Fall 2012

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Recommended Citation
Arnold, Tom, Raymond P.H. Fishe, and Adam Schwartz. "Salary Inversion in Business Schools: Does a Rising Tide Lift All Boats?" *Journal of Financial Education* 38, no. 3/4 (Fall/Winter 2012): 1-17.

Salary Inversion in Business Schools: Does a Rising Tide Lift All Boats?

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The paper analyzes AACSB salary survey information from 1979 to 2008. The question addressed in this analysis is whether salary inversion is widespread across the three business disciplines of accounting, economics, and finance. We find limited evidence of mean level inversions, which is concentrated in recent years. Stochastic dominance methods confirm these results. We also develop a measure of salary dominance based on comparing the distribution of reported salaries. This statistic shows a significant trend towards salary inversion in finance and accounting.

INTRODUCTION

Every year academic department chairs and deans deliberate over salary adjustments from limited raise pools. Generally, it is believed that business schools base a substantial portion of these raise adjustments on merit, as opposed to rank or length of service. Even so, considerations of equity are not lost in the process. In particular, the phenomenon of salary inversion may arise in some disciplines, which may task administrators to explain their decisions. Salary inversion occurs when a faculty member of higher rank receives a salary less than that of a faculty member of lower rank.[1] There may be several reasons for salary inversion, such as the hiring of new junior faculty at more competitive current salaries or responding to outside offers. In these cases, salary inversion provides insight into the basic supply and demand conditions in the market for that discipline. As merit considerations may be difficult to quantify and comparisons of records and experience equally difficult to develop objectively, those faculty affected by salary inversion may feel wronged or disadvantaged by the pay raise method or hiring process.

In an effort to provide better information to faculty and administrators, we investigate the extent of salary inversion in business schools accredited by the Association to Advance Collegiate Schools of Business (AACSB). We study three disciplines: accounting, economics, and finance. We use data collected by the AACSB in its annual salary survey. Our dataset covers the years, 1979 to 2008. These are aggregate data, which reveal means, medians and other selected distributional information on academic salaries. We find salary inversion at the mean between assistant and associate professor ranks for finance and accounting

disciplines at both private and public business schools, and for economics at private schools. Typically, these average level inversions arise first at private schools and then at public schools. All of these inversions begin in the late 1990s or early 2000s. We find no years with average level inversions between associate and full professors in the three business disciplines.

We also analyze the full distribution of salaries across disciplines and ranks over the AACSB data. We summarize this information in terms of first- and second-degree stochastic dominance to examine whether junior ranks dominate the more senior ranks. Because dominance measures compare all salaries, they provide more than simple summary statistics, such as the mean or median. First-degree stochastic dominance implies that salaries are uniformly higher across the entire distribution of all junior faculty members. Thus, first-degree dominance is a stronger statement about salary conditions between ranks than a comparison of means, and implies a greater burden on administrators to explain relative salary levels and adjustments. Note that first-degree stochastic dominance implies average-level salary inversion, but not vice versa.[2]

Evidence of first-degree stochastic dominance in any period is also likely to imply substantial salary changes in future periods when some junior faculty are promoted and move up through the ranks. LeClair (2004) makes a similar point while discussing the 2003-2004 AACSB salary survey: "...most recent trends still hold. For instance, the inversion of salary rates—where new hires earn as much or more than experienced faculty—is still in place and will inevitably contribute to the escalation of salaries across all categories."

We also test for second-degree stochastic dominance, when the salary distributions (using the cumulative distribution) cross, which negates evidence of first-degree dominance. When there is no first-degree dominance, second-degree dominance allows some salaries for faculty at senior ranks to exceed those of junior ranks when matched along the probability distribution of salaries. In effect, business schools may exhibit a spectrum of faculty quality or the results of cumulative pay raise procedures over a span of years, which leads to both higher and lower relative salaries from rank comparisons.

Our results show only a limited number of years with stochastic dominance in which a junior rank dominates a senior rank. We find no examples of either first- or second-degree dominance for associate and full professors, and only two instances with second-degree dominance between assistant and associate professors. Both instances are recent and occur in accounting and finance disciplines. In most years, our results imply first- and second-degree dominance by associates over assistant professors. To address the potential differences between private and public schools, we perform separate analyses for these institutional types.

Additionally, we develop a measure of salary dissimilarity based on the middle mass of the assistant and associate cumulative salary distributions. The middle mass is defined as the largest area in which assistant and associate cumulative salary distributions overlap. This salary dissimilarity measure (SDM) examines whether

associate salaries are more concentrated at the lower end of the middle mass versus assistant salaries over the same salary range. If salaries are distributed equivalently across the middle mass, then SDM equals 100%. As assistant salaries populate the upper end and associates the lower end of the middle mass, the SDM measure decreases. We find that the SDM measure tends to decrease for accounting and finance disciplines post-1999 in both public and private schools, but tends to increase for economics in private schools. On net, accounting and finance disciplines are moving towards greater salary dispersion between assistant and associate professors.

