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Supply and Demand for IS Faculty: A Longitudinal Study

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SUPPLY AND DEMAND OF IS FACULTY:
A LONGITUDINAL STUDY

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ABSTRACT

The supply and demand of IS professors shifted in the last decade. Understanding the fluctuation of the IS faculty job market is a critical success factor for future planning and recruitment efforts. This paper presents the results of a longitudinal study that monitored the supply and demand of IS professors between 1992 and 2004. Data, primarily from the AIS and ICIS placement services, were analyzed to identify the trends in this market. Other relevant issues such as the composition of IS faculty position applicants, supply of IS doctorates, and trends in IS professor salary are also discussed. The paper concludes with recommendations to business and IS schools based on the findings. Explain what the findings were

Keywords: management information systems faculty, supply and demand, IS faculty.

INTRODUCTION

The last decade witnessed shifts in the supply and demand of information systems (IS)[1] professionals and faculty. The IS job market was one of the hottest for many years during this time. It enjoyed double digit growth accompanied by steady increases in income for IS professionals [Ives, et al. 2002]. The same was true for IS faculty positions in the 1990's. During the mid-1990's, the number of IS faculty positions available began to exceed the number of

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[1] IS is the term that we will use throughout this paper. Terms like management information systems (MIS), and information technology (IT) are assumed to be similar for the purposes of this paper, and are used interchangeably at times.

people available to fill them. As Freeman, Jarvenpaa, and Wheeler [2000] concluded from their study, an imbalance in the supply and demand of IS faculty existed. This difference in the number of IS faculty positions available and the people available to fill them was believed to be attributed to the explosion in the overall information systems job market in two ways:

1.   Many people took IS professional positions rather than pursuing Ph.D.'s in IS,

2.   The increase in the number of IS jobs for undergraduates and graduate students resulted in a marked increase in the number of students pursuing IS degrees, which in turn increased the need for more IS faculty.

The result was a growing divide between the number of information systems faculty positions available and the number of people qualified to take these positions.

For example, in 2000 alone, 5.5 IS faculty positions were open for every person that applied. This situation was pleasant for job applicants, but not so enjoyable for the universities that were trying to fill open IS faculty positions. Furthermore, universities were under pressure from AACSB to hire people with terminal degrees to maintain accreditation.

The bursting of the dotcom bubble and economic slowdown in the late 1990's and early 2000's resulted in large reductions in IT spending and hiring in organizations. Enrollment in IT-related majors declined as a result of the gloomy IT job market that was well publicized by the media. At the same time, state budget shortfalls in many states prevented state institutions from securing the resources needed to hire additional IS faculty. These two reasons are believed to be contributors to the slowdown in the demand of IS faculty since 2001. While the demand for IS faculty was still high, the position-applicant ratio was much lower in 2001 than the previous years. This finding confirmed Freeman et al.'s [2000] observation that while the imbalance in the supply and demand of IS faculty seemed to be structural in nature, the short term supply and demand could be affected by changes in the economy and other factors.

The result of the shortage of qualified faculty in the mid-1990's also drove salaries much higher. In 1998, Dennis Galletta at the University of Pittsburgh began tracking salaries offered (http://www.pitt.edu/~galletta/salsurv.html). His research shows IS faculty salary offers increasing consistently for a number of years. In addition, given the severe shortage in the late 1990's, it was not uncommon for schools to enter into bidding wars over the more attractive applicants. The result was "signing bonuses" in the form of summer teaching and research support, discretionary spending accounts, and other emoluments.

While the demand of IS faculty cooled since 2000, this reduction in demand was believed to be the result of an economic recession, a sluggish IT job market, a negative portrayal of the IT career outlook by the media, and severe state budget shortfalls. However, this gloomy atmosphere may be tempered somewhat by other statistics. As the 2002-2003 report from the Department of Labor [U.S. Department of Labor, 2002] clearly indicated, computer occupations are expected to be among the fastest growing careers in the coming years. Therefore, modest demand of IS faculty may not continue forever. The surge in IS faculty demand in the late 1990's caught many universities unprepared. To develop an effective action plan to prepare themselves for future changes in the IS faculty job market, business and IS schools need to take this opportunity to reflect on and learn from experience.

The objective of this study is to provide an accurate picture of the IS faculty job market over an extended time period. The results should help both administrators and faculty better understand the dynamics that affect the supply and demand of IS professors.

PAST WORK

The supply and demand of IS professors is of interest to every academic in IS. Insightful previous work on this topic includes Jarvenpaa et al. [1991] and Freeman et al. [2000]. While this study differs from prior research in terms of research methodology, research questions, and

sources of data, it complements prior research, especially Freeman et al.'s [2000] study, in two ways:

1. While prior studies chose to provide snapshots of the IS professor job market, this study adopts a longitudinal approach in analyzing the trends of this particular job market. The data used in this research spans the period from 1992 to 2004 (Job market data from 2003 was not available, hence it is not included in the analysis). This approach allows us to validate some of the predictions by Freeman et al. [2000];

2. Extraordinary political, economic, and IT-related events took place in the U.S. and around the world since the release of Freeman et al.'s study. These events, which impacted the supply and demand for IS faculty profoundly, are discussed in this article. We believe that readers are more likely to gain a holistic view of the IS faculty job market by reading these two studies together.

OGANIZATION OF THIS ARTICLE

In the sections that follow, we discuss how data was collected (Section II), examine the trends in the job market for IS faculty, explore the demographics of those looking for IS faculty jobs, and discuss the implications of the data to universities (Section III).   These findings are followed by discussion and recommendations in Sections IV and V.

II. THE STUDY

DATA SOURCES

This longitudinal study examines the placement data for information systems faculty positions from 1992 to 2004. The study relies on the data from a combined placement database developed and supported by the Association for Information Systems (AIS), and the International Conference on Information Systems (ICIS)[2]. The database, which evolved over the years, is the predominant source for IS faculty position and applicant data over the period covered. Other sources include the *Chronicle of Higher Education,* in which all open positions are advertised.

With the inception of AIS in 1995, the AIS and ICIS databases were combined. As a result, data collection since then was much easier than previously. When this longitudinal study began in 1992, one of the authors would contact the placement director for ICIS every year to coordinate the data collection effort. Without the cooperation and generosity of these individuals, the data would have been unavailable for these early years. The ICIS placement directors would, each year, tabulate the data that specifically addressed the research questions described in the next subsection. Since 1995, the AIS/ICIS placement database was made available via the Internet for a fee. The data from the AIS/ICIS placement website was tabulated in the same format as the early data to maintain consistency.

RESEARCH QUESTIONS

The research questions for this study were driven by what the authors believe other people in the IS teaching profession would find of interest. These questions reflect the dynamics of IS faculty job market since 1992. In addition, many of the research questions were driven by what placement data was available during the early phases of this longitudinal study prior to the data being available on-line. The research questions this study intends to answer are:

      1. What are the trends in the demand for IS faculty over time?

      2. What are the trends in the supply of IS faculty over time?

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[2] ICIS was an independent international meeting until 2000, when it merged with AIS.

3. How severe is the imbalance between the supply and demand of IS faculty? How has this imbalance changed over time?

4. Is the number of dissertations awarded a good indicator of the overall number of applicants?

5. What was the impact of the imbalance of the supply and demand of IS faculty on IS faculty salaries?

RESEARCH QUESTION 1: What Are the Trends In the Demand For IS Faculty Over Time?

The placement data are valuable in identifying the trends in IS faculty positions over time. These trends, when compared to other events in higher education (e.g., funding crises) the IS industry (e.g., the bursting of the dotcom "bubble"), or the economy as a whole (e.g., recession), help in answering questions related to the understanding of what factors contributed to the fluctuation in the demand of IS faculty. This knowledge should lead to better forecasts of future demand. Since demand varies regionally, it is also useful to understand the trends by geographic regions. This data helps us identify regions with the biggest shortage or surplus of IS faculty and, perhaps, understand the factors that contribute to shortage or surplus. The regions were defined according to the classification scheme used in Brancheau and Wetherbe [1987].

