

Job Satisfaction among University Faculty: Individual, Work, and Institutional Determinants

University professors differ in so many ways from other workers, including other highly educated professional workers, but do they differ in the factors determining their job satisfaction? A valid answer to this question is of more than passing interest. Armed with knowledge of the determinants of university professors' job satisfaction, university administrators can devise more effective strategies for recruitment and retention (Johnsrud & Heck, 1994; Seifert & Umbach, 2008; Smart, 1990; Weiler, 1985). Perhaps even more important, knowledge of faculty job satisfaction may assist public policy-makers charged with formulating national policies for the "pipeline" and the continued health of scientific and education establishments (Boyer, 1990). Furthermore, as industrial research careers become more attractive, knowledge of university professors' job satisfaction determinants can prove valuable in efforts to combat the higher pay incentives generally provided in industry (Zumeta & Raveling, 2001). Related, since the early 1980s, U.S. federal government and state governments have designed public policies

This material is based on work supported by the National Science Foundation: "NSF CAREER: University Determinants of Women's Academic Career Success" (REC-0710836, Monica Gaughan, PI) and "Assessing R and D Projects' Impacts on Scientific and Technical Human Capital Development" (SBR 9818229, Barry Bozeman, PI). The authors gratefully acknowledge the support of the National Science Foundation. Any opinions, findings, conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation. We thank Rebecca Arce, Craig Boardman, Min-wei Lin, and Branco Ponomariov for their work during data collection.

Barry Bozeman is the Crenshaw Professor of Public Policy, School of Public and International Affairs, University of Georgia. Monica Gaughan is an Assistant Professor of Health Policy and Management, College of Public Health, University of Georgia.

The Journal of Higher Education, Vol. 82, No. 2 (March/April 2011)

Copyright © 2011 by The Ohio State University

aimed at promoting collaboration between university faculty and industry. Although these policies seem to have had the direct effect of encouraging such collaboration, they have refashioned universities and have perhaps affected faculty job satisfaction (Ponomariov & Boardman, 2008). If faculty members engaged in industry collaboration are more satisfied, then it augurs well for continued or expanded university-industry collaboration. In short, the degree and predictors of university faculty members' job satisfaction often have import beyond the immediate well being and self-interest of the professoriate.

Our study seeks to understand academic faculty job satisfaction, focusing on three different sets of variables—characteristics of the individual, the work context and institutional interactions. In one sense, each explanation is rooted in the individual, as is appropriate to a study of individual satisfaction. Thus, when we examine characteristics of work, we focus on the composition of work for individuals rather than on, say, work classifications. Likewise when we focus on characteristics of organizations and institutions we are interested in individuals' interactions or affiliations. As is the case with most of the job satisfaction literature, our analysis is based on responses to questionnaires. A special feature of our study is that it is based on a representative national sample of university faculty working in Carnegie Research Extensive universities (Carnegie Foundation, 2000) in all fields of science and engineering (details are provided below as well as in Bozeman & Gaughan, 2007).

Job Satisfaction Theory

In studying job satisfaction, one does not start with a blank slate. One of the most venerable traditions in organization theory research, the study of job satisfaction has by this point resulted in scores of research publications. Job satisfaction research has focused on a wide variety of job types and settings, predominantly business firms, but also hospitals, government agencies, professions, the military and, relevant for present purposes, university faculty (e.g. August & Waltman, 2004; Hagedorn, 1996, 2000; Hearn, 1999; Johnsrud & Rosser, 2002; Lillydahl & Singell, 1993; Olsen, Maple, & Stage 1995; Rosser, 2004). Given the scope of job satisfaction work, we do not provide a general literature review but focus on aspects especially relevant to our analysis. Those interested in analysis of the general literature on job satisfaction may consult any of several excellent overviews and syntheses of the literature (Judge, Thoresen, Bono, & Patton, 2001; Locke, 1976; Petty, McGee, & Cavender, 1984).