Our research relates to recent work on salary compression in higher education (Toutkoushian, 1998 and Barbezat, 2004). Salary inversion is closely associated with salary compression, which occurs when salary differences across ranks decrease over time. Toutkoushian (1998) suggests that salary compression (or inversion) arises in institutions that have hired several new junior faculty members, but failed to adjust compensation levels to existing faculty members. Toutkoushian develops a regression procedure to estimate what junior faculty would earn if they were compensated according to the mechanism used for more senior faculty. Barbezat (2004) applies this method to two national surveys of faculty salary and finds evidence of salary compression across a range of disciplines. By using the AACSB survey data, we also provide evidence for a national sample, although our methods are necessarily different because we do not observe individual faculty data.

The outline of this paper is as follows. In the next section (DATA), we discuss the development of the AACSB salary surveys and the extent of information provided about salary distributions. Section three (ANALYSIS OF AVERAGES) investigates mean level salary inversion and documents inversion differences between private and public business schools. This section also provides a detailed discussion of the finance discipline. Section four (STOCHASTIC DOMINANCE IN SALARIES) introduces stochastic dominance methods and applies them to the AACSB data. We modify these methods to develop other measures of salary differences between ranks. Section five offers our conclusions.

DATA

The AACSB has conducted salary surveys from member business schools since 1968. The early salary surveys (1968-71) were more general data collection and reporting efforts. Beginning in 1972, member institutions reported detailed information that included means and standard deviations. These detailed surveys reports distinguished salary information by discipline, degree-granting level, enrollment and regional categories.

With the 1977-78 survey, the AACSB changed the method by which it reported salary distributions, providing data on salaries at specific percentiles. The percentile breakdown reported maximum and minimum salaries as well as salary cutoffs for the 10%, 25%, 50%, 75%, and 90% levels. The mean salaries continued to be

reported, but the standard deviations were dropped after 1978. Throughout the years since 1978, the AACSB continued to modify what information they collected. In 1983, it introduced additional discipline distinctions—particularly the management discipline was further distinguished with organizational behavior and operations management distinctions. However, the basic format of the salary information—means and percentiles—remained the same, so these reports continued to provide a consistent series on annual academic compensation in business schools.

As an accrediting body, the response rates to these surveys have always been high, typically above 90 percent for accredited schools and around 50 percent for non-accredited schools. Table 1 shows that the majority of the overall response rates are between 70 to 80 percent and that the sample sizes are all large for the four institutional groupings: private versus public and accredited versus non-accredited. However, the lower response rates for non-accredited schools may introduce selectivity biases into our analysis. As such, we will only focus on the salary structure in accredited business schools. These response rates exceed the sample size requirements necessary to make reliable statistical statements and leave little concern for selectivity bias, as the number of non-respondents is unlikely to skew any results.

The data that we analyze consists of 6,634 entries from the AACSB annual surveys conducted between 1979 and 2008 for the disciplines of accounting, economics, and finance. The smallest unit of measurement in these surveys is the rank and hiring status of faculty. Specifically, the survey reports provide average and percentile information for existing instructors, assistant, associate and full professors, as well as new hires for each rank. These salary data are reported separately by discipline, institutional type (public or private) and accreditation status. Table 2 offers a picture of these data by summarizing of the mean, maximum and minimum salary averages across accredited schools for assistant, associate and full professors by discipline for the first, middle and a later year of the AACSB sample data.

Table 2 reports salary data in $1,000s, which are not inflation adjusted. These data show substantial nominal salary growth rates in most business disciplines. For the entire 29-year period, salaries over all disciplines grew at a compound average of 5.7% per year. As CPI inflation over this period averaged 3.8% per year, real wage growth was about 2.0% per year. Slightly less favorable conditions prevailed in the second half of our sample after 1992. Nominal salary growth averaged 3.9% per year and inflation averaged about 2.4% per year.

ANALYSIS OF AVERAGES

Our focus is on relative salary comparisons between ranks within a given discipline. We begin the analysis by investigating sample averages across the AACSB disciplines. The data in Table 2 provide our first look at salary inversion cases in AACSB business schools. This table shows that assistant professors on

Table 1. Response Rates to AACSB Salary Surveys, 1983-2008

This table reorts response rates and counts of business schools respondents.

