incentive-oriented occupations, such as forming-machine operators (glass containers) and miners—both exhibiting more wage dispersion within establishments than did most time-rated occupations in these industries. Wages in some time-rated jobs in cigarettes also had relatively more variation within plants, in part because of the extensive use of rate-range plans.

One worker characteristic—sex—is often associated with different wage distributions. Women, for example, are commonly employed in a small number of occupations near the low end of the wage structure. As a group, therefore, their dispersion values are typically lower than men's and more attributable to interplant variation. Combining the distribution of women's wage rates with that for men typically results in higher proportions of within plant variation by industry. In fact, there is a statistically significant relationship between the proportion of within plant variation and the female percentage of an industry's production work force.[8]

The glass containers industry illustrates how values for dispersion can differ between men and women. Although glass containers is a high-paying industry (table 2), seven-eighths of its 20,000 women production workers were employed in three low-paying jobs—final inspectors, selectors, and carton assemblers. Men, in contrast, were spread throughout the industry's earnings spectrum. The result is a much lower coefficient of variation for women (6) than for men (19) and, as expected, very different proportions of interplant variation—54 for women and 11 for men. The high proportion for women, clustered in three occupations, approximates the high values that are typical for most individual occupations. At an occupational level, the proportion of interplant variation as well as dispersion rates and pay levels were fairly similar for men and women in the industry.

Few changes from earlier data

To examine trend information on dispersion measures, observations for industries in table 1 were matched, where possible, with earlier data. Of the industries compared, indexes of dispersion for 16 industries were essentially the same (a difference of 2 percentage points or less) in both survey periods.

As shown in the following tabulation, six industries—led by glass containers—recorded declines of 4 percentage points or more in their dispersion indexes and five industries—led by candy products—exhibited increases of at least that magnitude.

Industry, by direction of change	*Wage dispersion index*	
	1970–72	*1975–78*
Increases:		
Candy products	33	40
Industrial chemicals	20	26
Nonferrous foundries	31	36
Paperboard mills	28	32
Paper mills	22	26
Decreases:		
Basic steel	24	18
Copper mining	15	11
Glass containers	28	18
Glassware (except containers)	28	22
Iron mining	20	16
Lead and zinc mining	27	18

No single factor or set of factors consistently explain these changes. However, a decline in the incidence of incentive pay was reported in several instances where dispersion values dropped. In glass containers, for example, "buy-outs" of incentive plans by the largest companies contributed heavily to the decline of incentive workers in the industry from 33 percent in 1970 to 13 percent in 1975. In basic steel, however, lower dispersion rates were accompanied by a sharp increase in the incidence of incentive workers—from two-thirds in 1972 to four-fifths in 1978. In steel, uniform cents-per-hour wage increases more than offset the increased use of incentive plans—typically group bonuses. Such wage increases compressed its occupational pay structure to the extent that the highest basic wage rates for workers exceeded the lowest by about 50 percent in 1978 compared with 80 percent in 1972.

In summary, industries vary not only with respect to average earnings but also in the extent to which individuals' earnings are dispersed around a central point. Such industry characteristics as highly uniform pay rates and skill requirements are associated with low dispersion rates while broad staffing patterns and incentive pay systems are commonly found where earnings are more dispersed. Despite their high pay levels, high wage industries tend to have relatively little earnings variation; the degree of this variation and the relative importance of interplant wage differences as a source of dispersion seems to be directly related. Finally, dispersion rates for most industries were essentially the same as those recorded 5 years earlier. □

FOOTNOTES

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[1] For an earlier account of wage dispersion by industry, see L. Earl Lewis, "Wage Dispersion in Manufacturing Industries, 1950–55," *Monthly Labor Review*, July 1956, pp. 780–86.

[2] The Spearman rank correlation coefficient was .84 between the coefficient of variation and the index of dispersion. This test compares the ranking of arrays of these two measures. Had they coincided exactly, the coefficient would be 1.0; if the rankings were reverse images of each other, the coefficient would be −1.0.