The majority of published studies about job satisfaction have used questionnaires and one of just a few standard measures for the depen-

dent variable. Not surprisingly, given this vastness of the literature, one can learn about almost any nuance of job satisfaction. However, despite some notable differences among research themes and findings, it is nonetheless the case that human beings, complex in so many ways, are relatively simple creatures when it comes to their satisfaction with their jobs. Overwhelmingly, studies (for reviews see Mitchell, 1982; A. B. Sousa-Poza & A. A. Sousa-Poza, 2000) report that workers want some degree of work autonomy, recognition from their supervisors and colleagues, time for leisure and family life and they want (what they perceive to be) fair pay (Clark & Oswald, 1996; Kreps, 1997; Rynes, Gerhart, & Minette, 2004). We focus on these issues here as well. One objective our study is to determine the extent to which academic faculty job satisfaction is premised on the same factors as other professional workers and managers. However, we also consider some factors unique to the academic faculty occupational type (e.g. time spent teaching college students) and other factors that, although not unique, are not commonly associated with other professions (e.g. tenure status).

As one might expect, practitioners of different disciplines tend to focus on different aspects and determinants of job satisfaction. Economists (e.g. Freeman, 1978) focus almost exclusively on pay, pay equity, and market-related issues; by contrast psychologists (e.g. Ryan & Deci, 2000) focus on both “intrinsic” (self-motivated) aspects of job satisfaction and “extrinsic” (externally-defined rewards such as pay, promotion, and advancement), and sociologists (e.g. Tuch & Martin, 1991) tend to examine satisfaction differences by race, gender, and position in social structures. In the higher education literature theories and evidence support both intrinsic motivations (Blackburn & Lawrence, 1995) and extrinsic factors related to pay and departmental climate (August & Waltman, 2004; Braxton, Luckey, & Helland, 2006; Fairweather, 2005; Rosser 2004). The distinction between intrinsic and extrinsic is neither simple nor straightforward. For example, if a faculty member who reports that attaining grants affords job satisfaction, is this because there is intrinsic value in the grants “game” (i.e. winning the game), because the grant will permit realization of intrinsically valued research goals, or because receiving a grant is related to the extrinsic motivations such as accolades or pay increases? Or is it some combination of these factors? Similarly, one might assume that pay motivation is extrinsic and straightforward- people want to be paid more. But in fact research shows that the amount of pay often is less important to workers than perceptions in the fairness of pay and the expectation of relationship between pay and performance (Erez & Isen, 2002; Hagedorn, 1996; Kalleberg, 1977; Whitehouse, 2001). No aspect of satisfaction is separable from its

social context and sometimes it is difficult to unravel job satisfaction factors that seem discrete but are actually intertwined

Job satisfaction research is dominated by studies of extrinsic motivators, in large part because these factors are, or appear to be, easier to measure. In at least some cases, job satisfaction theorists focus predominantly on intrinsic motivation and satisfaction. This is especially the case for fields where workers have made career choices that obviously do not maximize their direct economic self-interest. One especially relevant research tradition, found almost exclusively in public administration and political science research, examines “public service motivation” (Perry, 1996, 1997; Perry & Wise, 1990). According to these research findings, one of the most important differences between public and private sector workers is a the willingness of public sector workers to receive less than market pay in exchange for the ability to “make a difference.” Some (McKeachie, 1979) have suggested that college faculty are highly motivated by a professional calling and, for this reason, extrinsic motivators (pensions, pay, benefits, geographic location) are not as important to their job satisfaction as might be the case with other managerial and professional occupations.

With this very general background discussion of job satisfaction theory and research, its key concepts and foci, we turn to our hypotheses. As is evident in the discussion preceding each of the hypotheses, we draw from both the general research literature on job satisfaction as well as the more relevant but less extensive literature on faculty job satisfaction.

Hypotheses

We test the effects of three components on job satisfaction: individual attributes, institutional work context, and characteristics of faculty work. Each component includes separate hypotheses; Figure 1 presents a general schematic of the model.

Race and Gender

Although any of a number of individual attributes might be considered in connection with job satisfaction, we examine the factors that have most often been found in previous job satisfaction studies to account for differences in job satisfaction. These commonly researched variables pertain to gender, race, and family.