			Responses Received From						
			Accredited			Non-accredited			
Year	Overall Response	Sample Size	Private	Public	Response Rate	Private	Public	Response Rate	Total Faculty
2008	57.9%	485	128	291	90.9%	29	37	17.5%	25,338
2007	63.7%	491	123	288	91.9%	34	46	24.7%	26,768
2006	73.6%	485	122	279	91.6%	40	100	63.3%	24,829
2005	77.6%	510	123	278	95.5%	51	58	46.0%	25,922
2004	80.2%	519	118	274	95.8%	59	68	53.4%	25,928
2003	75.5%	494	109	264	94.9%	54	67	46.4%	25,089
2002	71.6%	474	107	243	91.1%	54	70	44.6%	24,183
2001	70.5%	464	99	242	90.2%	59	64	43.9%	23,367
2000	69.5%	462	95	229	90.3%	59	79	45.1%	22,996
1999	69.2%	460	93	224	91.4%	61	82	44.7%	23,110
1998	62.6%	417	82	207	86.3%	57	71	38.7%	20,162
1997	66.4%	442	81	197	87.7%	75	89	47.0%	21,355
1996	69.6%	461	79	205	91.0%	81	96	50.6%	22,494
1995	69.7%	467	80	192	89.8%	89	106	53.1%	22,738
1994	71.1%	475	80	187	91.1%	100	108	55.5%	22,901
1993	65.9%	438	77	125	70.6%	114	122	62.3%	24,621
1992	76.4%	511	80	178	95.2%	113	140	63.6%	24,305
1991	72.5%	482	74	175	92.2%	104	129	50.0%	23,208
1990	74.9%	495	76	169	94.6%	106	144	62.2%	23,898
1989	76.9%	512	78	172	96.5%	108	154	64.4%	23,956
1988	73.5%	483	67	169	93.7%	109	138	61.0%	22,129
1987	67.2%	438	60	152	87.2%	85	141	55.3%	20,653
1986	66.9%	427	59	150	86.0%	83	135	55.3%	20,590
1985	68.8%	436	62	150	88.0%	95	129	57.0%	20,058
1984	73.2%	460	nr	nr	nr	nr	nr	nr	20,602
1983	65.6%	361	nr	nr	nr	nr	nr	nr	16,557

average earn more than associate professors in finance during 2004-2005 academic year. This result also arises with a comparison of the median salaries in finance. No other discipline shows an average level inversion during 2004-2005 or in the two previous surveys. These data suggest that mean salary inversions are likely a limited more recent phenomenon in these three disciplines. To explore these results further, we examine the finance discipline in more detail, and then use similar methods for the other disciplines.

Table 2. AACSB Salary Comparisons for 1979, 1992 and 2005

This table reports salary data by discipline across all reporting AACSB member schools, combining accredited with non-accredited and public and private institutions. Data are shown for the beginning, midpoint and a late period in the AACSB sample. Panel A reports the salary averages, Panel B reports the salary medians and Panel C reports the salary maximums. All amounts are in $1,000 without inflation adjustments.

	Survey Year 1978-79			Survey Year 1991-92			Survey Year 2004-05		
Discipline	Assistant Professor	Associate Professor	Full Professor	Assistant Professor	Associate Professor	Full Professor	Assistant Professor	Associate Professor	Full Professor
Panel A: Average across All Business Schools									
Accounting	19.2	22.9	27.9	51.2	55.7	69.8	93.5	94.1	114.0
Economics	17.6	21.9	27.6	42.1	47.7	63.2	71.5	76.0	104.2
Finance	19.3	22.8	29.1	55.6	58.3	73.6	105.1	101.9	129.6
Panel B: Medians across All Business Schools									
Accounting	22.5	25.5	31.5	56.4	59.1	68.5	91.7	91.9	105.0
Economics	19.5	23.5	30.5	42.4	48.0	61.4	68.3	72.9	95.7
Finance	21.5	25.5	31.5	57.8	59.1	70.0	101.3	95.7	115.6
Panel C: Maximum across All Business Schools									
Accounting	33.0	38.0	42.0	85.0	117.8	181.6	180.0	203.0	325.0
Economics	26.0	32.0	42.0	79.0	92.0	152.9	150.0	200.0	306.8
Finance	32.0	42.0	42.0	92.0	114.9	190.0	171.8	195.4	375.0

A Closer Look at Finance Salaries

Figures 1 and 2 provide graphs of average and maximum salary levels for the Finance discipline over our sample period. The data in both figures are for accredited business schools. Figure 1 shows salary information for private schools and Figure 2 shows the same information for public schools.

The two graphs in each figure pair up assistant and associate professors and associate and full professors, respectively. The pairing for assistants and associates at both public and private schools show that average level salary inversions began at different periods for these two types of institutions. For private schools, average salary inversions in finance began in 1999, but it was not until 2002 that it arose in public schools. There may be many possible reasons for this three-year lag in competitiveness, such as budget constraints tied to state funding, a lack of incentives to be competitive in public schools, and a selectivity preference among the more talented new or existing assistant professors toward private institutions.

Unfortunately, the AACSB data do not provide an opportunity to examine these various possibilities in detail. However, we can investigate the extent of these differences across the three business school disciplines. Specifically, we can say that the differences in salaries between public and private institutions are statistically different from zero at the 1% level with private institutions paying more on average for all ranks in finance. A time-trend regression shows that that average salaries of assistant professors are increasing by approximately $78 per year (p-value = 0.07) more than average salaries of associate professors at private schools.[3] This estimate is $51 per year for public schools, but the time trend coefficient is not statistically significant for the public school sample.