Typically, when advertising an IS faculty position, universities specify the rank of the position (i.e. chair, full professor, associate professor, assistant professor, post-doctorate, visiting professor, or instructor). When the rank is not specified, the position is classified as 'rank open'. The trends in the demand of IS faculty by rank should be interesting to readers because this information shows whether a disparity exists between the demand for senior and junior faculty. To avoid inflating the number of positions, when a university advertised positions that can be filled by multiple ranks, (e.g., assistant or associate professor), the authors included the position in the total count of positions but not the total count of positions by rank. Therefore, the most conservative number of positions by rank was used in answering this research question.

RESEARCH QUESTION 2: What are the Trends in the Supply Of IS Faculty Over Time?

The trends in the supply of IS faculty are reflected by the number of applicants for IS faculty positions over time. Freeman et al. [2000] found that universities did not intend to expand their IS Ph.D. programs in the foreseeable future. Recent anecdotal conversations at IS conferences with colleagues seem to be consistent with this. As such, we have assumed that the supply of IS faculty will remain at the same level as before. Consequently, the past numbers describing the supply of IS faculty provided us with a starting point to predict future supply[3].

The years since 1992 also witnessed the changing dynamics in IS faculty position applicants. We are seeing an increasingly diverse pool of applicants (see Figure 5). While the placement services did not require applicants to supply demographic information such as gender and nationality of origin, this information could often be obtained from the name and professional vita of the applicant. When the applicant's gender or nationality could not be determined, "unknown" was entered as the value. The number of applicants by gender and nationality over time should help readers understand the changing face of IS faculty.

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[3] The limitation of this assumption is that some institutions choose to curtail or drop their Ph.D. programs, while others choose to start or expand Ph.D. programs. Without a full census of Ph.D. programs, the actual supply can not be known with certainty.

Both the number of applicants and positions can be analyzed separately for the AMCIS[4] and ICIS meetings.   Despite its short history, AMCIS placement is gaining popularity among both applicants looking for jobs and universities seeking candidates. Several reasons may contribute to this gain. First, the AMCIS annual conference is held in August each year while the ICIS annual conference is held in December. When ICIS was the only placement service, it was conventional for universities to interview candidates during the conference. With the increasing demand for IS faculty (see Figures1 and 2) in In recent years, more universities started to recruit earlier in the year so that they can attract more applicants. As a result, the AMCIS placement service surpassed ICIS in terms of the number of positions advertised and the number of applicants attending. Second, the AMCIS conference is held in the U.S.[5] while the ICIS annual conference is periodically held overseas (e.g., 1995, 1998, 2000, and 2002). Since both the supply and demand of IS faculty come primarily from the U.S.[6], we expect that the number of postings at the AIS placement service would surpass that at the ICIS placement service in those years. However, the number of openings is not an indication that one placement services is superior to another or that higher (or lower) ranked institutions prefer one meeting over another. It simply represents a shift in universities' recruiting timeline and the effect of conference location on candidate attendance. In fact, a large number of universities advertise at both placement services to achieve maximum exposure. Note that when a university advertised at both meetings, we only recorded it once during the data collection.

RESEACH QUESTION 3: How Severe is the Imbalance Between the Supply and Demand of IS Faculty? How did this Imbalance Change Over Time?

The difference between the supply and demand of IS faculty is the imbalance described by Freeman et al. [2000]. Maintaining a perfect balance is almost impossible, and the nature of the imbalance changes over time. To demonstrate this imbalance and its changes, the number of applicants and openings are displayed over time in our analyses.

Research Question 4: Is the Number Of Dissertations Awarded a Good Indicator of the Overall Number of Applicants?

As most junior IS faculty positions are filled by candidates who just obtained their Ph.D., we chose to use the number of dissertations awarded in a given year as an indicator of the number of applicants for IS faculty positions in a given year. However, there are limitations with this choice. In practice, we observed other sources of candidates for these junior faculty positions: junior faculty not receiving tenure at one organization being "forced" to take another junior-level position, junior faculty seeking to increase their "compressed" salary by voluntarily taking another junior position at a different university, and ABDs ("all but dissertation")[7].   From another perspective, it is also true that not all newly-minted Ph.D.s seek IS faculty positions. Some enter industry, or choose to accept positions in combined CS and IS programs, or schools of

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[4] The AIS conference changed its name to the Americas Conference on Information Systems (AMCIS) in 2001 to parallel the naming of ICIS, which is an acronym for the International Conference on Information Systems.

[5] Note that in 2006 AMCIS will be held in Acapulco, Mexico and in 2008 in Toronto, Canada. However, these venues are close enough to the United States that U.S. citizens are likely to attend. Whether non-U.S. students will attend these meetings is still an open question because immigration laws as they were interpreted in 2005 make it difficult for overseas students to leave and enter the country.

[6] Non-US demand was 12.8% of the total**.**

[7] The severe shortage of IS faculty also led universities to be more open to the idea of hiring ABDs in this "seller's market." To ensure the quality of candidates and their likelihood of succeeding in an academic career, universities often require an ABD candidate to complete defense of his or her dissertation proposal prior to arriving on campus and to demonstrate a good chance of completing the Ph.D. degree program. Whether or not this policy will affect the quality of IS education cannot be determined at this point.

information or continue to work at the schools that hired them as ABD's. In this study, we wanted to find out the extent of this phenomenon and determine whether the number of dissertations awarded is still a good indicator of the number of applicants in a given year.

A lower bound on the number of dissertations awarded was obtained from the MIS dissertation database maintained by MIS Quarterly. The database contains all dissertations reported from 1973 to the present. Yearly lists of MIS dissertations were published in the MIS Quarterly through 1999. The most up-to-date version of the database, which includes degrees awarded since then, is available at http://www.misq.org/dissertations.

Research Question 5: What was the Impact of the Imbalance of the Supply and Demand of IS Faculty on IS Faculty Salaries?

The surge in faculty salaries we observed in the late 1990's was driven mainly by a severe shortage of IS faculty. To attract qualified candidates, salary offers rose. The 2000-2001 Annual Report on the Economic Status of the Profession released by the American Association of University Professors [2001] showed that the range of faculty salaries between high- and low-paying disciplines widened drastically in the 1990s. Among the high-paying disciplines are business and computer and information sciences. However, feedback may exist between salary and the imbalance of supply and demand, although with a time lag. The increased salary of IS faculty may attract more people from industry, from MS programs in IS, and from other disciplines to pursue a Ph.D. in IS. The feedback will increase the supply of IS faculty candidates and may eventually create a surplus over time, particularly if demand decreases. How did all these factors play out in reality?