Studies of gender have been quite common in job satisfaction research (e.g. Forgieonne & Peeters, 1982; Hulin & Smith, 1964; Mason, 1995; Mottaz, 1986; Peccei & Lee, 2005; A. B. Sousa-Poza & A. A. Sousa-Poza, 2003). The finding that female faculty are less satisfied

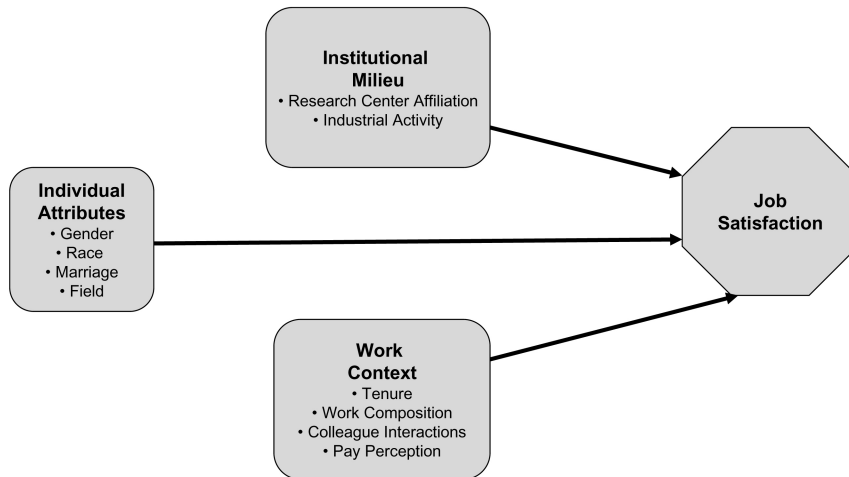


FIG. 1. Model Schematic of Job Satisfaction

with their jobs has been well established (Blackburn & Lawrence, 1995; Hagedorn, 1996; Olsen & Near, 1994; Olsen et al., 1995; Seifert & Umbach 2008). Given previous studies, we expect our study will show lesser satisfaction among female respondents, compared to male respondents. Specifically:

Hypothesis 1: Female faculty members tend to have lower levels of job satisfaction than male faculty.

Although relatively few studies of academic faculty have focused on race, the few studies (Bender & Heywood, 2006) available have found that white faculty members tend to feel more satisfied. Studies of other occupations (Glymour, Saha, & Bigby, 2004; Tuch & Martin, 1991) have similarly shown lesser job satisfaction among people who identify as other than white.

Hypothesis 2: White faculty members tend to have higher levels of job satisfaction than faculty identifying with other racial or ethnic groups.

Tenure

Given that tenure is essentially a condition of continued employment as an academic faculty member, it seems straightforward to suggest tenure as a determinant of job satisfaction. Tenure implies senior status and by definition means job security. In a directly relevant study, Stumpf and Rabinowitz's (1981) analysis of faculty career stages indicates that tenure relates strongly to job satisfaction.

Hypothesis 3: Tenured faculty members tend to have higher job satisfaction than those who are not tenured (but on the tenure track).

Although we do not provide a hypothesis about the relation of academic field to job satisfaction, we do consider field as a control. We know from previous research that engineers and scientists tend to differ in their educational antecedents, work practices, norms and cognitive styles (Shapira & Griffith, 1990). However, there is no strong theory suggesting that field affects job satisfaction and, moreover, the selection effects are likely too complex to accommodate in a study based on questionnaire data. Thus, we limit our analysis to a modest discipline control—whether one is a member of an engineering faculty as opposed to some other STEM field of discipline. (In alternative specifications we provided a more fine-grained analysis with twelve discipline codes. The results differed little from the engineering/all else control. The findings are available from the authors.)

Family Life

The inter-relation of work life and family life is well known and several researchers have examined the impact of family dynamics on job satisfaction, typically viewing the family as a positive buffer to the stress of jobs (Adams, King, & King, 1996; Kossek & Ozeki, 1998). Many studies have examined university faculty family dynamics, but most often in connection with research productivity (Bellas & Toutkoushian, 1999; Fox, 2005; Sax, Hagedorn, Arredondo, & Dicrisi, 2002; Xie & Shauman, 1998). In most instances, marriage is found to be a strong predictor of research productivity, typically with married men fairing somewhat better than married women and with married women fairing somewhat better than the unmarried, either men or women. There are only a few studies examining the effects of family dynamics on university faculty job satisfaction. One of the best known of these is Hagedorn's (2002); she reports that married faculty expressed higher levels of job satisfaction than did their unmarried colleagues. We also expect that marriage will increase the job satisfaction of university faculty, through similar dynamics—spousal encouragement and psychological support, specialization of tasks and division of labor, and reducing feelings of isolation.