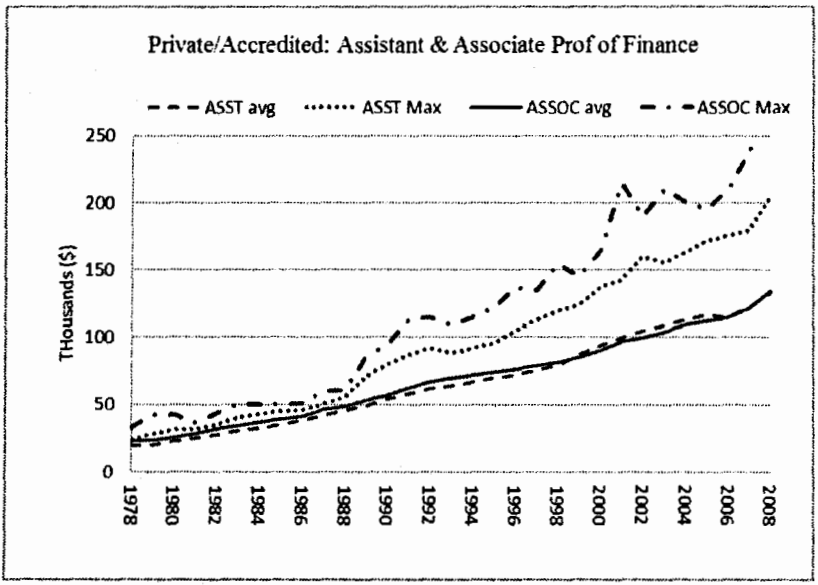
The data in Figures 1 and 2 also show that average salary inversions do not extend to a comparison between associate and full professors of finance. The average salary difference is $12,800 between associate and full professors in public schools versus $25,300 in private schools. The public/private gap is greatest in the 2005 survey, where the average associate-to-full salary difference is $28,000 for public schools and $46,300 for private schools.

Figures 1 and 2 also confirm that associate/full professor salary gap is increasing over time. Similar to the results for assistant and associate professors, we estimated a time trend regression to determine the relative salary path for associate and full professors. This regression shows that the average change in the salary of associate professors is $855 per year (p-value = 0.003) lower than full professors in private business schools. This time trend coefficient shows a relative disadvantage of $311 per year (p-value = 0.011) for public business schools. These results also show that salary relationships differ between private and public business schools, with private schools maintaining increasingly higher salaries for full professors.

The differences between average salaries for associate and full professors of finance suggest that the variance of these salary distributions may be increasing over time, which may also be true for assistant professors. The increasing levels of the

Figure 1. Average and Maximum Salaries in Finance for AACSB-accreditated Private Business Schools

This graph shows salary information in private schools for assistant and associate professors and associate and full professors respectively.



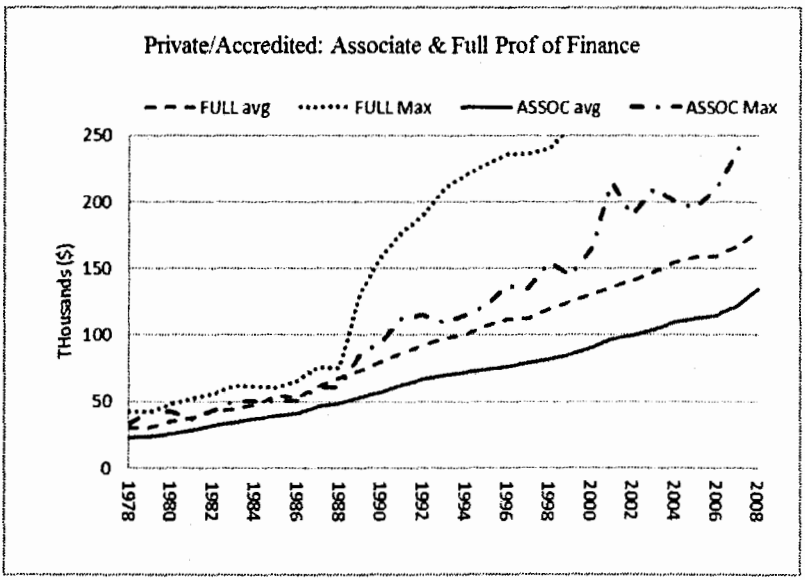
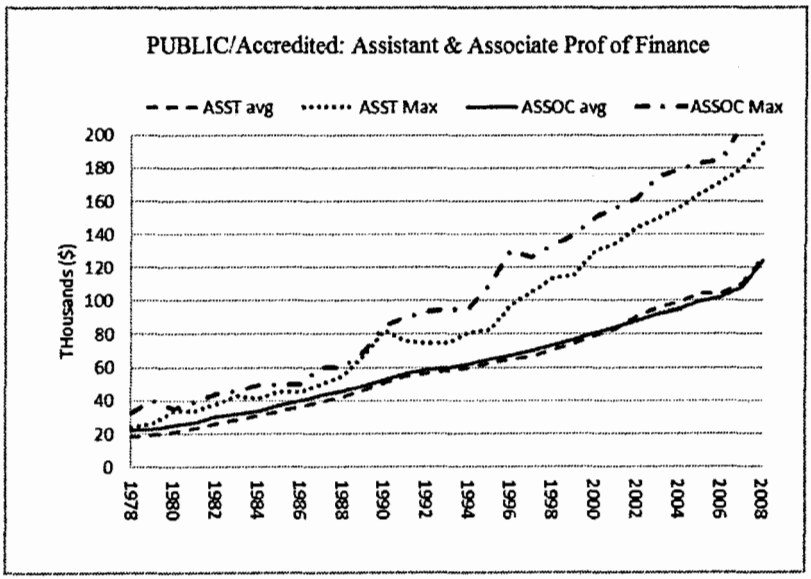
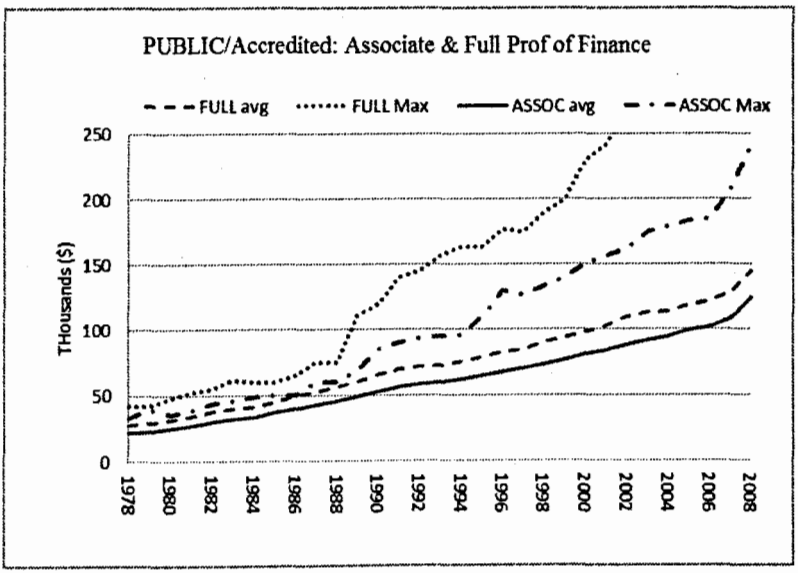