III. FINDINGS

TRENDS IN ACADEMIC POSITIONS OVER TIME

Total Number of Openings

As shown in Figure 1 and Table 1, the number of open IS faculty positions increased until 2000 across all regions. After 2000, the number of positions dropped drastically. This change in demand is most likely the result of the economic downturn both in the U.S. and globally. In the U.S., the demand for MIS faculty was highest in the Northeastern region among all regions in many of the years. The number of international positions increased in 1995 (when ICIS was held in Amsterdam) after which they experienced a sharp drop and then increased steadily again up through 2000. The sharp international drop after 1995 coincided with the Asian economic crisis that started in the middle of 1995. The data demonstrate the short-term effect of economic conditions on the IS faculty job market.
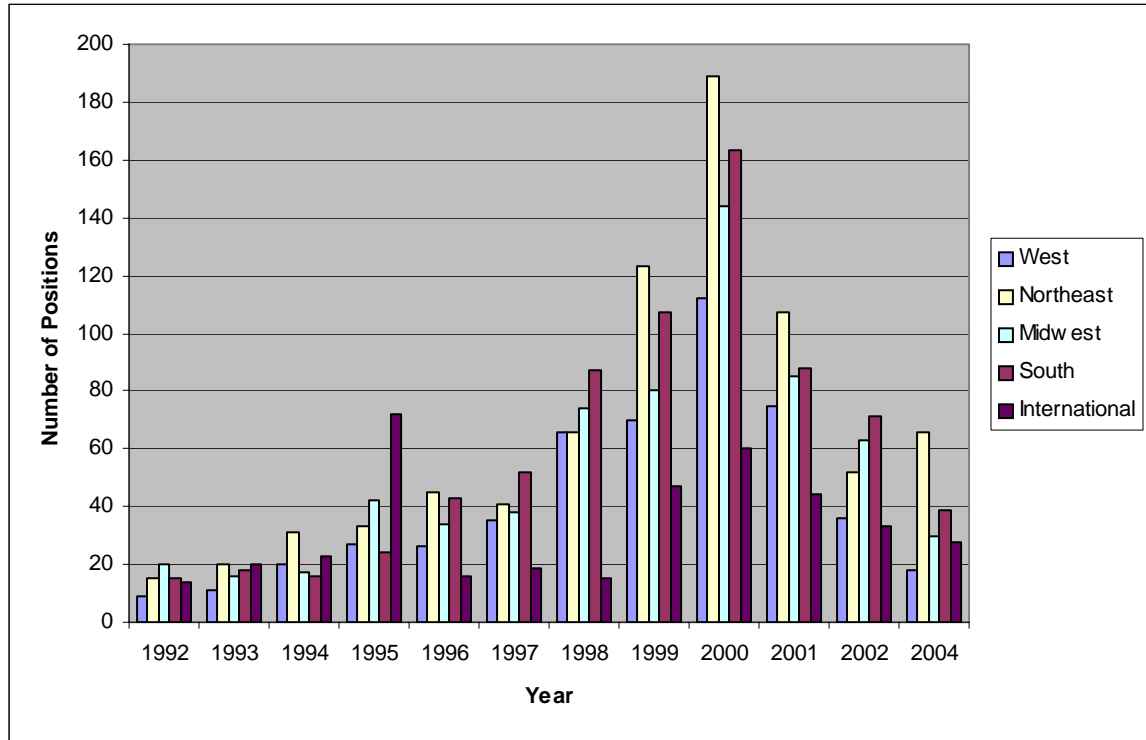
Figure 1. Total Number of Positions by Region, AMCIS and ICIS Combined

Table 1. Data for Figure 1

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2004
West	9	11	20	27	26	35	66	70	112	75	36	18
Northeast	15	20	31	33	45	41	66	123	189	107	52	66
Midwest	20	16	17	42	34	38	74	80	144	85	63	30
South	15	18	16	24	43	52	87	107	163	88	71	39
Total U.S.	59	65	84	126	148	166	293	380	608	355	222	153
International	14	20	23	72	16	19	15	47	60	44	33	28

Positions by Rank

Figure 2 shows the number of positions by rank. While the total number of positions increased year by year from 1992 to 2000, the increase was substantial in some ranks and hardly noticeable in others. The greatest increases occurred in the number of assistant professor, rank open, and associate professor positions. The rank open positions in particular increased from merely six openings in 1992 to 171 in 2000. For senior faculty positions such as chair and full professor positions, while the total number of openings remained low, the required qualifications were much higher after 1999.   Positions such as post-doctorate and instructor positions did not increase noticeably in number over the years.
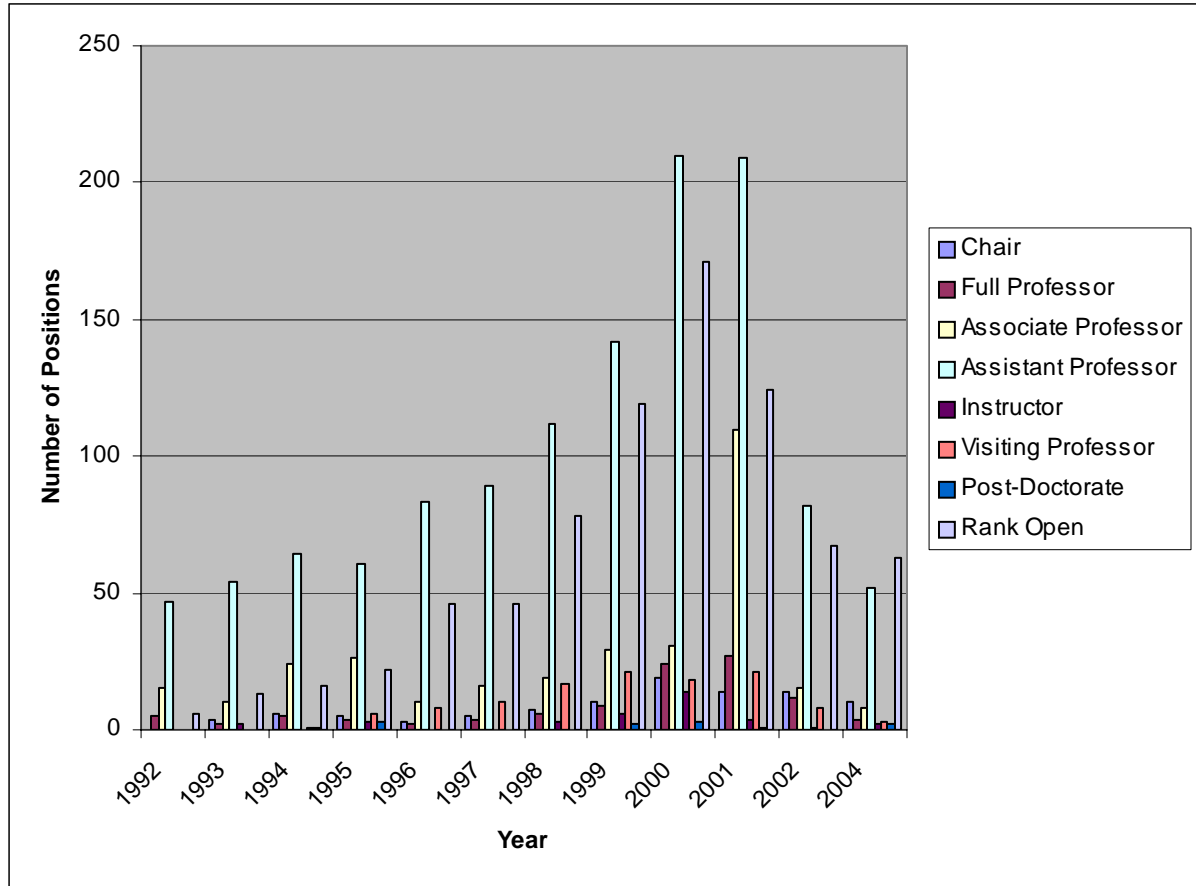
Figure 2. Total Number of Positions by Rank, AIS and ICIS Combined

Table 2. Data for Figure 2

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2004
Chair	0	4	6	5	3	5	7	10	19	14	14	14
Full Professor	5	2	5	4	2	4	6	9	24	27	12	4
Associate Professor	15	10	24	26	10	16	19	29	31	110	15	8
Assistant Professor	47	54	64	61	83	89	112	142	210	209	82	52
Instructor	0	2	0	3	0	0	3	6	14	4	1	2
Visiting Professor	0	0	1	6	8	10	17	21	18	21	8	3
Post-Doctorate	0	0	1	3	0	0	0	2	3	1	0	2
Rank Open	6	13	16	22	46	46	78	119	171	124	67	63

One common observation across all years is that the largest number of openings is for assistant professor positions. Historically, universities are more willing to hire junior faculty rather than hire senior faculty.   This preference may, in IS, also be partially due to the dynamic nature of the field. As the issues in IS changed over the years, universities turn to new Ph.D.'s for their expertise in contemporary IS issues (e.g., electronic commerce and web technologies). The relatively large

number of openings for rank open and associate professor shows relatively high mobility for senior faculty members. However, as the demand of IS faculty went down in 2001, 2002, and 2004, this mobility also diminished.

