

5A. Wage Structures in the Electronics Industry

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5A.1 Introduction

Over the past 20 years, wage inequality in the U.S. economy has increased rapidly. In this chapter, we examine the extent to which changes in wage inequality in the semiconductor industry reflect changes in wage inequality in the economy as a whole. For the entire economy, Gottschalk (1997) has shown that wage inequality has increased along several different dimensions. Nationally, the education premium has increased, the experience premium has increased, and within-group (i.e., among workers with similar education, experience, and occupation) inequality has increased. In the next section, we show that in the semiconductor industry, wage inequality has grown, but only along one of these three dimensions--education. The experience premium has not increased and within-group inequality has remained constant. Also, wage dispersion within each occupation group - managerial and professional; production; and sales, clerical and miscellaneous support - has increased and the managerial/professional premium has gone up.

Then, we examine wage structures for the U.S. fabs in the CSM sample. Using wage data from the sample fabs, we calculate within-occupation wage ratios and career paths. Although we have cross-sectional data that do not allow for intertemporal analysis, these calculations provide a snapshot of the wage structures facing different types of workers in the semiconductor industry.

5A.2 Wage Structures: Evidence from National Data

Characteristics of the Data

In order to examine and analyze changes in wage inequality in the semiconductor industry on the national level, data were gathered for years spanning 1979 to 1995 from the March Current Population Surveys (CPS). The sample used throughout this section consists of full-time workers employed in the electrical machinery, equipment and supplies industry (CPS industry code 342, see Table 5A-1). Since the semiconductor industry is only a subset of this industry group, the data are less precise than desired.

Table 5A-1. SIC Industry codes in CPS industry 342

SIC classification	Description of Industry
361	Electric distribution equipment
362	Electrical industrial apparatus
364	Electric lighting and wiring equipment
367*	Electronic components and accessories
369	Misc. Electrical equipment and supplies

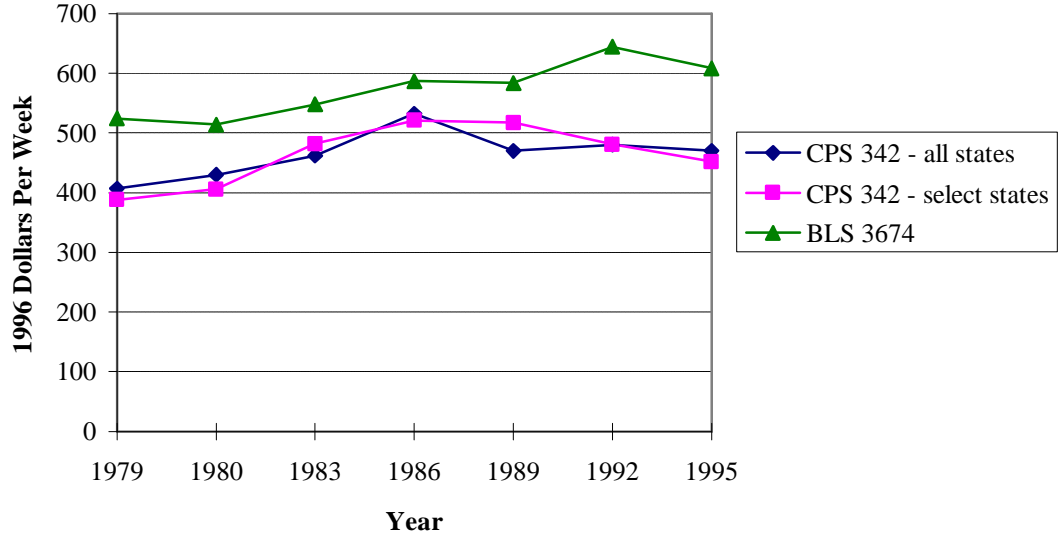
*SIC 367 includes:

SIC classification	Description of Industry
3671	Electron Tubes
3674	Semiconductors and related devices
3679	Electronic components

In an exploration of how well CPS data represents the semiconductor industry, we created another sample on the basis of geographic location. By selecting workers from the nine states that have the highest semiconductor employment (called CPS-select states), we can attempt to increase the likelihood that our sample more accurately represents semiconductors. However the gain comes at the expense of a smaller sample size. In 1994, the states with the largest number of employees working in the semiconductor industry (in descending order) were California, Texas, New York, Arizona, Pennsylvania, Oregon, Massachusetts, Idaho, and Colorado.

Although CPS 342 is not a precise representation of the semiconductor industry, the CPS 342 data compare well to data for the semiconductor industry from the Bureau of Labor Statistics (BLS, SIC 3674). For example, in a comparison of CPS 342-all states, CPS 342-select states and BLS 3674, mean real earnings¹ are similar and the trends are similar over time (Figure 5A-1)². The CPS 342-all states data match up with the BLS semiconductor data as well as the CPS 342-select states match. Since the all states sample have more observations, this analysis will focus primarily on the sample from all states. The presence of other industries in the sample adds noise to the data, but the trends, which are the focus of our analysis, appear to be preserved.

Figure 5A-1. Mean Real Earnings - Production Workers



We sorted the CPS 342 data into three occupations: managerial and professional (primarily composed of engineers); production; and sales, clerical, and miscellaneous support. (See Table 5A-2.) Our analysis will focus on a comparison of managers and professionals with production workers.

Table 5A-2. Number of Observations - all states

Year	Overall	Managers/Profs	Production	Sales, Clerical, & Misc.
1979	238	53	151	34
1980	267	68	151	48
1983	186	35	121	30
1986	201	55	110	36
1989	196	48	126	22
1992	178	50	92	36
1995	157	56	81	20

Table 5A-3. Number of Observations - select states

Year	Overall	Managers/Profs	Production	Sales, Clerical, & Misc.
1979	92	29	47	16
1980	109	30	54	23
1983	74	20	42	12
1986	79	22	42	15
1989	74	24	44	6
1992	64	26	26	12
1995	73	31	33	9

We use these data to explore changes in earnings inequality over the period 1979 to 1995 in the semiconductor industry. Our data analysis presents:

- general trends in earnings dispersion,
- changes in the education, managerial/professional, and experience premiums, and
- within-group earnings dispersion.

For comparison, the analysis is carried out for both the sample containing all states and the sample from select states.

General Trends

In the past 20 years, the U.S. economy as a whole has experienced a period where mean wages have grown slowly while inequality has increased rapidly (Gottschalk, 1997). These economy-wide trends are also present in the semiconductor industry. Mean real weekly wages have been slowly increasing over time for the industry as a whole (Figure 5A-2). Real earnings for production workers increased until the mid-1980s and then decreased thereafter, while the earnings for managers and professionals show a steady increase from 1980 to 1992 (Figures 5A-3 and Figure 5A-4). Much of the increase in real wages for production workers in the early 1980s is probably linked to a change in the composition of the workforce. During this period, many of the lowest skilled and most labor intensive jobs in the industry were eliminated through a combination of automation and outsourcing of these jobs overseas. The production jobs that remained were predominantly higher-skill jobs. Accordingly, between 1979 and 1986, even though total employment in the industry was increasing, the relative share of production workers declined from 60 % to 40% (Figures 5A-5, 5A-6). The post-1986 stagnation in production worker wage is more difficult to explain. Apparently, as the semiconductor industry began to recover from a recession in 1985-1986, it was able to expand hiring of production workers without putting upward pressure on the mean real wage of production workers. (See Chapter 2, “Inter-Industry Comparisons: Lessons Learned From the Semiconductor Industry” for more discussion on employment.)