Figure 2. Average and Maximum Salaries in Finance for AACSB-accredited Public Business Schools

This graph shows salary information in public schools for assistant and associate professors and associate and full professors respectively.





maximum salaries in Figures 1 and 2 also support this view.

Salary Inversion by Discipline

Table 3 provides a summary of mean level salary inversions for all years in our sample. All three disciplines—accounting, economics, and finance—show evidence of salary inversion in private business schools, whereas accounting and finance also show evidence of salary inversion in public business schools. Across these groups, the average size of such inversions range from $500 in economics to $3,671 in finance for private schools and from $300 in Accounting to $3,700 in finance for public schools.

Table 3 also shows that salary inversion is a recent phenomenon with the earliest case in finance in 1999. Most instances, however, began in 2002 or 2003, which means that overall salary inversion has affected business schools for only a few years. Although deans and department chairs must rationalize salary decisions to other administrators and possibly the faculty, these results show relatively small differences in compensation. Thus, the concern expressed by LeClair (2004) that salary inversion is widespread in business disciplines may be overstated.

To determine whether these average salary differences are statistically significant, we conducted three tests: pairwise Student's t-test assuming unequal variances, Wilcoxon signed-rank test and the Mann-Whitney U-test, with the Mann-Whitney U-test focused on whether the distributions between two ranks were identical. Table 4 reports the results of these tests for all disciplines with AACSB-accredited private and public schools analyzed separately. Table 4 reports the p-values for each test.

If deans and department chairs are treating the different ranks as increasing in value from junior to senior levels, then we would expect to find significant differences between these salary comparisons. This result arises most strongly for associate and full professor comparisons. In every discipline and for private and public schools, average salaries are statistically greater for full professors than associate professors. This result is not compelling for salary comparisons between assistant and associate professors. The Student's t-test and Mann-Whitney U-test show a lack of significance for every discipline except Accounting in public business schools. The Wilcoxon signed-rank test shows a different set of results. With this test, only the finance discipline in private business schools has no statistically significant difference between average salaries for assistant and associate professors. This test may lack power compared to the Student's t-test, particularly the assumption that the data are from two related samples may not be valid in these comparisons. The general import of these results is that we will now focus our remaining analysis on the differences between assistant and associate professors because it appears that there are demonstrative differences between associate and full professor ranks.

Table 3. Salary Inversions for Assistant versus Associate Professors by Discipline

This table reports the years during which the average salary of assistant professors exceeded associate professors by discipline and by type of institution. The average difference in salaries is reported using only years where salaries are inverted. A positive number implies that assistant professors' average salary exceeding associate professors' average salary by that mean amount.

Comparison	Accounting	Economics	Finance	Accounting	Economics	Finance
	Private AASCB-Accredited Business Schools			*Public AACSB-Accredited Business Schools*		
Inversion Years	2003-2005	2003-2005	1999-2005	2004-2005	none	2002-2005
Average Salary Difference for Inversion Years	$2,000	$500	$3,671	$300	n.a.	$3,700

STOCHASTIC DOMINANCE IN SALARIES

The previous results show that there is some evidence of average-level salary inversion across certain AACSB disciplines for assistant and associate professor ranks, but none for associate and full professors. The significance tests, however,

Table 4. Comparison Tests for Average Salaries by Discipline

This table reports the results of three statistical tests designed to determine if there are significant differences between salaries at lower and higher ranks. The Student's t-test compares means salaries assuming unequal variances; the Wilcoxon Signed-Rank test compares paired differences of salary averages; and the Mann-Whitney U test compares salary distributions. Data shown in the table are p-values for one-tail t-tests and two-tail tests for the remaining statistics. The data are divided by discipline and institutional type--private versus public--in Panels A and B.