Trends at ICIS and AMCIS

Once AIS was founded in 1995, the AMCIS conference quickly became one of the most important and well-attended conferences in the IS field. As Figure 3 shows, the number of positions advertised at AMCIS conferences surpassed the
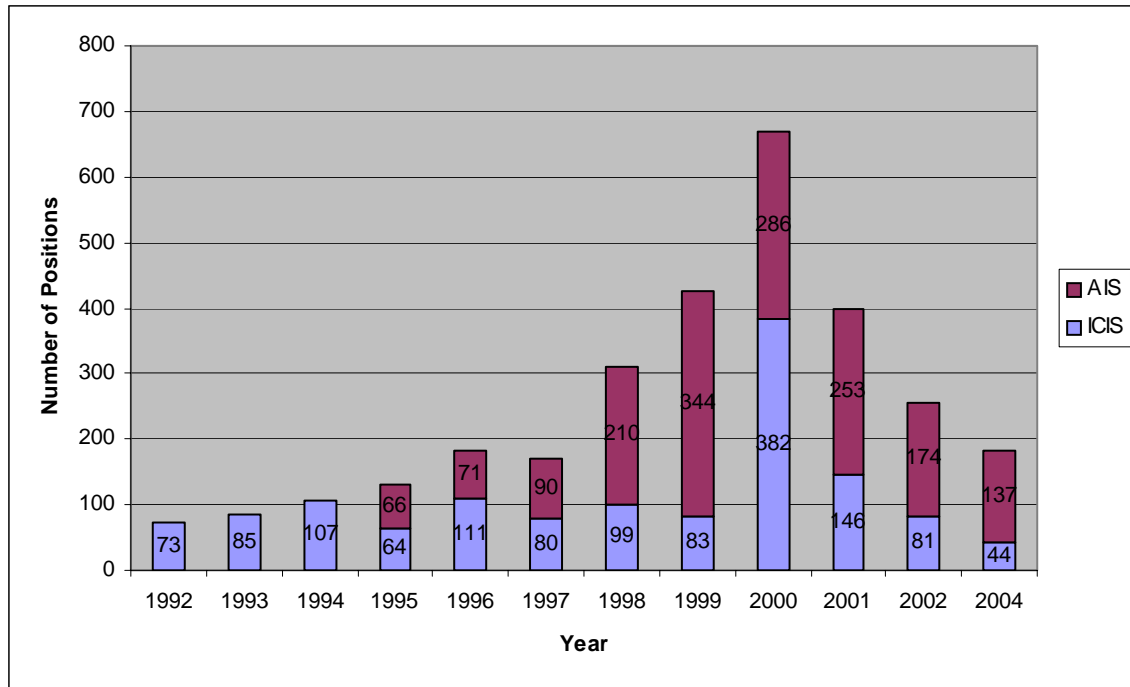

Figure 3. Total Number of Positions, AMCIS vs. ICIS

number of positions at the ICIS conferences in four of the last five years. A marked shift occurred in university recruiting timelines. More and more universities start their recruiting effort earlier with hopes of attracting a larger number of qualified candidates.

TRENDS IN APPLICANTS OVER TIME

Total Number of Applicants

Contrary to Jarvenpaa et al.'s [1991] forecast, Figure 4 shows a slight downward trend in the number of applicants for IS faculty positions from 1992 to 2000. The number increased sharply in 2001, followed by another drop in 2002. The downward trend from 1992 to 2000 was likely the result of the moderate demand for Ph.D.s in IS, coupled with the relatively more lucrative salaries that were being offered in industry.
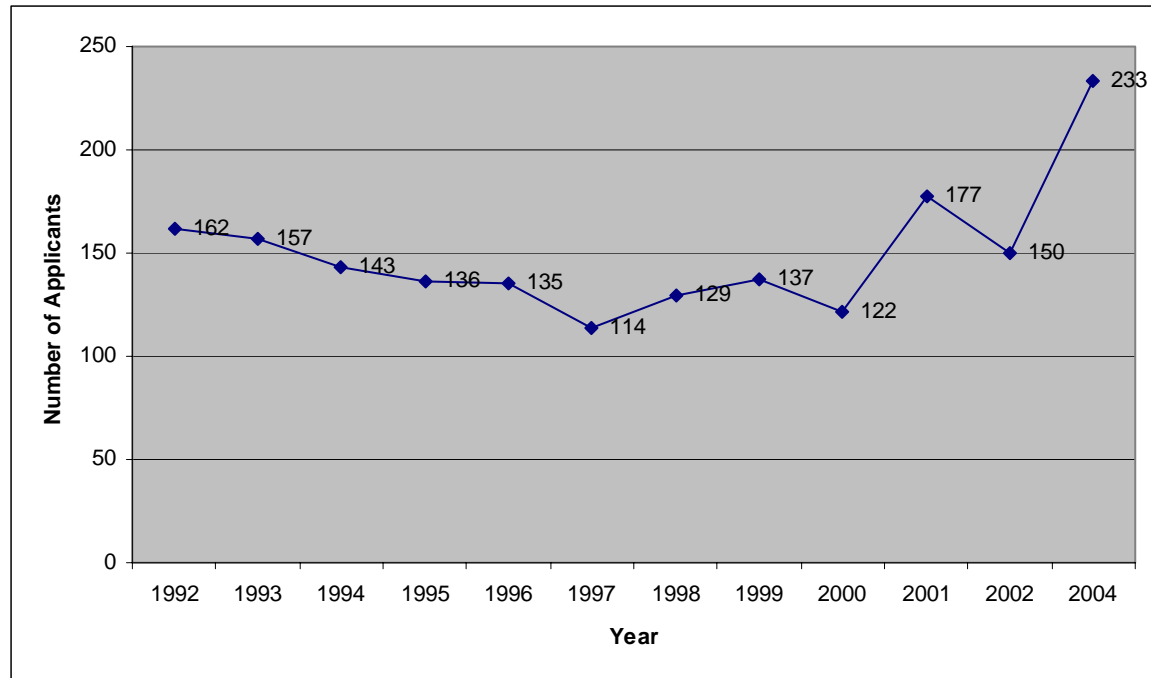
Figure 4. Total Number of Applicants, AMCIS and ICIS Combined

The number of applicants surged to 233 in 2004. Three possible reasons for the general increase from 2000 to 2004 are:

1. As the demand for IS faculty improved in the mid-to-late1990's, increasing number of people began to pursue a doctoral degree in IS. The multi-year time lag between demand and supply serves as strong evidence for this explanation.

2. As the market for IS faculty contracted after 2000, applicants who did not find satisfactory employment in the previous years remained in the job market.

3. With reduced demand, ample supply of new Ph.D.'s, and the fixed number of quality outlets available for publications, universities increased the number of tenure denials. Many people started looking for alternative employment because they were denied tenure or felt that they would soon be.

Although data for testing these hypotheses are not available, each may have contributed to the surge in applicants.