Figure 5A-2. Mean Real Earnings - All Workers

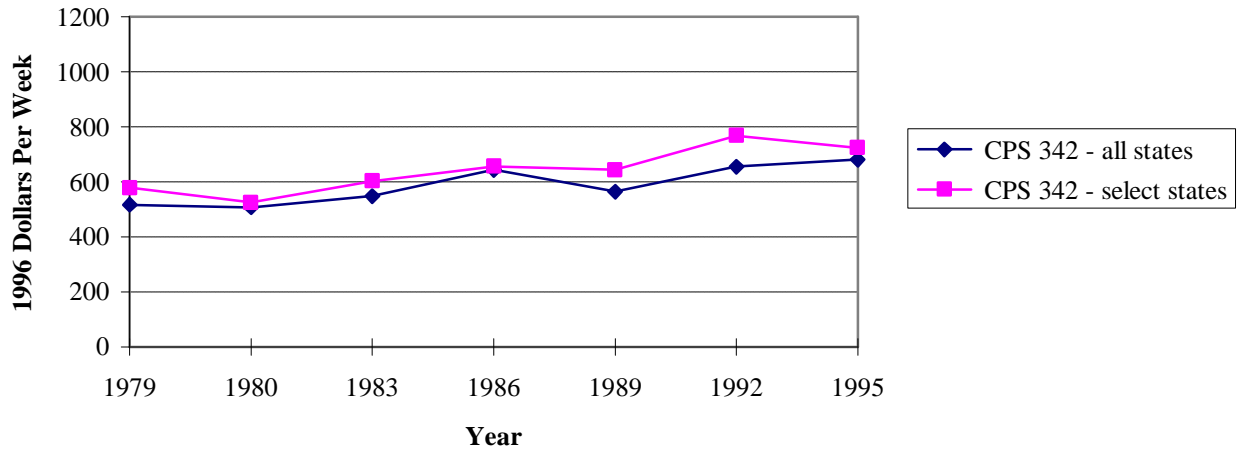


Figure 5A-3. Mean Real Earnings - Production Workers

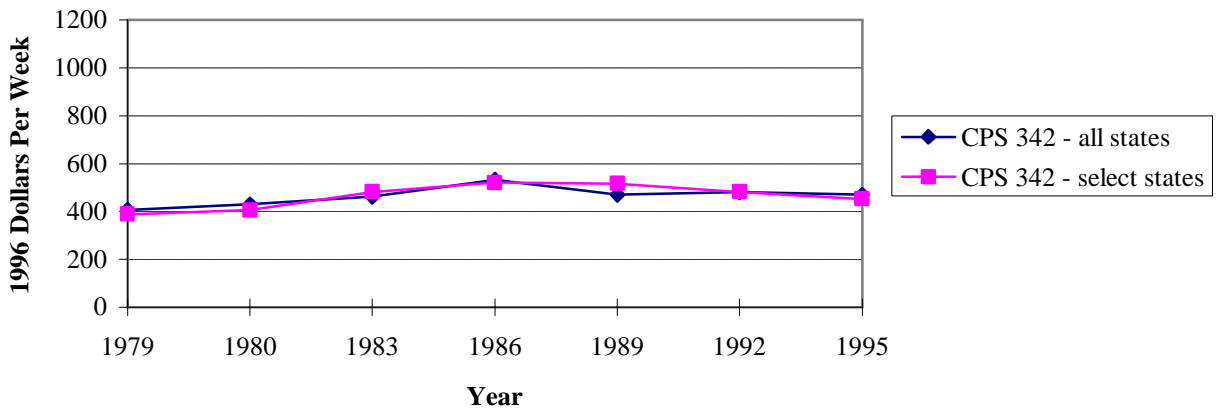


Figure 5A-4. Mean Real Earnings - Managers and Professionals

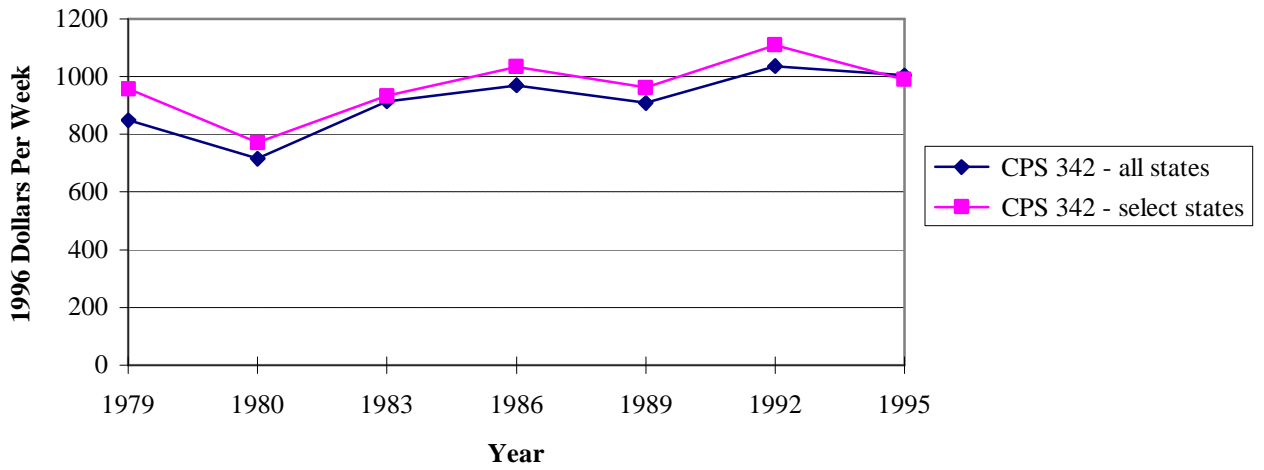


Figure 5A-5. BLS 3674 Employment

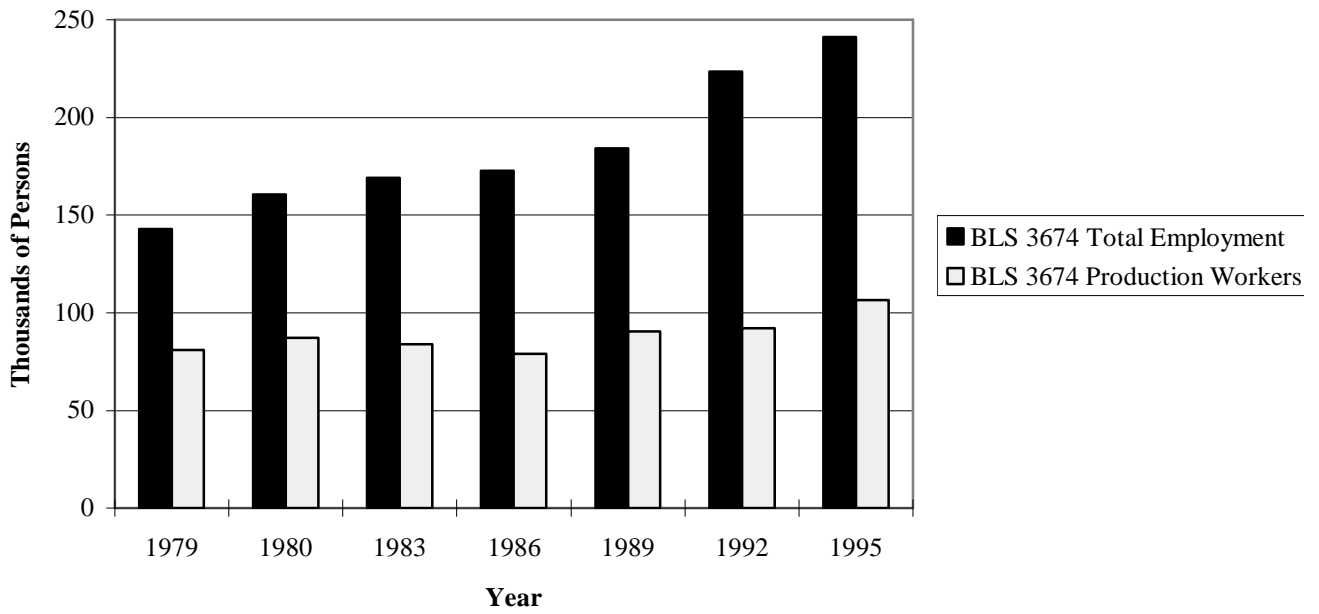
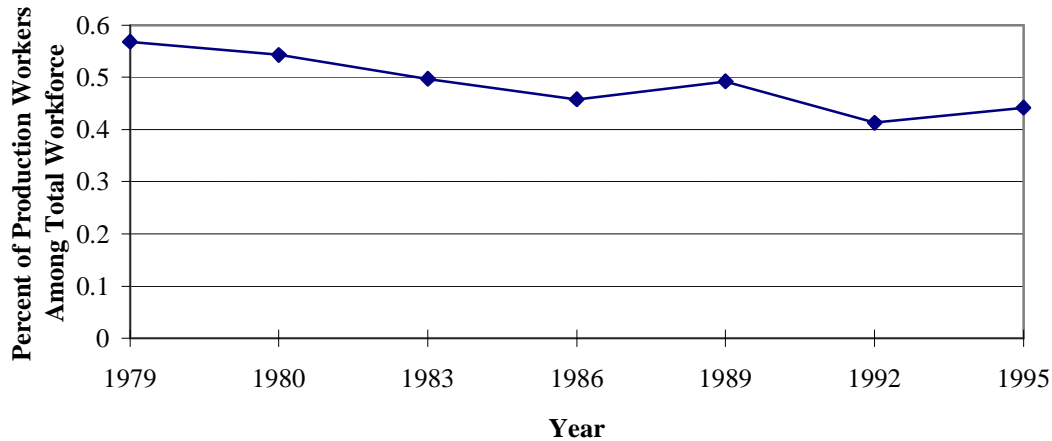
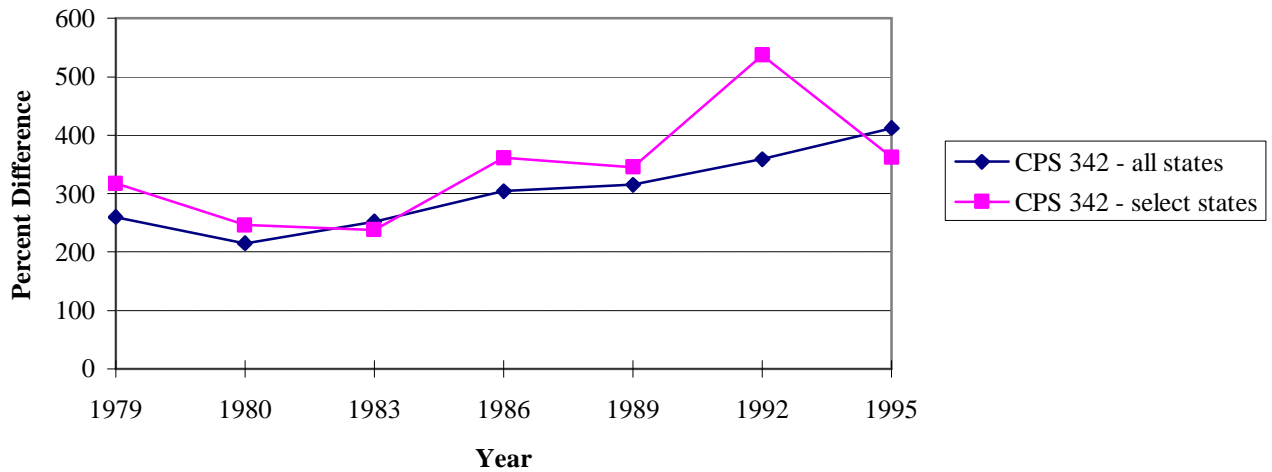


Figure 5A-6. Production Workers Composition of Total Workforce



The increase of the mean real wage for all semiconductor workers has been coupled with an increase in the dispersion of wages. We estimate dispersion by measuring the percent difference in the earnings of the workers at the 90th and 10th percentiles.³ The dispersion of earnings in the semiconductor industry increased from 260% in 1979 to 412% 1995 (Figure 5A-7). In other words, the highest decile of workers earned 3.6 times more than the earnings of the lowest decile of workers in 1979, and 5.1 times 1995 (In the select states the trend is similar, although the increase over time is more variable.). In the economy as a whole, Gottschalk calculates that the percent differences in weekly wages at the 90th and 