	Student's t-test		Wilcoxon Signed-Rank		Mann-Whitney U	
Discipline	Assistant v. Associate	Associate v. Full	Assistant v. Associate	Associate v. Full	Assistant v. Associate	Associate v. Full
Panel A: Private AASCB-Accredited Business Schools						
Accounting	0.357	0.009	0.003	0.000	0.335	0.012
Economics	0.227	0.001	0.042	0.000	0.206	0.003
Finance	0.403	0.005	0.264	0.000	0.365	0.009
Panel B: Public AACSB-Accredited Business Schools						
Accounting	0.268	0.041	0.000	0.000	0.001	0.046
Economics	0.090	0.002	0.000	0.000	0.098	0.005
Finance	0.388	0.037	0.014	0.000	0.110	0.047

show more similarity between the junior ranks than indicated by average comparisons, particularly for private business schools. In this section, we examine the relationship between assistant and associate ranks using stochastic dominance methods. We also adapt these methods to measure salary ranges of potential salary inversion and calculate a salary dissimilarity measure (SDM) to assess the degree of salary separation within the middle mass of assistant and associate cumulative salary distributions.

Stochastic Dominance by Discipline

We investigate the AACSB salary distributions for evidence of first- and second-degree stochastic dominance.[4] First-degree dominance implies that the salary distribution of a junior rank everywhere dominates that of a senior rank. In effect, the cumulative distribution function of the junior rank lies beneath that of the senior rank as measured across salaries. Second-degree dominance is less restrictive and is a consideration when the two cumulative distributions cross, possibly multiple times. Second-degree dominance requires a comparison of the areas between the two distributions over the entire range of salaries. These areas are compared at each salary level, and the junior rank distribution must prevail in area for every comparison for second degree dominance to hold. We follow the methods in Levy (2006), who provides details on how such comparisons are made using asset return distributions to construct optimal portfolios.

As both first- and second-degree stochastic dominance imply mean level salary inversion, there are only a few years and disciplines that present the opportunity for either type of dominance by junior ranks. However, we can reverse the analysis to ask whether the associate rank shows evidence in its salary distribution of dominating the assistant rank. One may expect to find such dominance given the lack of salary inversion in most years and most disciplines. Table 5 presents the results of this analysis.

Table 5 reports all cases of dominance in either direction of rank with results for both private and public business schools. An "Assoc" entry implies that Associate professors are both first- and second-degree dominant over assistants. When these two test results differ, the entry is marked with an "*", which implies that the first-degree dominance relationship of associate over assistants is not determinant, but the second degree dominance relationship still holds. An "Asst" entry implies that Assistant professors are only second-degree dominant over Associate professors. A "No" implies that a first- or second-degree dominance relationship cannot be determined. These salary data show consistent dominance by associate professors over assistant professors in the early years of the AACSB salary surveys. For the six years, 1983 to 1988, 94.4% of the entries show first- or second-degree dominance by associate professors in private and public schools. The nine-year period at the end of our sample, 2000 to 2008, tells a different story. Now only 11.1% of the entries show dominance by associate professors for private schools and

Table 5. Stochastic Dominance for Assistant and Associate Professors

The aggregate salary distributions are compared for stochastic dominance for each survey year, 1979 to 2008 by discipline. All faculty are affiliated with AACSB-accredited business schools. An "Assoc" entry implies that associate professors are both first- and second-degree dominant over assistants. When these two tests differ, the entry is marked with an "*", which implies that the first-degree dominance relationship of associate over assistants is indeterminant, but the second-degree dominance relationship holds. An "Asst" entry implies that assistant professors are only second-degree dominant over associate professors. A "No" implies that a first- or second-degree dominance relationship cannot be determined.