Geographic Distribution Worldwide

Comparing the number of applicants by continent (Figure 5 and Table 3) shows that, while the total number of applicants did not change much over the years, the composition of applicants did see some major shifts. The number of applicants from North America declined. The number of applicants from the Asian/Australian region and, to a certain extent, the European region increased. Notably in 2001 and 2002 (a year when ICIS was held in Barcelona), the combined number of applicants from Asia/Australia and Europe either surpassed or were very close to the number of North American applicants. The majority of applicants from the Asia/Australia region came from India, China, and South Korea. The number of applicants from South America and Africa, always small, were roughly the same in 2004 as they were in 1992.
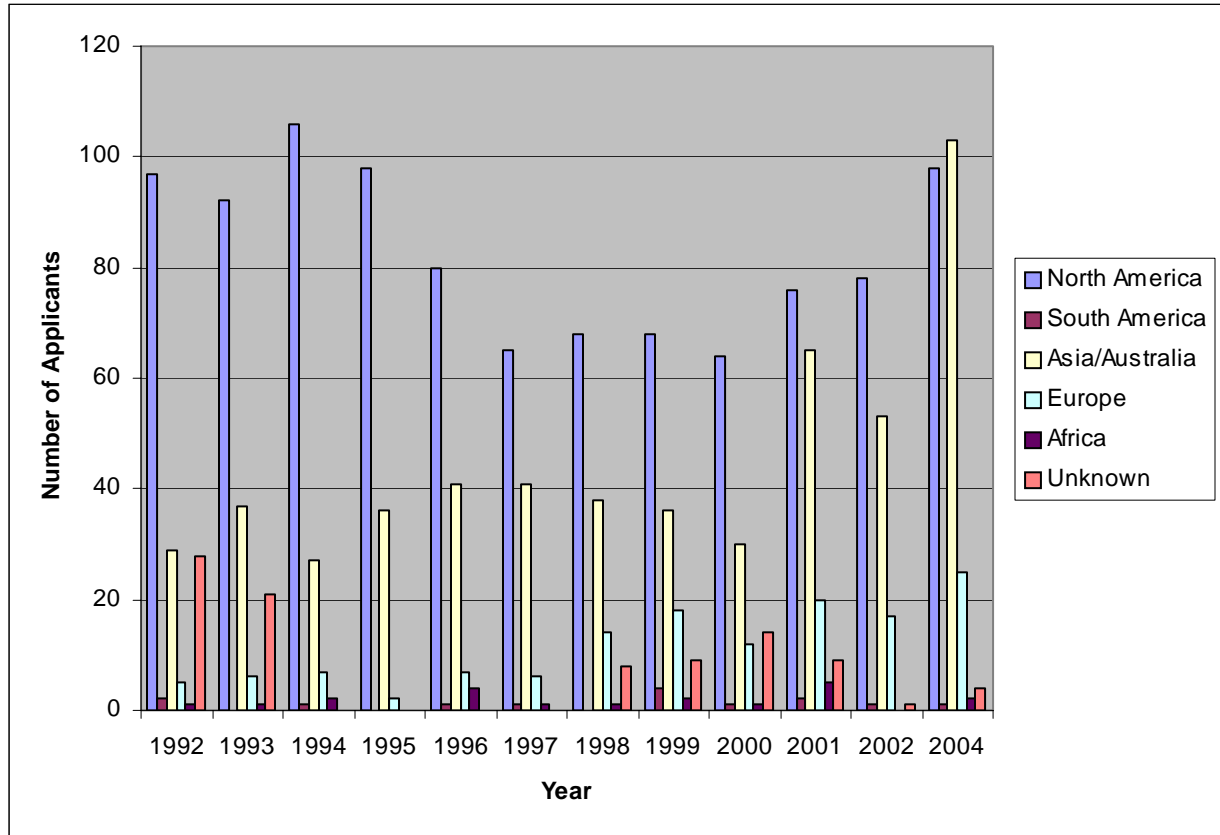
Figure 5. Total Number of Applicants by Geographic Region

Table 3. Data for Figure 5

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2004
North America	97	92	106	98	80	65	68	68	64	76	78	98
South America	2	0	1	0	1	1	0	4	1	2	1	1
Asia/Australia	29	37	27	36	41	41	38	36	30	65	53	103
Europe	5	6	7	2	7	6	14	18	12	20	17	25
Africa	1	1	2	0	4	1	1	2	1	5	0	2
Unknown	28	21	0	0	0	0	8	9	14	9	1	4

Gender

Gender data for 1992, 1994, and 2003 were not available to the authors. Figure 6 and Table 4 show that the number of female applicants remained fairly consistent.
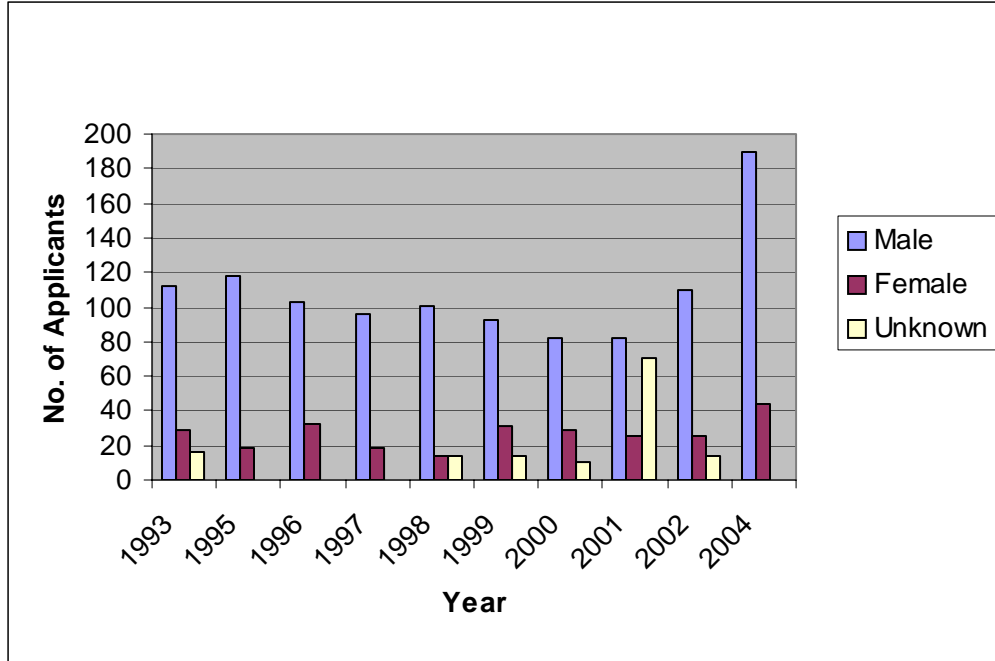
Figure 6. Total Number of Applicants by Gender

Table 4. Data for Figure 6

	1993	1995	1996	1997	1998	1999	2000	2001	2002	2004
Male	112	118	103	96	101	92	82	82	110	190
Female	29	18	32	18	14	31	29	25	26	44
Unknown	16	0	0	0	14	14	10	70	14	0

ICIS vs. AMCIS

As Figure 7 shows, the number of applicants at AMCIS surpassed the number of applicants at ICIS since 1995 with the exception of 2001. One possible reason for this change is that ICIS, being international, held meetings outside the U.S. for some of the years being analyzed. As the majority of the applicants and universities seeking candidates were from the U.S., the AMCIS conference, which is always held in the U.S., was logistically more convenient and less costly for applicants. In the four years in which the ICIS conference was held outside the United States (i.e. 1995, 1998, 2000, and 2002), the number of applicants registered at the AMCIS placement service exceeded the number of applicants registered at the ICIS placement service by a large margin.
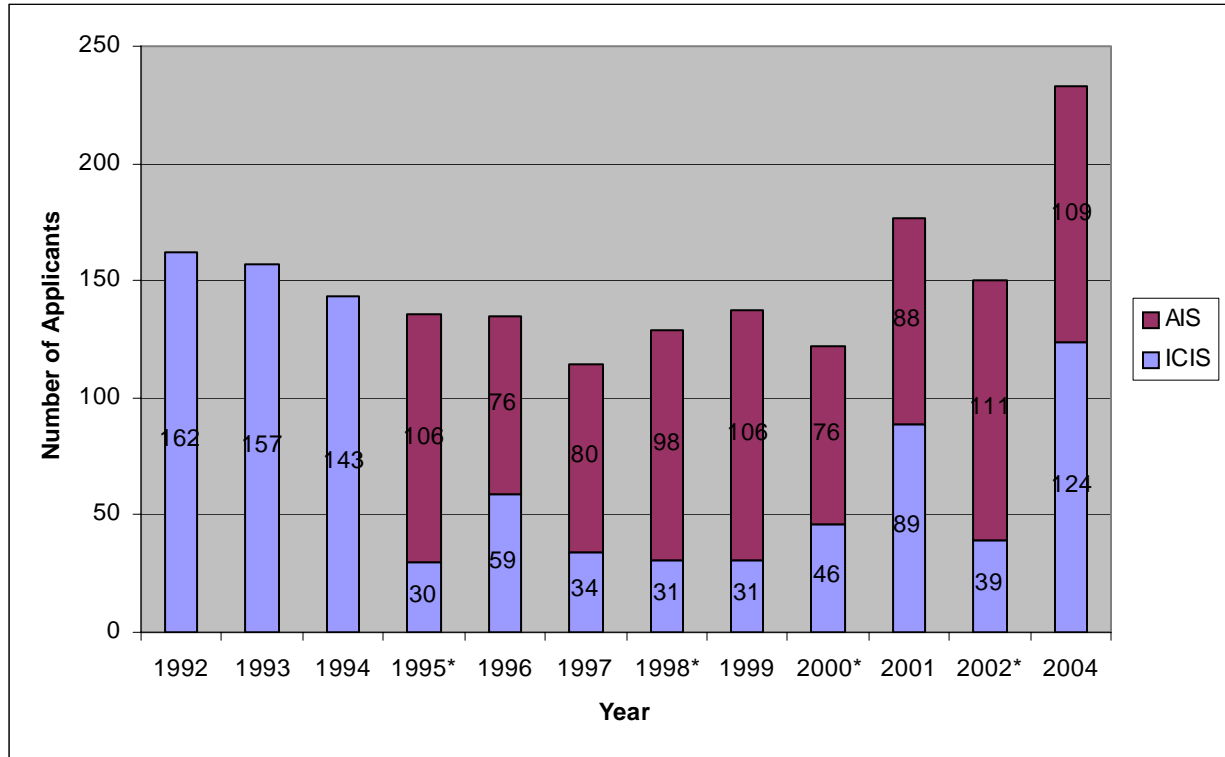
* ICIS held outside the U.S.