10th percentiles increases from approximately 250% in 1979 to approximately 400% in 1993. The dispersion of wages in the semiconductor industry closely tracks wage dispersion in the entire economy during this time period.

Figure 5A-7. Percent Difference In Weekly Earnings at 90th and 10th Percentiles - All Workers



Earnings dispersion also increased within the two key occupation groups. The earnings dispersion of managers and professionals remained steady from 1979 through 1986, after which inequality increased markedly (Figure 5A-8). The total increase in earnings dispersion for managers and professionals, which grew from 259% in 1979 to 413% in 1995, matched the increase for the industry as a whole, and also the economy-wide increase. Earnings dispersion among production workers exhibited a steady increase from 150% in 1979 to 267% in 1995 (Figure 5A-9). Overall, earnings dispersion increased within each occupational group, and earnings dispersion is lower among production workers than among managers and professionals.

Figure 5A-8. Percent Difference in Weekly Earnings at 90th and 10th Percentiles - Managers and Professionals

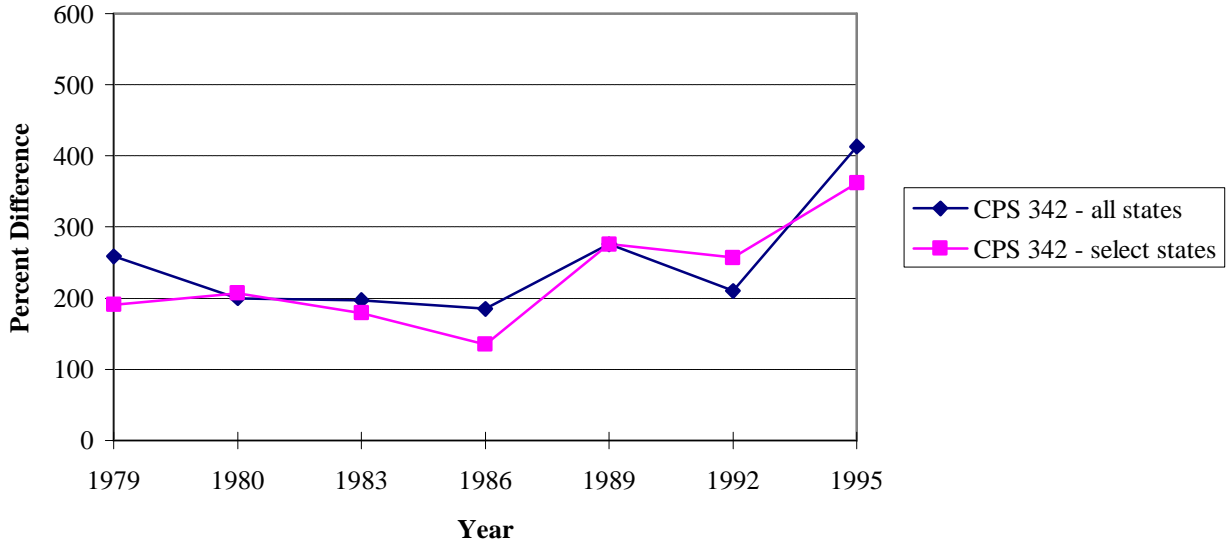
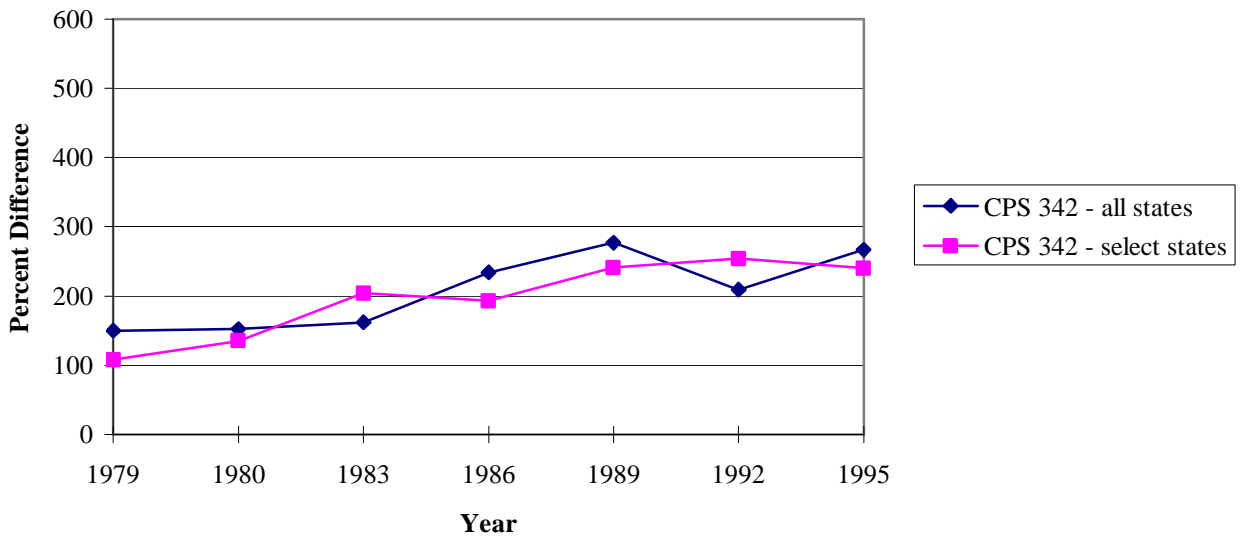