Hypothesis 4: Married faculty members tend to have higher job satisfaction than unmarried faculty.

Industrial Activities

As noted in the introduction, policy initiatives of latter half of the twentieth century encouraged the development of organized university

research centers and greater interactions with industry on the part of higher education institutions and their personnel. In this section, we discuss these trends with a particular focus on how they may or may not affect the job satisfaction of professors.

Few if any university-related topics are currently debated with more vigor than the role of university-industry ties and commercialization. From one perspective, the “academic capitalism” argument (Bok, 2003; Slaughter & Leslie, 1997) sees commercial influences as pushing the university off track, away from its traditional teaching and curiosity-driven research missions. But others see university-industry partnerships as having positive impacts on education and, especially, on technology transfer and innovation and the contribution of universities to regional economies (Mowery, 2004). Public policy makers have largely embraced the more positive view and have for several decades developed policies designed to promote universities as “engines of economic growth” (Feller, 1990), particularly in the STEM disciplines we study here. In the higher education literature, Fairweather (1989) takes a more nuanced view, stressing that open communication and decision making can ensure that industry needs are balanced with the other missions of the university, especially those of instruction.

We have elsewhere (Bozeman & Gaughan, 2007; Dietz & Bozeman, 2005) provided evidence related to the economic and managerial controversies surrounding university-industry research and technology interactions, but our focus here is not on policies and institutional impacts, but on faculty satisfaction. The question of university commerce is exceedingly complex; the question of impacts on faculty satisfaction less so. Is there any reason to believe that those faculty who interact directly with industry are any more or less satisfied than those who do not? A related question deserves attention: are those who are affiliated with complex university research centers more or less satisfied? Although these questions certainly are distinct, they are related. Those affiliated with research centers tend to interact often and more intensely with industry (Lee, 1996; Lin & Bozeman, 2006).

With respect to the impacts of industry interaction, it is easy enough to identify factors likely to have positive and negative impacts on faculty satisfaction. On the positive side, industry involvement provides job variety. Typically, as job variety is increased, especially discretionary variety, job satisfaction increases (Griffin, Patterson, & West, 2001). There is no obvious reason why this general finding should not obtain for university faculty. Another likely positive is that industry involvement may increase the immediacy and visibility of impact of research and thereby increase job satisfaction. Most researchers, if they see their research

used at all, tend to see its use at some considerable remove. But those who work with industry have the possibility of seeing their research contribution to technological applications that, in turn, may provide social or economic benefit. There may well be educationally related elements of satisfaction as well. Previous research (Lin & Bozeman, 2006) tells us that faculty members involved with industry often have more success placing their students and this may increase job satisfaction.

On the negative side, work with industry may increase the faculty member's work load and exert cross-cutting pressures and role conflicts. Campbell and Slaughter's (1999) interviews showed significant tension between faculty and university administrators, tensions relating to intellectual property disclosures and commitment to the university. Apart from any conflict of interest pressures, there is some evidence (Gulbrandsen & Smeby, 2005) that faculty research foci sometimes change as a function of increased industry interaction, generally becoming more applied in nature. Naturally this is a problem for job satisfaction only if the researcher views the change as undesirable.

On balance, there seems little compelling evidence as to whether the negative or the positive factors associated with industry interaction play a stronger role in job satisfaction. Thus, we hypothesis no significant effect:

Hypothesis 5: Faculty members who are more involved with industry do not differ in their job satisfaction from those who are not involved with industry.

University Research Center Affiliation

As mentioned, affiliation with university centers relates to commercialization. A great deal of industry interaction is through such centers. But many university research centers, even large complex ones, do not have significant collaborations with industry (Crow & Bozeman, 1998). There are reasons to expect effects of center affiliation on job satisfaction, direct effects that do not relate to commercial involvement. In the first place, those involved with centers often have more access to resources, including not only equipment and technology, but also graduate and postdoctoral research assistance (Lin & Bozeman, 2006). Second, there is the possibility that affiliation with such centers is enriching because it exposes faculty to persons with related interests but from different fields and disciplines. True, not all such centers are diverse and multidisciplinary, but many can be characterized as "multi-function, multi-discipline" (Bozeman & Boardman, 2007). However, the multi-functional aspects of some research centers also provide a possible suppressor of job satisfaction: role conflict. Interview studies of university

research centers have shown role conflict and conflicting incentives and rewards among center affiliates (Bozeman & Boardman, 2007). The fact that tenure and promotion are rarely vested in the research center is one of many tensions.