Figure 7. Total Number of Applicants, AMCIS vs. ICIS

The Imbalance between the Supply and Demand

Figure 8 superimposes the number of applicants and the number of open positions over time. While the number of applicants remained fairly stable over the years, the number of openings increased by more than nine times between 1992 and 2000 before a sharp drop in 2001. The number of applicants exceed the number of openings being recruited for 1992 and 1995. However, in every year since then, the number of openings exceeded the number of applicants, with the gap increasing every year through 2000. However, the short-term demand for IS faculty fluctuated drastically. What is particularly noticeable is that the rate of decrease in the number of positions in 2001 and 2002 was almost as drastic as the rate of increase seen in 1998, 1999, and 2000. Note, however, that ICIS was held in Barcelona in 2002, which might reduce the number of applicants in that year.
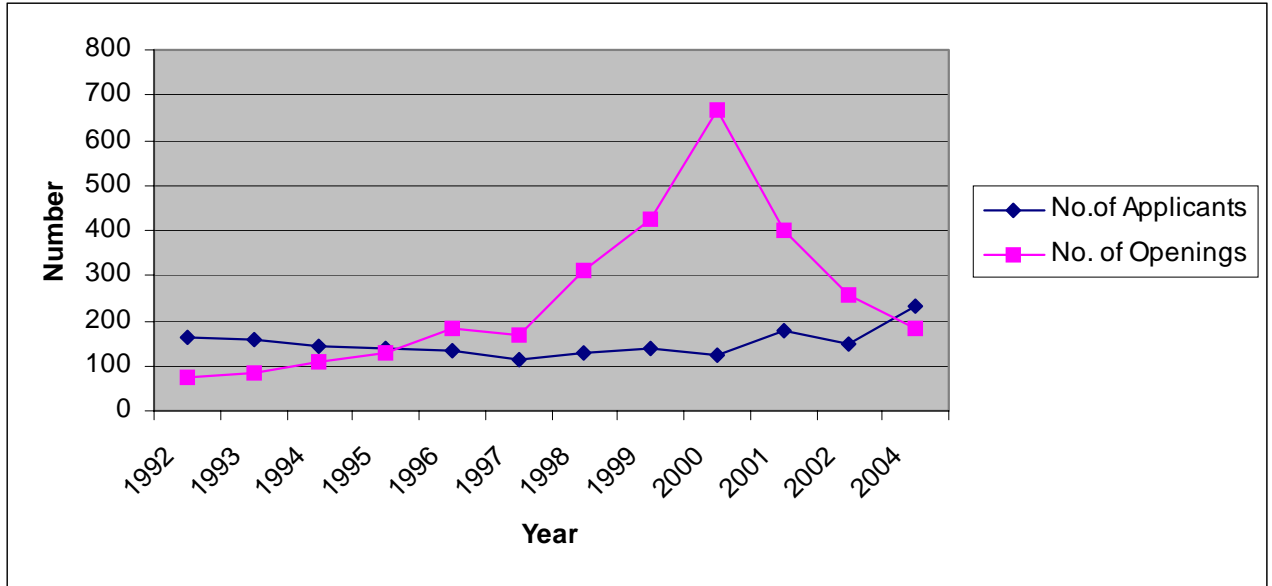
Figure 8. Number of Applicants vs. Number of Positions

The overall trend shows that the imbalance between the supply and demand is shrinking and that, if current trends continue, equilibrium may be reached in the near future. Nevertheless, as the market demonstrated, many factors can cause the demand to fluctuate.

The position-to-applicant ratio represents the average number of positions for each applicant in a given year. Between 1992 and 1995 the position-to- applicant ratio was less than one position per applicant (Figure 9). The equilibrium in the supply and demand was reached between 1995 and 1996. Since 1995, the position-applicant ratio shot up to almost 5.5 by 2000. However, the ratio tapered down to only 0.78 in 2004.

Since supply was relatively constant, the overall trend in the demand of IS faculty (Figure 8) and the overall trend in the position-to-applicant ratio (Figure 9) are similar. Thus, imbalance of supply and demand of IS faculty we saw in the last decade was largely caused by the fluctuation in the demand rather than the supply.
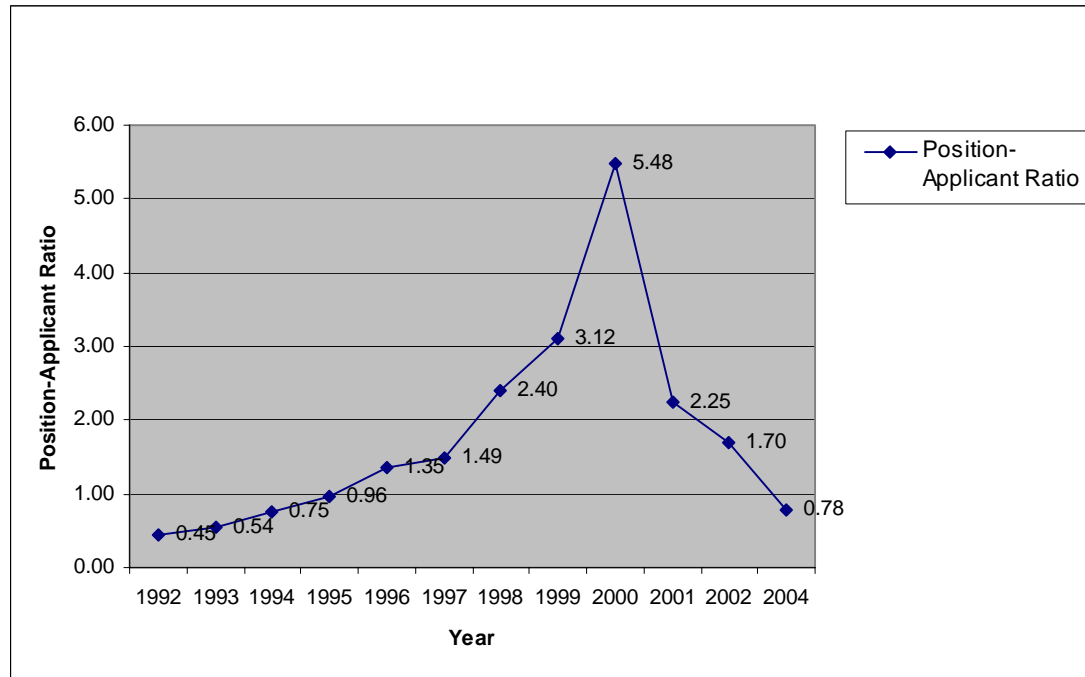
Figure 9. Position-to-Applicant Ratio

Is the Number of Dissertations Awarded a Good Indication of the Number of Applicants?