Figure 5A-9. Percent Difference in Weekly Earnings at 90th and 10th Percentiles - Production Workers



Education Premium

One method for analyzing changes in wage inequality is through estimating a standard log weekly earnings regression with measures of education, race, sex, and potential experience as independent variables.⁴ In addition, we expanded the model to control for occupational differences by including an independent variable on occupation.⁵

The ‘college degree (or more)’ premium is shown in Figure 5A-10. The coefficient compares the earnings in the semiconductor industry of an individual with a college degree to the earnings of an individual with the same race, sex, and experience but with a high school degree. For example, in 1995 the college graduate’s log wages would be higher than a similar high school workers’ log wages by 0.535.⁶

The college degree premium for employees in the semiconductor industry increased from 0.443 in 1979 to 0.535 in 1995. This trend reflects the national trend which was estimated by Gottschalk to have increased from 0.35 in 1979 to 0.60 in 1995.

In order to disentangle the effect of education from the effect of occupation, we also calculated the ‘college degree (or more)’ premium while controlling for occupation. Since managers and professionals typically have college degrees and production workers do not, the college premium after controlling for occupation is lower than the college degree premium alone. Some of the uncontrolled college premium will appear as managerial/professional premium in the controlled regression. Figure 5A-11 shows the college degree premium controlled for occupation⁷. The estimated college degree premium is approximately 0.33 in 1979 and 1995, and it usually fluctuates between 0.3 and 0.4 over the period. However, given the imprecision of our occupation measures, we cannot unambiguously conclude that an education premium within occupations exists. Interpretation of the occupation-controlled estimate is difficult because we may be measuring wage differences within each occupation group that exist irrespective of educational degree.

Automation and the rapid pace of technological change in the industry have caused the demand for college-educated workers to increase over time and the demand for less-skilled workers to stagnate. In addition, the expansion of manufacturing abroad in low-wage countries has put downward pressure on the wages of production workers. These changes in the relative position of occupations will effect their relative earnings. As long as the above factors are driving the industry’s labor demands, we expect to see the college premium rise.

Figure 5A-10. College Degree Premium

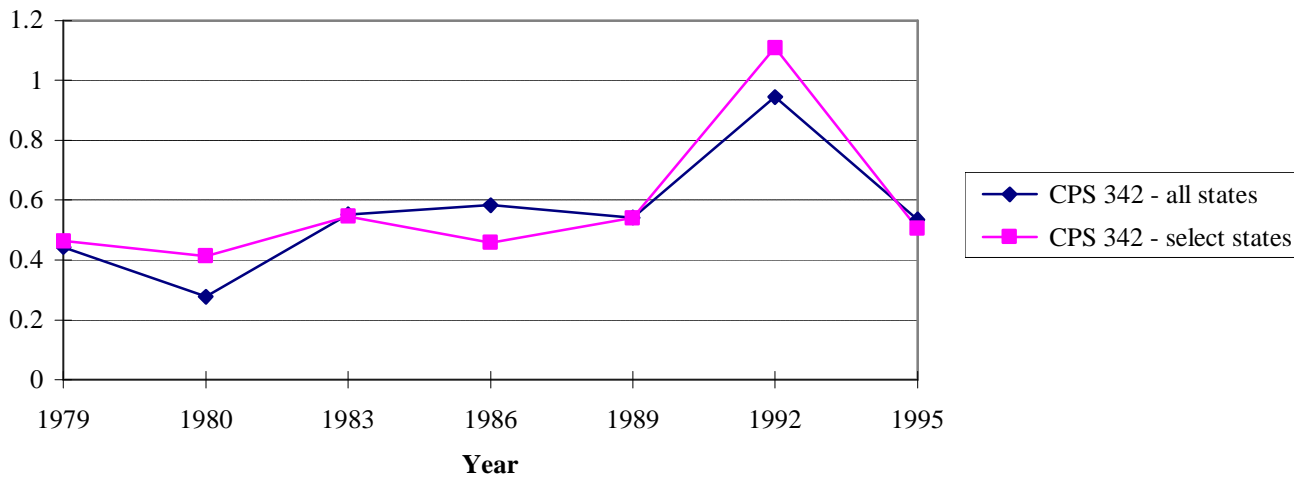
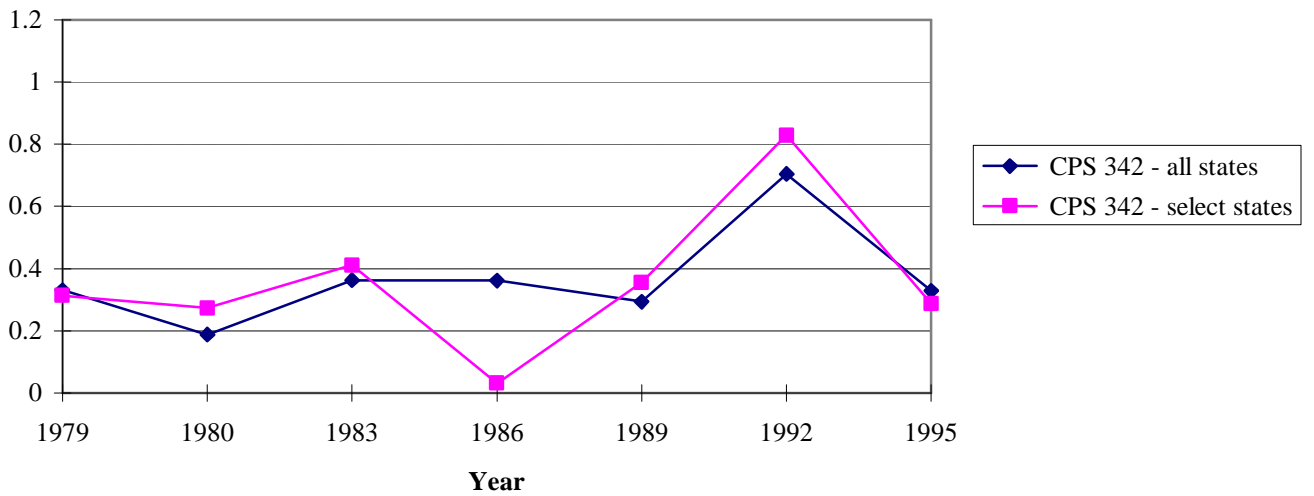