[3] Two factors contribute to the index of dispersion exceeding the coefficient of variation: (1) the interquartile range, which covers 50 percent of the workers, is almost always higher than the standard deviation, which includes about one-third of the workers (68 percent typically fall within ± 1 standard deviation of the mean); (2) the mean is generally higher than the median. Hence, the index of dispersion contains a larger numerator and smaller denominator than does the coefficient of variation.

[4] The Spearman rank correlation coefficients were −.53 for industry pay level, −.40 for unionization, and −.64 for single-rate pay systems—all statistically significant at a 1-percent level.

[5] The Spearman rank correlation coefficient was .42 between the coefficient of variation and the proportion of interplant variation.

[6] In theory, it would be possible to use the analysis of variance technique to isolate the percentage of total within plant variation because of differences among occupations (interoccupational) and those due to differences within occupations (intraoccupational). The Bureau's wage surveys, however, do not examine all occupations in an industry. Instead, occupations are selected to represent an industry's wage structure; these occupations may cover between 30 and 80 percent of the production workers in an industry. Thus, in some cases, 70 percent of the workers are lumped together in a residual category consisting of a broad range of occupations which are not studied separately.

[7] The Spearman rank correlation coefficient was .48 between the proportion of interplant variation and the number of establishments in an industry.

[8] The Spearman rank correlation coefficient was .44 between the proportion of within plant variation and the percentage of women in the industry.

A Technical Note on Dispersion Calculations

Coefficient of variation. The summary measure of relative dispersion called the coefficient of variation is derived from total wage variation by summing the wage variation that results from interplant and intra-plant factors; relating that total to the number of workers to derive the "average dispersion per worker"; and, finally, relating that average, the standard deviation, to the industry mean wage. The procedure involves the following series of equations:

(1) Interplant variation $= \Sigma(\overline{X}_e - \overline{X}_i)^2$

where X_e is the mean wage in each establishment and X_i is the industry mean;

(2) Intraplant variation $= \Sigma(\overline{X}_w - \overline{X}_e)^2$

where X_w is the individual wage rate and X_e is the mean wage in the establishment; the sum of equations (1) and (2) equals the total wage variation;

(3) $\text{Variance} = \dfrac{\textit{Total wage variation}}{\textit{Number of workers} - 1}$;

(4) Standard Deviation $= \sqrt{\text{Variance}}$; and

(5) $\text{Coefficient of Variation} = \dfrac{\textit{Standard deviation}}{\textit{Mean}}$.

Dispersion measures compared. As mentioned earlier, the rankings of industry wage dispersions were similar and highly correlated using either indexes of dispersion or coefficients of variation. In terms of data accessibility, however, the index of dispersion is easier to derive because the Bureau publishes quartiles or full distributions of earnings, or both, but not standard deviations in its occupational wage survey reports.

The impact on an industry's coefficient of variation and index of dispersion could be quite different with a change in the minimum wage. To illustrate, data from the May 1978 men's and boys' shirts survey were adjusted to bring all workers paid less than $2.90—the Federal minimum that became effective in January 1979—to that level; no other wage rates were changed. The effect on dispersion statistics is illustrated below:

Statistic	*Actual values*	*After adjustment*	*Percent change*
Median	$3.04	$3.04	0
Middle 50 percent	$2.70–$3.65	$2.90–$3.65	21
Index of dispersion	31	25	19
Mean	$3.28	$3.36	2
Standard deviation	$ .73	$ .67	-8
Coefficient of variation	22	20	9
Interplant proportion	25	23	-7

The much larger decrease in the dispersion index than in the coefficient of variation (19 percent compared with 9 percent) reflects the fact that most of the workers affected by the adjustment are in the lower 25 percent of earnings array. As can be seen, the median and third quartile are unchanged. The coefficient of variation, however, only drops 9 percent, reflecting an 8-percent decline in the standard deviation and a 2-percent increase in the mean.

In summary, either the index of dispersion or the coefficient of variation, in most instances, can be used to gauge dispersion effectively. The former has the advantage of being easier to derive; however, the coefficient of variation provides a more refined measurement because it takes into account portions of the wage distribution which are ignored in computing the index of dispersion.