Since there is as much reason to expect positive as negative impacts on job satisfaction, we provide the null hypothesis for center affiliation and job satisfaction.

Hypothesis 6: Faculty members who are affiliated with university research centers do not differ in their job satisfaction from those who are not involved with industry.

Characteristics of Faculty Work

In addition to structural arrangements like center affiliation and industrial interactions, the perceived content of work occurring in the core missions of the university are important determinants of faculty job satisfaction. The work context model includes elements of work as perceived by the individual as well as work elements that are behavior based (e.g. collaborations).

Almost all faculty members describe their work as involving research, teaching and service and, just as important, most evaluations of faculty work, whether for yearly performance evaluation, contract renewal or tenure and promotion, center on these three categories of activities. In most cases, formal performance-related documents specifically stipulate that review criteria will be based on these three criteria. Despite a common construction of the faculty job as being composed of research, teaching and service, there is evidence that faculty have very different work responsibilities and preferences in connection with the respective activities (Link, Swann, & Bozeman, 2008; Milem, Berger, & Dey, 2000). Although time allocation patterns vary over time and according to setting, many have noted a tendency for research time increasingly to drive out time devoted to teaching and service (Fairweather & Beach, 2002; Milem et al., 2000; Singell, Lillydahl, & Singell, 1996). One reason is the trend in the past two decades for second- and third-tier colleges and universities, ones previously dominated by teaching missions, to emulate higher ranked universities in requiring more research and publication activity of their faculty (Fairweather, 2005; Jacobson, 1992; Milem et al., 2000).

Although there is considerable evidence that there is little or no relationship between quality teaching and quality research (Harry & Goldner, 1972; Hattie & Marsh, 1996), the relationship between time spent on each and job satisfaction is more scarce and equivocal. We assume,

given the increased demands for publication and pressures to find the time to conduct and support research, that job satisfaction will be greater among those teaching less at research universities. It is a stereotype that teaching and service are thankless tasks and that research is rewarded, but sometimes there is some veracity to stereotypical assumptions.

Finally, we expect that those who spend more time writing grant proposals will tend to have lower satisfaction. Prior research shows that time spent writing grants is positively associated with conducting research (Bozeman & Gaughan, 2007), but there is no reason to assume that each contributes positively to job satisfaction. Our reasoning here is based on qualitative data in our database. In response to the question: "What single change, other than increased pay, would increase the quality of your work life," one of the most common responses was "less time devoted to writing grants." Survey respondents were asked to estimate the average number of hours of each activity separately.

Hypothesis 7: Those who spend a greater amount of time on research tend to have higher job satisfaction.

Hypothesis 8: Those who spend more time teaching undergraduate students tend to have lower job satisfaction.

Hypothesis 9: Faculty who report spending more hours writing grant proposals tend to have lower reported job satisfaction.

Collaboration and Collegiality

Much of the general (i.e. non-university based) job satisfaction literature stresses the role of colleagues and especially colleagues' respect not only on job satisfaction but also commitment and performance (Curry, Wakefield, Price, & Mueller, 1986; Donovan, Brown, & Mowen, 2004; Judge, Locke, Durham, & Kluger, 1998; Sparrowe, Liden, Wayne, & Kraimer, 2001; Struthers, Eaton, Ratajczak, & Perunovic, 2004). Few studies of academic faculty examine relationships with colleagues, especially as pertains to job satisfaction (Seifert & Umbach, 2008). One's interactions and views about one's colleagues and the department play an important role in faculty job satisfaction (August & Waltman, 2004; Hagedorn, 2000; Rosser, 2004). Although not directly related to job satisfaction, it is instructive that a study by Gmelch, Wilke, and Lovrich (2005) found that one of the most important factors in their "Faculty Stress Index" is "reward and recognition." These items play a more prominent role than time constraints, student relations or academic department characteristics. This focus on "need for recognition" is quite consonant

with the general management literature, which shows relationships between recognition and not only satisfaction, but also performance.