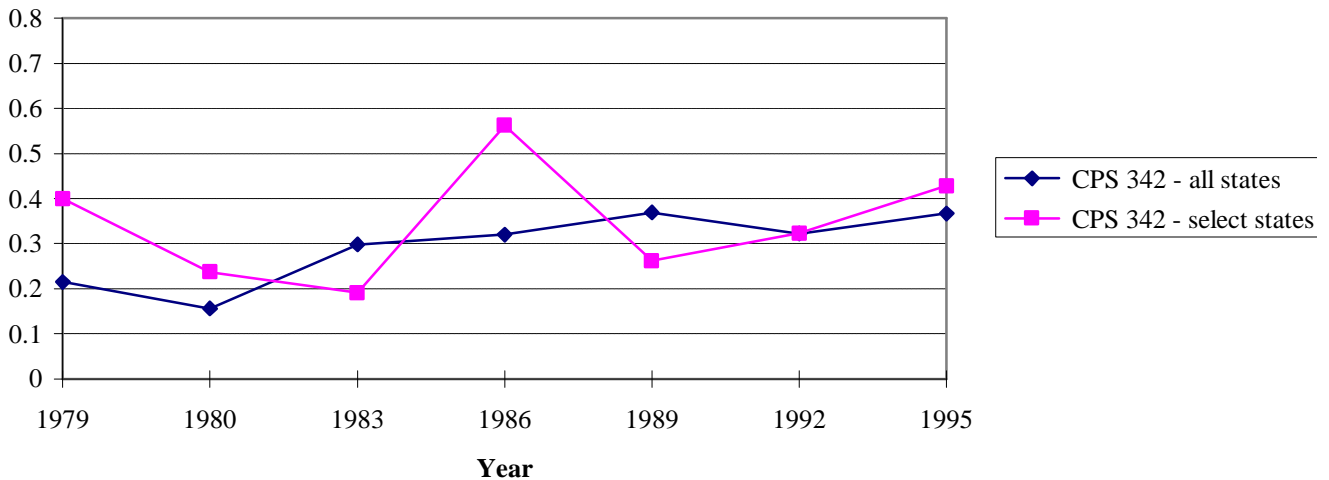
Figure 5A-11. College Degree Premium, controlled for occupational differences



Managerial/Professional Premium

In order to calculate the impact that being a manager or professional employee has on earnings, we can examine the estimates of the coefficients on the occupation dummies included in the yearly log earnings regressions. The trend in the ‘manager and professional occupation’ premium is shown in Figure 5A-12. Comparing a manager (or professional) and a production worker with the same education, experience, race, and gender, the manager/professional’s log earnings exceeded the production worker’s log earnings by 0.224 in 1979 and by 0.367 in 1995.⁸ This occupational premium is in addition to the educational premium that managers earn when their education is higher than the education of production workers.

Figure 5A-12. Manager and Professional Premium



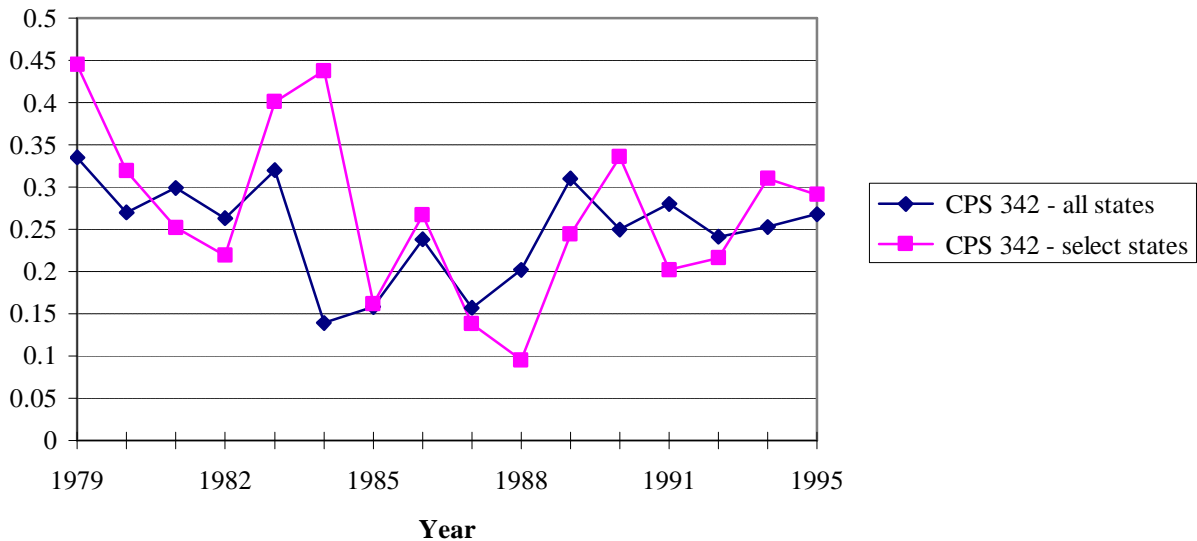
Experience Premium

In order to calculate the impact that experience has on earnings, a similar log earnings regression was estimated (including the occupation dummies). The coefficients on potential experience and potential experience squared were used to calculate the experience premium for an employee with 10 years of experience. Figure 5A-13 presents the results of these calculations.

This figure shows the experience premium decreasing slightly over the beginning of the time period and then increasing at the end of the time period.⁹ This comparison may be misleading because the implementation of non-salary compensation packages, which are not reported in the CPS data, especially to senior employees, is a common compensation practice in the semiconductor industry. An increase in non-salary compensation as an employee’s experience increases may offset lower tenure-based earnings increases; if so, the experience premium calculated on wages or salary alone would decrease.

Our result differs from Gottschalk's. He finds the experience premium is increasing over the entire time period. Since the semiconductor industry is marked by the rapid pace of technological change, there may exist a "new skills" premium which would counteract the experience premium. The "new skills" premium would lead to a lower observed experience premium in the semiconductor industry than in the economy as a whole.

Figure 5A-13 Experience Premium (evaluated at 10 years)

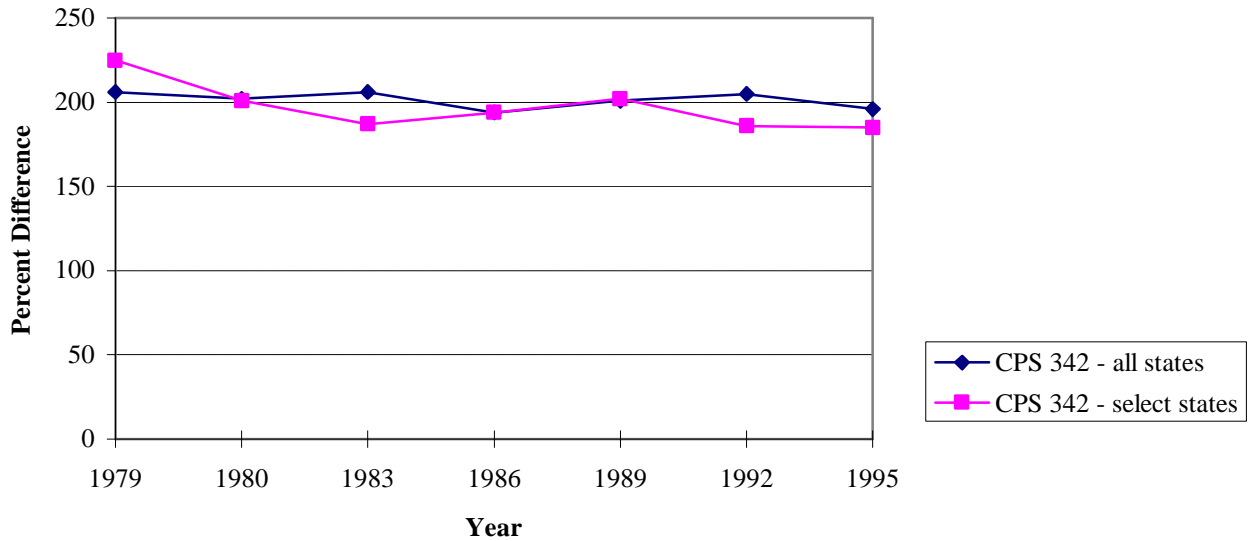


Within-Group Inequality

Wage inequality has also been growing among individuals with identical characteristics (that is, education, potential experience, occupation, race, and gender). We use the same regression setup in order to calculate the within-group earnings dispersion (Figure 5A-14). Examining the percent difference between workers in the 90th and 10th percentiles of the residual dispersion provides a measure of the earnings difference that can exist between two workers with identical characteristics.¹⁰