While Figure 10 and Table 5 show that Ph.D.s awarded appeared to be a relatively good indicator of the number of applicants for IS faculty positions in the earlier years (1992 – 1998), this data should not be interpreted too strongly as no reliable data were available after 1998. Data on the number of dissertations awarded after 1998 are published at http://www.misq.org/dissertations. The data on the website show a growing disparity between the number of dissertations awarded and the number of applicants in the last few years. For example, in 2001, only 36 dissertations were reported to be awarded, but there were 177 applicants for IS faculty positions. Nevertheless, since the reliability of the dissertation data on the website cannot be verified, this paper does not include these data in the analysis. If the disparity does exist as the website data suggest, the authors believe that it is due to several issues:

1. An increasing number of ABDs entering the job market in response to the shortage of IS faculty,

2. Existing faculty members seeking employment in other institutions as the result of salary compression or denial of tenure,

3. The "noisy" nature of Ph.D. data that was always provided on a voluntary basis, but did not follow a formal process in recent years (e.g., the annual MISQ article).

4. Recent Ph.D.'s with alternatives available to the traditional IS faculty position such as industry.

These phenomena are likely to impact IS programs in the long-term. For example, as ABD candidates fail to complete their degree requirements and thus fail to gain entry to tenure track positions, a more temporary, mobile teaching environment will be created.
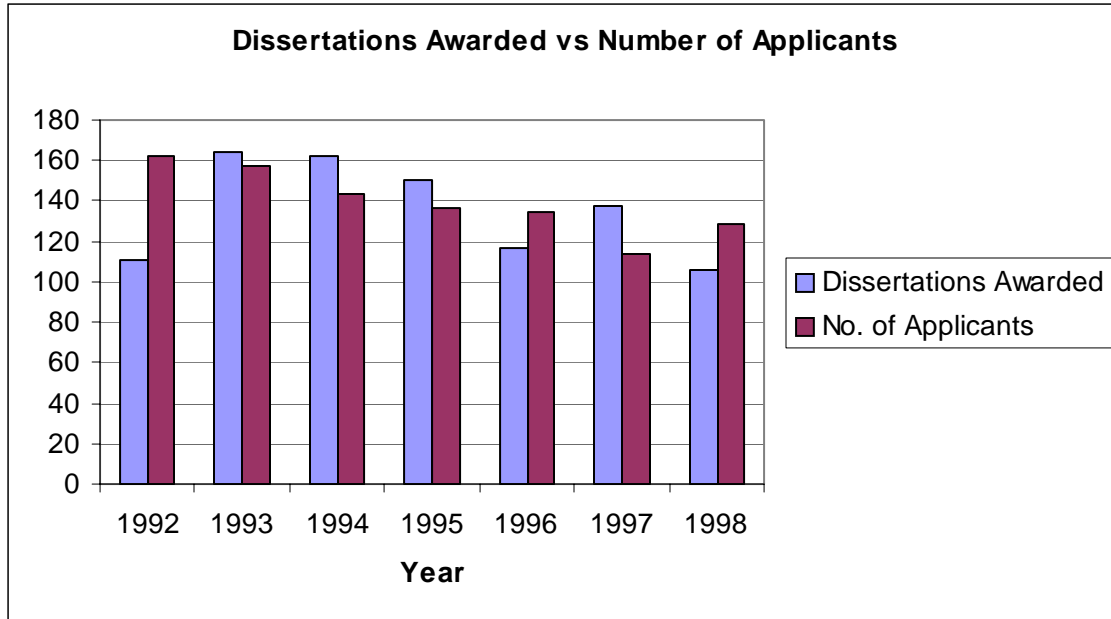
Sources: [Hamilton & Davis, 1993, 1994, 1995, 1996, 1997, 1998, and 1999]

Figure 10. Dissertations Awarded vs. Number of Applicants

Table 5. Data for Figure 10

	1992	1993	1994	1995	1996	1997	1998
Dissertations Awarded	111	164	162	150	117	137	106
No. of Applicants	162	157	143	136	135	114	129

In addition, the increasing number of ABDs taking faculty positions will also likely affect the quality and research output of IS programs. While the impact of these combined phenomena remains to be seen, it is likely the overall effect will be negative.

TRENDS IN IS FACULTY SALARY OFFERS

Data on the salaries offered to IS faculty hires became available in 1998. Hence the analysis only covers the years 1998 through 2004. Table 6 displays the salary index and year-to-year percentage increase/decrease in salary offered to new IS Assistant Professors. The great majority of the offers included in the salary survey (http://www.pitt.edu/~galletta/salsurv.html) study were made to new IS Assistant Professors; therefore the average salaries offered to new Assistant Professors were used to demonstrate the salary fluctuation over the years. The data show that average salary offered to new IS Assistant Professors increased consistently between 1998 and 2002. In 2003-04, the average salary decreased. Table 7 displays the year-to-year percentage increase/decrease in number of applicants, number of positions, and position-applicant ratio. Theoretically, the increase/decrease in average salary offers should correlate with the increase/decrease in position/applicant ratio. Figures 11 compares the year-to-year percentage changes in the average salary offered to new IS Assistant Professors with the year-to-year percentage changes in:

- number of applicants,
- number of positions, and

- position-applicant ratio,

respectively. Note that the data in Tables 6 and 7 and in Figure 11 are based on academic years rather than calendar years.

Because only six years' data is available at this point, this correlation is not evident.

Table 6. Salary Index and Percentage Increase/Decrease in Salary for New Assistant Professors

Year	Average Salary Offered to New IS Assistant Professors	Sample Size (n)	Salary Index	Percentage increase/decrease in salary
1998-99	$67,569	72	100	
1999-00	$76,894	70	114	13.80%
2000-01	$81,482	97	121	5.97%
2001-02	$90,368	73	134	10.91%
2002-03	$96,939	40	143	7.27%
2003-04	$92,365	48	137	-4.72%

Table 7. Percentage Increase/Decrease in Applicants, Positions, and Position-Applicant Ratio

Year	No. of Applicants	Percentage increase/decrease in applicants	No. of Positions	Percentage increase/decrease in positions	Position-Applicant Ratio	Percentage increase/decrease in position-applicant ratio
1998-99	129		309		2.40	
1999-00	137	6.20%	427	38.19%	3.12	30.12%
2000-01	122	-10.95%	668	56.44%	5.48	75.67%
2001-02	177	45.08%	399	-40.27%	2.25	-58.83%
2002-03	150	-15.25%	255	-36.09%	1.70	-24.59%
2003-04	233	55.33%	181	-29.02%	0.78	54.30%
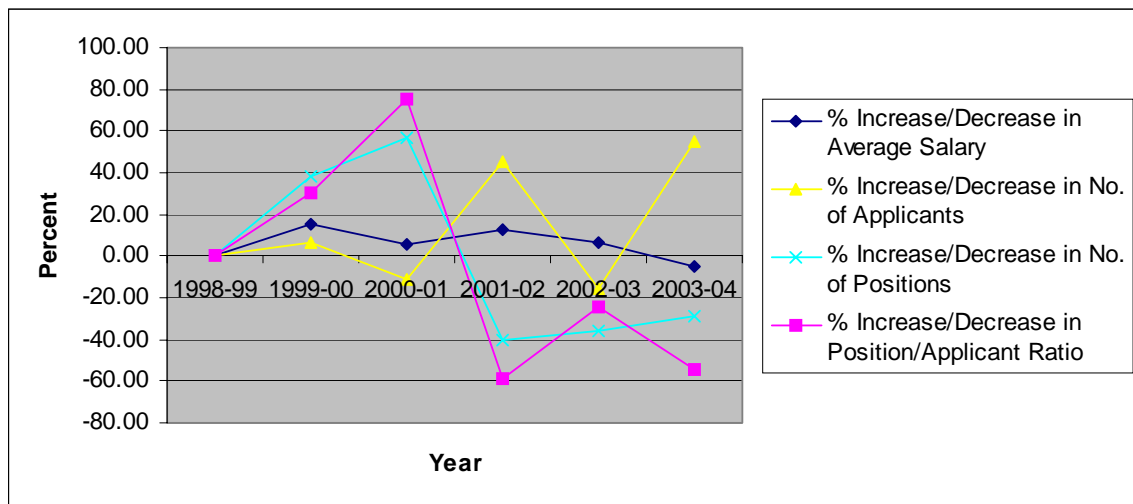
Figure 11. Comparison of Percentage Year-to-Year Changes in Average Salary Offered to New IS Assistant Professors, Number of Applicants, Positions, and Position-to-Applicant Ratio)

Supply and Demand for IS Faculty: a Longitudinal Study by M. Frolick, L. Chen, and B.D. Janz

The Annual Report on the Economic Status of the Profession by American Association of University Professors in 2001 [AAUP, 2001], showed IS faculty are among the higher paid professors within institutions. In 2000, IS is among the top 25% disciplines in terms of pay (i.e. law, business, the health professions, computer and information sciences, engineering, the physical sciences, and mathematics). The salary of IS faculty was clearly well above average, and, as the figure demonstrates, grew at a steady pace until 2003. The average salaries offered to new IS Assistant Professors reached as high as $96,939 in 2002. Nevertheless, as the percentage increase/decrease in salary shows (Table 6), the reduction in the demand of IS faculty in the recent years clearly affected the rate of salary growth.