Another indirectly related study is Barnes, Agago, and Coombs's (1998) study of university faculty job stress and intention to leave academia. The authors found that one of the major factors associated with staying is a "sense of community." Although interactions with colleagues can affect job satisfaction for any type of occupation, our hypotheses relate specifically to academic work. First, university faculty generally have more freedom of choice in work partners and can in most instances choose to work alone if they wish. Following previous related work (Bozeman & Corley, 2004), we expect that those who spend less time working alone (as a percentage of all their work time) and who have a higher number of collaborators will tend to have higher job satisfaction. We also expect that those who feel they have the respect of their faculty colleagues will have higher job satisfaction.

Hypothesis 10: Faculty who feel their colleagues respect them tend to have higher job satisfaction.

Hypothesis 11: Faculty members who have a larger number of research collaborators tend to have higher job satisfaction.

Pay Perceptions

We examine the effects of faculty views as to whether they are paid "what they are worth in the market." Assessments of one's worth in the market may have both an empirical comparison and a broader psychological basis. Issues related to pay and pay perceptions have received a great deal of attention, especially in the management (Tang, Luna-Arocas, Sutarso, & Tang, 2004) and economics (Hamermesh, 2001) literatures. In the face of extensive research few doubt that pay and perceptions of pay equity play an important role in job satisfaction. Beyond this assumption, much is in dispute. Is it the actual amount of pay that is determinative or pay relative to one's colleagues or peers? Or is it the relationship of pay to expected pay or the pay one feels one deserves? Most important for present purposes, even if pay is important, are there other factors such as conditions of work, inherent interest in one's work, or work autonomy, that are even more important than pay? Is pay really just a proxy for the respect of one's colleagues or a proxy for perceived power or efficacy? Or is it really about the money and the tangible commodities and services that it enables us to consume?

Let us consider two of the most important interpretations of the assessment of one's pay as it relates to the market. We can refer to these

assessments as the “literal” interpretation and the “socially determined interpretation.” One can mount evidence for a literal interpretation having some face validity. Academic faculty exchange information, and, at least in some instances, pay rates for new positions are part of job advertisements. Some states publicize the salaries of faculty members working in their state universities. Thus, even if one does not read the readily available statistics from such sources as *The Chronicle of Higher Education*, it is not difficult to determine what others are making. Naturally the judgment about whether one is paid what one is worth in the market is much more complex and entails not only market information but assessing oneself.

The choice of direct measures of pay or perceptual and self-assessments pay measures seems in part a matter of disciplinary preferences. Most of the economics literature embraces the literal approach, focusing on the actual amounts or actual pay inequities rather than some psychologically-mediated aspect of these. Economists, who tend to examine a great many behaviors in terms of pay, have focused only limitedly on job satisfaction, presumably because it is a psychological construct of the sort not often favored by economists. In perhaps the best-known study of the economics of job satisfaction, Freeman (1978) begins by noting that few economists have studied job satisfaction because of a “professional suspicion of what may be called subjective variables” (p. 135), but then goes on to say job satisfaction affects economic life and, thus, warrants scrutiny. With few exceptions, economists who have investigated the relationship between pay and job satisfaction have found strong effects (see Hamermesh, 1977; Lydon & Chevalier, 2001; Watson, Storey, Wynaeczyk, Keasey, & Short, 1996). This is not to say that the relationships are necessarily straightforward. For example, Lydon and Chevalier (2002) found that wages affect job satisfaction but when controlling for endogeneity effects the magnitude of the relationship doubles. Moreover, wage expectations sometimes provide a better explanation of job satisfaction than do actual wages. This finding is line with long-standing research in the expectancy theory tradition (Erez & Isen, 2002; Ilgen, Nebeker, & Pritchard, 1981; Mitchell, 1974, 1982; Vroom, 1964).