The within-group inequality in the semiconductor industry has changed very little from 1979 to 1995; CPS 342 shows the residual percent differences at the 90th and 10th percentiles decreasing slightly from 206 to 196. Although one of the underlying factors in growing wage inequality on the national level is increasing within-group inequality, these unobservable differences do not account for growing wage inequality in the semiconductor industry. The growth of inequality in the industry has been driven predominantly by changes in wages between groups defined by their education, experience, and occupation.

Figure 5A-14. Percent Difference in Weekly Earnings Residual at 90th and 10th percentiles - All Workers



We also checked to see if wage dispersion within occupational group had been changing. Within-group wage dispersion for both managers and professionals and for production workers has remained constant over the time period (Figures 5A-15 and 5A-16). Because of small sample sizes, production workers in the select states show greater variability.

Figure 5A-15. Percent Difference in Weekly Earnings Residual at 90th and 10th Percentiles - Managers and Professionals

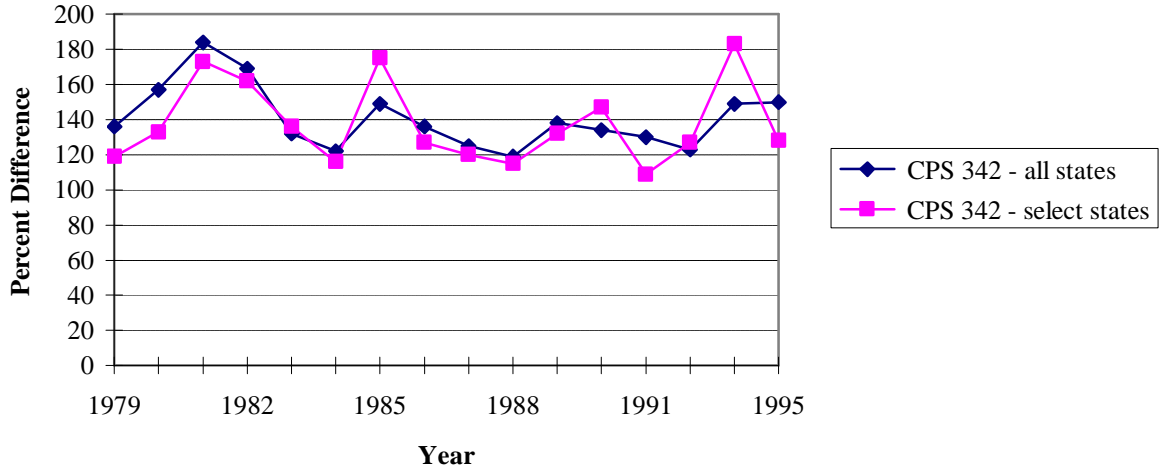
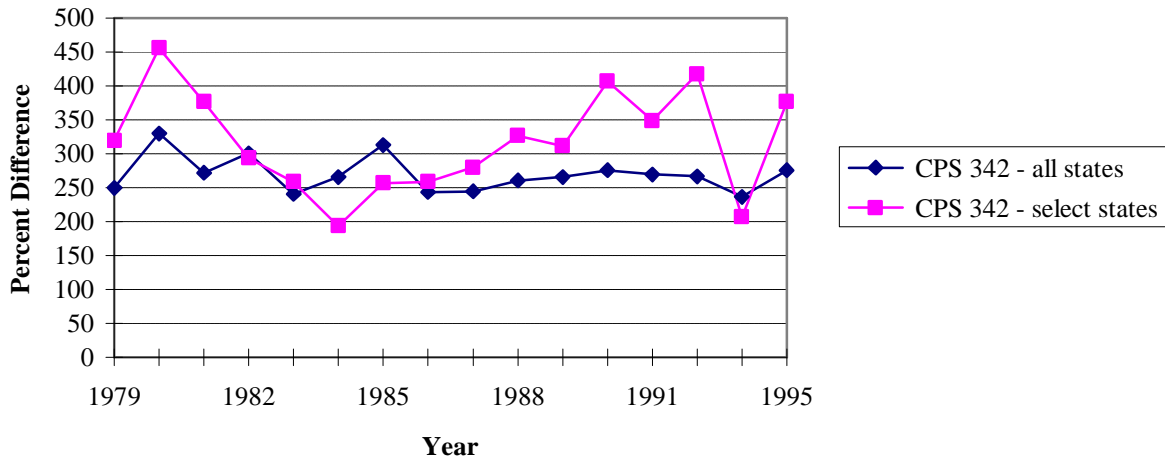


Figure 5A-16. Percent Difference in Weekly Earnings Residual at 90th and 10th Percentiles - Production Workers



Summary

In the economy as a whole, wage inequality has increased rapidly from 1979 to 1995. The combination of an increasing education premium, increasing experience premium, and increasing within-group dispersion results in a large cumulative increase in wage inequality.

Although the trend in wage inequality in the semiconductor industry is similar to the national trend, the underlying changes in inequality exhibit important differences. The growing inequality in the semiconductor industry reflects a rapidly growing managerial and professional premium and slowly increasing college premium. The semiconductor industry, however, does not exhibit growth in the experience premium or in within-group dispersion, both of which are occurring nationally. Thus, the majority of the changes in relative wage levels are driven by the occupation premium, which is closely linked to the college premium. We believe that automation, the rapid pace of technological change, and the outsourcing of manufacturing work are responsible for the increase in the earnings of college-educated engineers and managers and a decrease in real wages for production workers.

A.3 Wage Inequality within a Fab

Characteristics of the Data

The next level of analysis is at the fab level. Data collection from 16 fabs, including 7 U.S. fabs¹¹, occurred during the early to mid-1990s. We will analyze the wage structures of the semiconductor fabs to see what type of wage inequality is generated by these structures. Specifically, we will examine career ladders, which correspond to the experience premium in the previous section. Although we do not have any data that directly tie together education and earnings, our comparison by occupation (engineer, technician, and operator) indicates the return to education since the three occupations have different minimum education requirements (college degree, AA degree, and high school diploma, respectively). Since we do not have any time series data on the sample fabs, we cannot analyze changes in wage inequality over time.

Career Ladders and Experience

At the 16 fabs, we collected data on wages at each employment grade.¹² Ratios of maximum base pay to minimum entry level pay were calculated in order to measure how much earnings vary within occupation. These percentage wage differences are reported in Table 5A-4. For example, at Fab A1 the difference between the average wage of an operator at the top grade and the average wage of an entry-level operator is 1.60 times the average entry-level wage, thus the top grade operator earns 2.60 times the bottom grade; the difference between the top grade and the entry grade at Fab L13 is 0.46 more than average wage for an entry-level operator, so at Fab L13, the top grade operator earns 1.46 times the bottom grade. These results show a wide variation in pay structures across the fabs. The variation is also apparent in the wage paths for each occupation at each fab (Figures 5A-17, 5A-18, 5A-19). The percentage difference between the top wage and the

bottom wage varies from 46% to 258% for operators, 21% to 177% for technicians, and 123% to 241% (and possible 851%) for engineers.¹³

Most fabs in the sample reported operator wage paths with at least four levels and rather flat wage paths across grades. Technician wage paths are steeper than operator wage paths, but tend to have fewer grades. The wage paths for engineers are typically longer and more steeply sloped relative to those for operators and technicians.