Year	Accounting	Economics	Finance	Accounting	Economics	Finance
	Private AACSB Accredited			Public AACSB Accredited		
1979	Assoc	Assoc	Assoc	Assoc	Assoc	Assoc
1980	Assoc	Assoc	Assoc	Assoc	Assoc	Assoc
1981	Assoc	Assoc	Assoc	Assoc	Assoc	Assoc
1982	Assoc	Assoc	Assoc	No	No	No
1983	Assoc	Assoc	Assoc	Assoc	No	Assoc
1984	Assoc	Assoc	Assoc	Assoc	Assoc	Assoc
1985	Assoc	Assoc	No	Assoc	Assoc	Assoc
1986	Assoc	Assoc	Assoc	Assoc	Assoc	Assoc
1987	Assoc	Assoc	Assoc	Assoc	Assoc	Assoc
1988	Assoc	Assoc	Assoc	Assoc	Assoc	Assoc
1989	No	Assoc	Assoc	Assoc	No	No
1990	Assoc	Assoc*	No	Assoc	Assoc*	No
1991	No	No	Assoc*	Assoc	Assoc	No
1992	Assoc*	No	Assoc*	Assoc	Assoc	Assoc*
1993	No	Assoc	Assoc	No	No	Assoc*
1994	Assoc	Assoc	No	Assoc	No	Assoc*
1995	No	Assoc	No	Assoc	No	Assoc*
1996	Assoc	Assoc	Assoc*	Assoc	No	Assoc
1997	Assoc	Assoc	Assoc*	Assoc	No	Assoc
1998	Assoc	Assoc	Assoc*	Assoc	No	Assoc*
1999	No	Assoc	No	No	Assoc*	Assoc*
2000	No	No	No	Assoc	No	No
2001	No	No	No	Assoc*	Assoc	Assoc*
2002	No	No	No	Assoc*	Assoc	No
2003	No	Assoc*	No	Assoc*	Assoc	No
2004	No	No	No	No	Assoc	No
2005	No	No	Asst*	No	Assoc	No
2006	No	Assoc*	No	Asst*	Assoc	No
2007	No	Assoc*	No	No	Assoc	No
2008	No	No	No	No	No	No

only 44.4% show this dominance for public schools. The trend is that first- and second-degree dominance is more difficult to identify because assistant and associate salary distributions show more ranges in which salaries overlap, which rules out first-degree dominance. This trend holds for finance and accounting but less so for economics.

Ranges of Salary Overlap and the Salary Dissimilarity Measure (SDM)

To gain a better sense of potential salary inversion, Table 6 reports the salary dissimilarity measure for assistant and associate professors in private and public business schools. The SDM is computed between two overlapping points on the cumulative salary distribution functions (CDFs) for associate and assistant professors. These points are identified as the lower and upper values of the probability range in Table 6. The overlapping salaries covered by this range are shown in the salary range column for each year and discipline.

The SDM is computed as the ratio of the area under the assistant professor CDF relative to the area under the associate professor CDF, both defined between the salary ranges shown in the table. An "*n.a.*" in the tables implies that the distributions did not have a region with assistants dominating associates that represented at least 10% of the CDF or did not have any overlapping points. Note that the SDM calculations start in 1999 in Table 6 because there were very few years in which we found regions in which assistants dominated associates prior to 1999.

The SDM approaches unity as both distributions approach a prefect overlap between the specified salaries; as assistants increase their dominance of associates over the range, the SDM decreases. Because the CDFs of the two distributions start and end at the same probability, as the SDM decreases the assistants tend to become more concentrated at the higher salaries in the range. Thus, the measure shows how dissimilar salaries are within the range.

As shown in Table 6, the overlapping regions cover between 10% and 76% of these salary distributions. The median coverage is 55.6% and the mean is 51.4% of these salary distributions. Given the relatively wide coverage, we consider this measure as applying to the "middle mass" of these distributions.

The SDM results show a clear decrease in this measure from the upper 90% to the upper 80% levels in accounting for both private and public business schools. This suggests that the relative lack of dominance in Table 5 for accounting may only be a temporary phenomenon. The finance discipline shows a dip in this measure from the upper to the lower 80% levels in the early years of the decade for private schools. The measure then returns to a lower 90% level implying a minimal change in the salary dissimilarity for assistant and associate professors in finance at private schools during recent years. The public school SDM values for finance tend to follow the accounting results: High 90% at the beginning and low 90% levels at the end of the decade. In contrast, the economics discipline suggests that assistant and associate salaries have become more similar over the past decade at private schools,

Table 6. Salary Dissimilarity Measure and Overlapping Salary Ranges

This table shows distribution data for assistant and associate professors from 1999 to 2008 employed at AACSB accredited business schools. The salary dissimilarity measure (SDM) is computed between two overlapping points on the cumulative salary distribution functions (CDFs) for associate and assistant professors. These points are identified as the lower and upper values of the probability range in the table. The overlapping salaries covered by this range are shown in the salary range column for each year and discipline. The SDM is computed as the ratio of the area under the assistant professor CDF relative to the area under the associate professor CDF, both defined between the salary range shown. An "n.a." implies that the distributions did not have a region with assistants dominating associates that represented at least 10% of the CDF or did not have any overlapping points. The salary range is in $1,000.