IV. DISCUSSION AND RECOMMENDATIONS

Table 8 summarizes the findings of this study. The table also compares the study's finding with those of Jarvenpaa et al. [1991] and Freeman et al. [2000]. The table provides a historical perspective on the supply and demand of IS faculty.

Table 8. Comparison of Findings

Jarvenpaa, Ives, and Davis, [1991]	Freeman, Jarvenpaa, and Wheeler, [2000] (Survey Conducted in 1998)	The Present Study
1. Forecasts a sizable and steadily increasing quantity of new IS doctorates 2. The demand for Ph.D.'s will be greater than the corresponding supply for the very short-term 3. Because the supply of Ph.D.'s is growing faster than demand, a smaller number of unfilled IS faculty positions per new doctorate 4. After 1994, the demand, particularly within Ph.D. granting universities, will drop, causing many Ph.D.'s to pursue careers in non-doctoral-granting universities	1. A steady state of new IS Ph.D.'s in the short-term (no increase in new supply) 2. Demand expected to continue to outpace supply least until 2002. 3. The demand is growing faster than supply; lecturers will be used to fill teaching positions in place of tenure-track faculty 4. The shortage of IS faculty will likely increase faculty churn among universities	1. The imbalance between the supply and demand increased between 1995 and 2000, after which the imbalance quickly diminished 2. Compared to demand, the number of applicants for IS faculty positions remains consistent except in 2004, in which a surge in the number of applicants was witnessed. 3. Demand fluctuates drastically year to year. 4. The percentage of applicants from outside North America, in particular, Asia/Australia and Europe, increased 5. A large imbalance between male and female applicants.. 6. IS faculty salary offers increased steadily until 2002 and then dropped

Source: Columns 1 and 2 based on Freeman et al.[2000]

The findings of this study show that the short term demand of IS faculty is affected by such factors as economic condition, demand for IT professionals, and budgetary issues. In addition, while no enrollment data was gathered for this study, anecdotal evidence suggests that faculty demand is driven in part by IS enrollment in undergraduate/MS/MBA programs [Sloan, 2004]. As these programs swelled with students, demand rose, and more recently, as enrollments decline in

these programs, demand dropped[8]. The number of applicants for IS faculty positions remained consistent over most of the years under study. The number of applicants ranged from 114 to 171 between 1992 and 2002. The number of applicants surged to 233 in 2004. While many of these findings might appear intuitively obvious, this study is the first to provide a longitudinal view of hard data to support such assumptions.

The demand for IS professors declined between 2001 and 2004 compared to 1999 and 2000, but the total demand was still ahead of 1998 and earlier. The decline may be to the result of a combination of weak economy, gloomy IT career outlook, and declining enrollment in IS majors. Nevertheless, the present is not the first time IS enrollment in universities declined. The 1980's witnessed a steady decline in the number of students interested in a computer career [Cale, et al., 1991]. This decline was followed by a decade of impressive growth in the number of people pursuing IS careers. The decline, however, suggests that universities must take a proactive approach to change the negative outlook of the IT industry as portrayed by the media. One thing that we need to keep in mind is that the reduced demand of IS faculty may be temporary. As Ives et al. [2002] pointed out, the need for firms to manage information did not diminish, and the demand of IT professionals would return to a steady growth rate. The U.S. Department of Labor, Bureau of Labor Statistics [2002], projects that computer occupations such as system analysts, computer scientists, and database administrators as being among the fastest growing occupations. A growing demand of qualified IS professionals will again raise the demand of IS faculty at the university level. All of these factors can increase the demand of IS faculty in the coming years.

Changing requirements in the market place for IS professionals is also fueling the demand of IS faculty with certain specialties. For example, in the late 1990s', favorable economic conditions coupled with the rise in e-business led to a sharp increase in the demand for IT professionals with Web skills. Many universities rushed to expand IS departments and curricula to include e-commerce and e-business education.

The dynamic nature of the IS field changed the types of expertise demanded by the marketplace. This temporal change is evident in the key issue research conducted in the last two decades [e.g. Ball and Harris, 1982; Dickson, et al., 1984; Brancheu and Wetherbe, 1987; Niederman and Brancheau, 1991; Brancheau et al., 1996; Watson et al., 1997; Luftman and McLean, 2004]. The key issue research shows that new IS topics important to organizations were added as key issues, and the rank order of existing issues shifted over time. Besides the implications to practitioners and researchers, the key issue research also serves business and IS schools as a valuable resource for planning future IS curricula, resource allocation, and need for IS faculty with specific expertise. Forward planning also gives schools more time to acquire new and highly sought-after expertise internally through training for existing faculty members rather than hiring new faculty.

One observation that doctoral-granting universities need to notice is the severe imbalance between the number of male and female applicants for IS faculty positions. This imbalance, evident for some time, did not improve by any measure during this study. While women are entering various traditionally male-dominated fields and proved that they are just as capable as their male counterparts, academic departments of IS remain male-dominated. The imbalance may affect IS education long term. For example, the lack of female IS faculty members may affect the enrollment of female students in IS-related fields due to the lack of female mentors and role models.

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[8] While no hard enrollment data was gathered for this study, personal experiences and conversations with colleagues that are collecting enrollment data suggest that enrollments in undergraduate/graduate IS programs declined significantly since 2002.

In the last few years, universities tried hard to recruit new IS faculty. This conclusion is reflected in the earlier and longer recruiting cycles and escalating salary offers shown in this study. Salary compression no doubt motivated faculty to pursue higher salaries by switching institutions. We suggest that in many cases it would be preferable for schools try to develop and retain existing faculty members instead of the expensive, time-consuming, and uncertain process of recruiting new faculty.

The data show that supply for IS faculty lags demand by at least a few years. This chronological imbalance is not surprising if the existence of high demand motivates would-be Ph.D. students to enroll in doctoral programs. Once these candidates enter the market – typically in a batch approximately four years later – supply would then outstrip demand. This delay, in effect, sets up what is known in supply chain analysis as the "bullwhip effect," where supply/demand imbalances tend to be amplified as time goes on. These imbalances tend to worsen as the time between demand and supply lengthens (in this case, a very long four years). If the bullwhip effect is indeed operant in the IS faculty market, then operations research results tell us that three approaches to countering this effect can be considered:

1. reduce the time between demand and supply (in other words, shorten the time it takes to earn a Ph.D. – not feasible),

2. improve the forecasting for demand (in other words, try to improve the guess of those factors that lead to higher faculty demand, e.g., enrollment, new emerging technologies, better economic conditions)– again, not feasible), or

3. smooth the supply with a constant, somewhat lower quantity (in other words, rather than create, curtail, or cease Ph.D. programs, opt instead for an ongoing program of smaller cohorts of Ph.D. students – this solution is perhaps the only feasible option. However, it requires cooperation among institutions to achieve).

V. CONCLUSION

Using a longitudinal approach, this study collected and analyzed placement data at the two major IS conferences in terms of IS faculty positions and applicants between 1992 and 2004. The study provides not only a picture of the supply and demand of IS faculty in this time period but also provides insights to the probable causes that influenced the dynamics of this particular job market. The recommendations in Section IV are based on the findings and should help in planning and recruitment.

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