Table 5A-4. Within-Group Percentage Wage Dispersion

Fab	Operators	Technicians	Engineers
Fab A1	160	105	241
Fab L4	115	177	123
Fab A2	88	37	133
Fab A3	114	108	214
Fab L16	116	125	851
Fab L13	46	21	124
Fab A4	128	129	153
Fab L14	-	47	-
Fab L7	38	15	49
Fab M5	128	164	110
Fab M6	258	-	233
Fab L15	29	26	95
Fab M10	38	50	97
Median	114-115	50-105	124-133
Mean	105	84	202

Figure 5A-17. Operator Wage Paths at Semiconductor Fabs

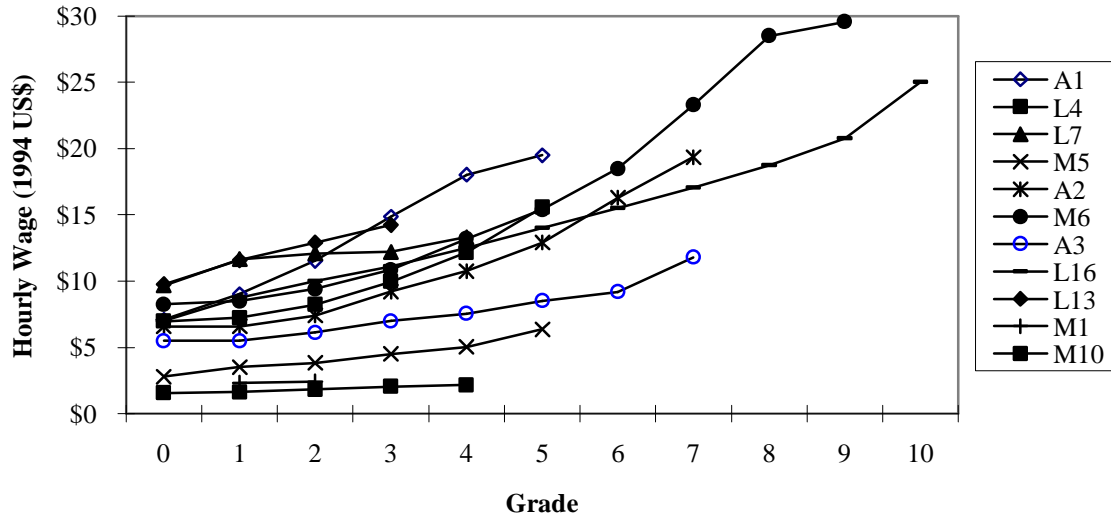
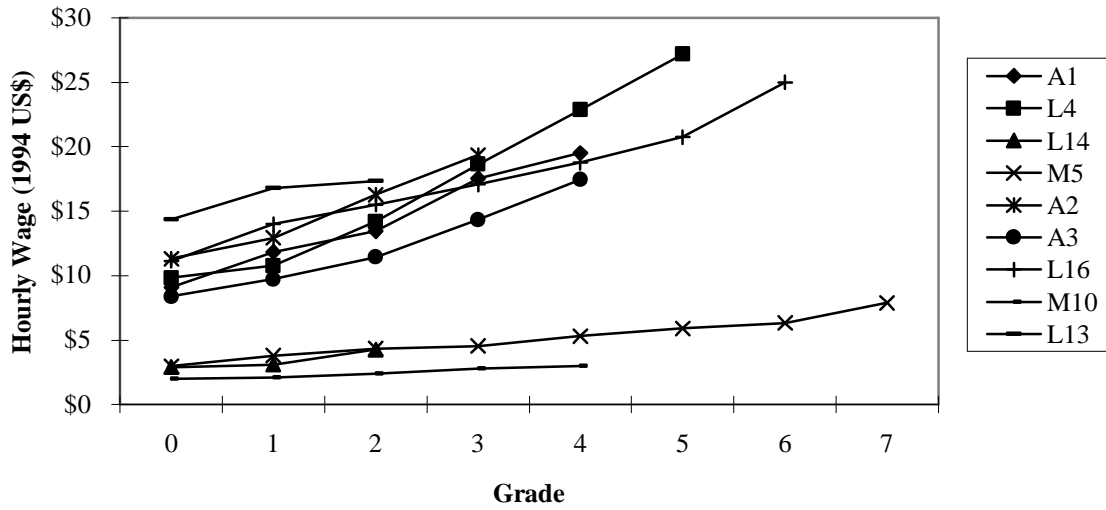


Figure 5A-18. Technician Wage Paths at Semiconductor Fabs





Occupational Differences

Next we look at earnings dispersion across occupations. The fabs in the sample show a very large variety in wage structures. Even within the U.S. there is large variation. The ratio of operator starting wages and engineer starting wages¹⁴ ranges from 0.32 at Fab M10 to 0.96 at Fab M5. The percent difference for starting wages between technicians and engineers ranges from 0.42 at Fab M10 to 1.19 at Fab L16 (Table 5A-5).

Aggregating the wages at all U.S. fabs, we see that there are large differences between the mean and median wages at the starting wage and at the top wage for the three occupation groups. For example, operators, technicians and engineers with no experience make \$17,014, \$25,875, and \$34,200 respectively. An entry-level engineer averages twice as much (or \$17,186 more per year) as an entry-level operator; an entry-level technician makes 50% more (or \$8,861 more per year) than an operator. These same differentials also hold at the high end.

Table 5A-5. Ratio Between Starting Wages at Semiconductor Fabs.

Fab	Operators vs. Engineers	Technicians vs. Engineers
Fab A1	0.49	0.55
Fab L4	0.38	0.57

Fab A2	0.40	0.79
Fab A3	0.52	0.91
Fab L16	0.74	1.19
Fab L13	0.61	0.88
Fab A4	0.36	0.58
Fab L14	0.58	0.73
Fab L7	0.54	0.46
Fab M5	0.96	-
Fab M6	0.46	0.49
Fab L15	0.56	0.78
Fab M10	0.32	0.42
median	0.52	0.58-0.73
mean	0.53	0.70

Table 5A-6. Mean Starting and Top Yearly Wages at U.S. Fabs (1994 Dollars)

Occupation	Mean Starting Wage	Median Starting Wage	Mean Top Wage	Median Top Wage
Operator	17,014	14,768	26,437	24,669
Technician	25,875	23,608	39,166	36,525
Engineer	34,200	34,920	83,964	66,600

Summary

The cross-sectional data from the fabs in the CSM sample describe an industry that uses a variety of compensations practices. Even fabs within the same country exhibit substantially different pay structures. Some fabs present their workers with long career paths and potential earnings growth while other fabs do not. The fabs overall have substantial occupational pay differences that are a result of the complementary factors of an education premium and a managerial/professional premium. Although the fabs are diverse, their aggregation leads to the results in the first section, where overall inequality is high and similar to the economy as a whole.

References

Gottschalk, Peter. 1997. "Inequality, Income Growth, and Mobility: The Basic Facts."
Journal of Economic Perspectives, Vol. 11, No. 2 (Spring), pp. 21-40.