Discipline Year	SDM	Salary Range	Probability Range	SDM	Salary Range	Probability Range
	Private AACSB Accredited			*Public AACSB Accredited*		
Accounting:						
1999	98.10%	87.0 - 106.7	67.6% - 90.5%	*n.a.*	*n.a.*	*n.a.*
2000	95.70%	88.4 - 117.8	65.3% - 91.9%	*n.a.*	*n.a.*	*n.a.*
2001	92.80%	88.2 - 127.8	54.6% - 92.2%	*n.a.*	*n.a.*	*n.a.*
2002	93.50%	90.7 -142.4	51.8% - 92.9%	99.10%	100.0 - 113.5	81.0% - 91.0%
2003	93.60%	93.8 - 166.4	51.6% - 96.1%	98.10%	89.0 - 117.9	58.8% - 90.8%
2004	92.50%	90.0 - 165.6	37.9% - 94.6%	94.70%	84.9 - 130.0	46.8% - 92.8%
2005	88.80%	91.1 - 155.9	36.9% - 91.8%	95.80%	86.9 - 137.5	42.9% - 92.9%
2006	89.70%	95.7 - 167.1	38.7% - 92.8%	93.40%	81.7 - 144.2	24.4% - 93.1%
2007	89.40%	92.8 - 164.8	28.0% - 90.6%	91.70%	83.0 - 148.7	19.4% - 91.2%
2008	89.60%	105.6 - 178.2	34.5% - 90.9%	88.10%	87.8 - 168.9	15.7% - 91.9%
Economics:						
1999	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
2000	90.90%	67.2 - 108.4	51.5% - 93.9%	*n.a.*	*n.a.*	*n.a.*
2001	86.80%	67.5 - 104.0	41.5% - 88.4%	*n.a.*	*n.a.*	*n.a.*
2002	88.80%	68.7 - 122.9	39.0% - 95.0%	*n.a.*	*n.a.*	*n.a.*
2003	92.30%	72.8 - 106.4	45.8% - 83.9%	*n.a.*	*n.a.*	*n.a.*
2004	88.30%	74.2 - 116.9	40.4% - 87.3%	*n.a.*	*n.a.*	*n.a.*
2005	90.30%	74.3 - 116.0	38.0% - 84.6%	*n.a.*	*n.a.*	*n.a.*
2006	96.50%	78.3 - 127.0	43.8% - 90.5%	*n.a.*	*n.a.*	*n.a.*
2007	93.70%	84.7 - 117.6	49.2% - 80.3%	*n.a.*	*n.a.*	*n.a.*
2008	99.00%	112.3 - 138.5	78.1% - 90.6%	*n.a.*	*n.a.*	*n.a.*
Finance:						
1999	88.70%	74.5 - 113.9	30.1% - 88.3%	98.90%	80.9 - 99.9	66.6% - 89.9%
2000	85.40%	75.9 - 123.9	25.5% - 88.3%	97.90%	93.4 - 109.0	63.3% - 90.9%
2001	85.60%	81.2 - 128.4	26.5% - 84.0%	95.60%	84.4 - 118.8	58.7% - 91.9%
2002	82.30%	80.5 - 136.7	21.6% - 87.9%	91.60%	77.6 - 131.7	32.6% - 93.2%
2003	82.10%	78.4 - 143.8	16.8% - 86.4%	89.20%	76.6 - 134.3	22.8% - 91.7%
2004	87.90%	83.2 - 147.0	17.6% - 84.4%	89.00%	76.7 - 140.7	19.1% - 91.5%
2005	86.30%	84.6 - 153.1	17.8% - 85.4%	87.90%	77.4 - 141.2	14.2% - 89.5%
2006	93.60%	90.0 - 152.8	25.0% - 82.6%	91.50%	77.7 - 145.0	15.1% - 89.7%
2007	91.00%	97.0 - 161.0	27.0% - 82.2%	91.60%	87.9 - 159.9	26.2% - 90.8%
2008	92.60%	103.0 - 173.4	23.3% - 81.3%	92.20%	95.4 - 167.2	19.7% - 83.4%

which supports the view that salary inversions and salary dissimilarity are discipline specific, and not necessarily a widespread phenomenon.

CONCLUSION

The issue of relative academic salaries is important to faculty and administrators for budgeting and the provision of incentives within business schools. Using AACSB salary survey data, we show that mean level salary inversion between assistant and associate professors is a recent finding and occurs in finance and accounting at private and public universities and in economics at private universities. By applying the method of stochastic dominance and a related SDM metric, we observe that there is possibly a trend towards increasing salary inversion in the upper salary range for the finance and accounting disciplines. However, the opposite appears to hold for the economics discipline.

END NOTES

[1]Toutkoushian (1998), uses "level of experience" instead of rank to define salary inversion. We will use the rank measure, as the level of experience is not available from the AACSB salary surveys.

[2] There is an extensive literature on the use of stochastic dominance in portfolio selection and decision-making under uncertainty. See Levy (2006) for comprehensive discussion of this literature and stochastic dominance theorems.

[3] This is the coefficient on the time trend variable in a regression adjusted for first-order serial correlation and estimated over the entire sample period. The p-value of this estimated coefficient is 0.072 and the adjusted R-squared is 0.87. The dependent variable is the difference in average salary between assistant and associate professors.

[4] We do not compute third-degree stochastic dominance results, although they may be derived from the AACSB data.

REFERENCES

Barbezat, D. A., 2004. A Loyalty Tax? National Measures of Academic Salary Compression, *Research in Higher Education* 45, 761-776.

LeClair, D., 2004. The Professor's Paycheck, *BizEd* (March/April), 58-60.

Levy, H., 2006. *Stochastic Dominance: Investment Decision Making Under Uncertainty, Studies in Risk and Uncertainty* (Springer Publishing Co., New York), 2nd edition.

Toutkoushian, R. K. 1998. Using Regression Analysis to Determine if Faculty Salaries are Overly Compressed, *Research in Higher Education* 39, 87-100.