Appendix

Regression results (standard errors are in parentheses):

College Premium

	without occupation dummies		with occupation dummies	
	CPS 342 - all states	CPS 342 - select states	CPS 342 - all states	CPS 342 - select states
1979	0.443 (0.067)	0.464 (0.088)	0.331 (0.075)	0.313 (0.086)
1980	0.278 (0.06)	0.414 (0.092)	0.187 (0.069)	0.273 (0.104)
1981	0.471 (0.055)	0.468 (0.085)	0.354 (0.058)	0.274 (0.088)
1982	0.293 (0.069)	0.281 (0.099)	0.131 (0.073)	0.159 (0.106)
1983	0.552 (0.069)	0.546 (0.107)	0.363 (0.081)	0.411 (0.136)
1984	0.555 (0.077)	0.647 (0.134)	0.36 (0.097)	0.455 (0.067)
1985	0.709 (0.07)	0.854 (0.091)	0.438 (0.087)	0.704 (0.115)
1986	0.583 (0.078)	0.458 (0.129)	0.362 (0.091)	0.031 (0.139)
1987	0.461 (0.078)	0.682 (0.171)	0.271 (0.082)	0.327 (0.175)
1988	0.496 (0.066)	0.431 (0.108)	0.31 (0.074)	0.171 (0.118)
1989	0.542 (0.08)	0.541 (0.145)	0.294 (0.095)	0.355 (0.173)
1990	0.482 (0.081)	0.536 (0.135)	0.282 (0.084)	0.343 (0.128)
1991	0.888 (0.087)	0.906 (0.138)	0.66 (0.099)	0.588 (0.146)
1992	0.945 (0.102)	1.109 (0.178)	0.705 (0.126)	0.829 (0.254)
1993	0.802 (0.121)	0.768 (0.243)	0.696 (0.129)	0.788 (0.256)
1995	0.535 (0.106)	0.505 (0.146)	0.329 (0.12)	0.287 (0.162)

Manager and Professional Premium

	without education dummies		with education dummies	
	CPS 342 - all states	CPS 342 - select states	CPS 342 - all states	CPS 342 - select states
1979	0.425 (0.069)	0.635 (0.085)	0.215 (0.071)	0.4 (0.089)
1980	0.267 (0.051)	0.378 (0.08)	0.156 (0.058)	0.237 (0.09)
1981	0.426 (0.052)	0.527 (0.073)	0.261 (0.056)	0.392 (0.081)
1982	0.38 (0.056)	0.318 (0.083)	0.328 (0.064)	0.255 (0.093)
1983	0.499 (0.062)	0.466 (0.09)	0.298 (0.073)	0.191 (0.114)
1984	0.533 (0.072)	0.537 (0.115)	0.291 (0.091)	0.277 (0.145)
1985	0.688 (0.066)	0.605 (0.099)	0.377 (0.079)	0.149 (0.101)
1986	0.565 (0.07)	0.674 (0.094)	0.32 (0.082)	0.562 (0.122)
1987	0.487 (0.069)	0.603 (0.129)	0.348 (0.077)	0.503 (0.153)
1988	0.555 (0.062)	0.612 (0.091)	0.339 (0.071)	0.471 (0.118)
1989	0.552 (0.068)	0.512 (0.106)	0.369 (0.084)	0.262 (0.134)
1990	0.559 (0.072)	0.656 (0.11)	0.407 (0.079)	0.464 (0.117)
1991	0.71 (0.082)	0.838 (0.122)	0.38 (0.088)	0.536 (0.129)
1992	0.707 (0.076)	0.787 (0.138)	0.322 (0.099)	0.323 (0.19)
1993	0.453 (0.072)	0.319 (0.152)	0.167 (0.076)	-0.031 (0.132)
1995	0.591 (0.096)	0.701 (0.129)	0.367 (0.109)	0.428 (0.16)

Experience Premium (evaluated at 10 years)

	CPS 342 - all states		CPS 342 - select states	
	Potential Experience	(Pot. Experience)^2	Potential Experience	(Pot. Experience)^2
1979	0.0416 (0.006)	-0.00081 (0.00013)	0.0554 (0.0085)	-0.00109 (0.00021)
1980	0.0323 (0.0049)	-0.00053 (0.00011)	0.0388 (0.0086)	-0.00069 (0.00021)
1981	0.0359 (0.0051)	-0.0006 (0.00011)	0.0307 (0.0073)	-0.00055 (0.00015)
1982	0.0321 (0.0064)	-0.00058 (0.00014)	0.0268 (0.0095)	-0.00049 (0.00021)
1983	0.0384 (0.0059)	-0.00064 (0.00012)	0.0501 (0.0098)	-0.001 (0.00022)
1984	0.0167 (0.0073)	-0.00028 (0.00016)	0.0373 (0.0141)	0.00065 (0.00033)
1985	0.0176 (0.0071)	-0.00018 (0.00015)	0.0199 (0.0103)	-0.00037 (0.00022)
1986	0.0295 (0.0083)	-0.00057 (0.00018)	0.0327 (0.0114)	-0.0006 (0.00025)
1987	0.0184 (0.0093)	-0.00027 (0.0002)	0.0149 (0.0218)	-0.00011 (0.00048)
1988	0.0233 (0.0067)	-0.00031 (0.00014)	0.0102 (0.0104)	-0.00007 (0.00021)
1989	0.0365 (0.0082)	-0.00055 (0.00018)	0.0277 (0.0139)	-0.00033 (0.00028)
1990	0.0297 (0.0092)	-0.00047 (0.0002)	0.0398 (0.015)	-0.00062 (0.00034)
1991	0.0335 (0.01)	-0.00055 (0.00022)	0.0229 (0.017)	-0.00027 (0.00038)
1992	0.0276 (0.0096)	-0.00035 (0.0002)	0.025 (0.0246)	-0.00034 (0.00055)
1993	0.0291 (0.0091)	-0.00038 (0.0002)	0.036 (0.0178)	-0.0005 (0.00039)
1995	0.033 (0.0087)	-0.00062 (0.00016)	0.0341 (0.0114)	-0.0005 (0.00019)

¹ All dollar figures are in 1996 dollars deflated by the Personal Consumption Expenditures deflator

² In order to increase clarity only selected years are shown in the graphs, however when doing so would result in lost information on the trends and variability of the data, the entire time series is shown.

³ This avoids top coding problems associated with CPS data.

⁴ Specifically the independent variables include a set of education dummies (less than high school, some college, college degree or more), a race dummy, a sex dummy, potential experience and potential experience squared. We include the square of the potential experience variable because it has been shown that the effects of experience on the log wage are concave. Potential experience is calculated as age minus years of education, minus six.

⁵ We included a set of occupation dummies (sales, clerical and misc. support, and managerial/professional).

⁶ For example, consider a worker with a high school degree who earns \$700 weekly in 1995. The worker's log wage is $\ln(700) = 6.551$. With a college degree, the worker would expect to earn her original log wage plus the college premium or $6.551 + 0.535 = 7.086$, or \$1195.12, thus a college degree would improve this worker's expected real wage by \$495.12.

⁷ Although most of our estimates had very small standard errors, the estimate for college degree premium controlled for occupation in 1986 is very imprecise. See Appendix A for complete regression results.

⁸ Explicitly, consider a worker who is a production worker and earns \$700/week in 1995. The worker's log wage is $\ln(700) = 6.551$. If the worker was a manager or professional, he would expect to earn his original log wage plus the manager/professional premium or $6.551 + .367 = 6.918$. A log wage of 6.918 translates to a real wage of \$1010.30, thus in real terms for this worker, the manager/professional premium is \$310.30.

⁹ Calculating the experience premium at five and 20 years of experience shows a similar decrease.

¹⁰ The within-group earnings dispersion equals the dispersion of the regression residual. The residual accounts for all unobserved differences among the employees. By examining the percent difference in the 90th and 10th percentiles of the residual, it is possible to measure how much dispersion there is between two workers who are observably identical.

¹¹ U.S. Fabs: A1, L4, A2, A3, L16, L13, A4.

¹² The within-group percentage wage dispersion was determined for each occupation by calculating the maximum reported base pay for the top grade minus the minimum reported initial pay, divided by the minimum reported initial pay. The results for the sample fabs are not exactly comparable to the corresponding wage dispersion figures from the national sample because there are small sample size problems, there are other industries in the CPS 342 code, and the CPS data compare individuals from many fabs, while the CSM sample data compare individuals from the same fabs.

¹³ Fab L16 may have included managers in their engineer wage data.

¹⁴ For example, the ratio between the average starting wage for engineers and the starting wage for operators at Fab L16 is 0.74.