Watson and colleagues (1996) provide another economic study of job satisfaction that seems to resemble industrial psychology work and theory, in this case equity theory (Carrell & Dittrich, 1978; Huseman, Hatfield, & Miles, 1987; Tremblay, Sire, & Balkin, 2000). Watson and colleagues found that job satisfaction relates to wage inequities, but only for those who expect to change jobs. For those planning to stay in their current job, such inequities have no effect on job satisfaction. Finally, Mottaz (1985) suggests that extrinsic rewards, including pay, are only

important in low-status occupations; well-educated people working in relatively high-status jobs are much more oriented to intrinsic rewards.

Outside of economics, the preponderance of motivation and job satisfaction literature emphasizes that perceptions of pay equity and the expectation that good performance will be rewarded generally are more important to job satisfaction than is the absolute amount one is paid. A few studies of the relationship of pay to job satisfaction have focused in whole or part on university faculty. Tang and Talpade (1999) focused on differences between men and women with respect to their satisfaction with pay. Examining 110 faculty and staff in a single university, these researchers found no significant difference between faculty and staff in pay satisfaction but did find differences between men and women faculty. Men were more likely to be satisfied with their pay and females more satisfied with their co-workers. In a related study, Tang and colleagues (2004) examined the impact of money on the income-pay satisfaction relationship and found that income increases lead to a greater professed value for money, especially after certain pay thresholds have been met. This finding reinforces the earlier work of Groot and Brink (1999) who found that satisfaction with earnings is better predicted by relative wages than absolute wages. Among faculty, Hagedorn (2004) found that the magnitude of wage differentials predicted the greater job dissatisfaction of women faculty.

Perhaps the best evidence for expecting that pay would be no less important to academic faculty job satisfaction than to other highly educated groups is Bender and Heywood's study (2006) comparing job satisfaction among university faculty, nonacademic researchers and managers. This is an especially interesting study not only because of its relevance to the current study but also due to findings (Clark & Oswald, 1996; Hamermesh, 2001) that the more highly educated often are more dissatisfied with their jobs, thus confounding any comparison of university professors with general occupational categories. The Bender and Heywood study showed that for both males and females, in both private business and in universities, the relationship of pay to job satisfaction was statistically significant.

In our study, respondents were not asked to indicate their pay due to the researchers' desire to enhance response to the questionnaire. However, we do have data concerning respondents' views about their pay, specifically whether they feel they are paid what they are "worth in the marketplace." Given findings in the expectancy and equity theory traditions we feel that the *perceptions* about pay may prove as important as actual pay. Moreover, if this presumption is incorrect then the hypothesis will not be supported.

Hypothesis 12: Faculty who agree that they are paid “what they are worth” in the market place tend to have higher levels of job satisfaction than those who do not.

Methods: The Research Value Mapping National Study of U.S. Academic Faculty

Our data are from the Survey of Academic Researchers conducted in 2004–5. The purpose of the survey was to study a variety of aspects of faculty work and attitudes in universities, focusing in particular on industrial activities and research center affiliations. Our target population was tenured and tenure track faculty members in Carnegie (2000) research extensive universities. Sampling frames were constructed from university catalogs in the following National Science Foundation STEM disciplines: biology, computer science, mathematics, chemistry, physics, earth and atmospheric sciences, agriculture, and sociology. In addition, samples were drawn from five sub-disciplines of engineering: chemical, civil, electrical, materials, and mechanical.

Women were over-sampled to yield large enough samples to evaluate gender differences. This was done in order to make sure that sufficient women appeared in the sample and, specifically, to ensure that women from every discipline would be represented, even those (e.g. computer science, electrical engineering) where women are found in quite small numbers. Furthermore, stratification by sex replicates the tenure and rank distribution of fields, as women are likely to be at earlier career ages. The result of this stratification, of course, is that variables strongly correlated with sex may lead to spurious inference about co-varying variables. In the case of univariate and bivariate statistics, it is necessary to weight to generate correct parameter estimates (Winship & Radbill, 1994). With respect to multivariate analysis, however, there is an ongoing methodological debate as to whether potential bias resulting from over-sampling should be handled through model specification or by using a design-based approach with weighting (Groves, 2004; Winship & Radbill, 1994). In this analysis, we employ both approaches: Following Winship and Radbill we control for gender in the model specification, and all models are adjusted using sampling and non-response weights in STATA.

The survey was sent to 4,916 targets, yielding 1,794 respondents after three waves of administration. Adjusting for deceased and retired targets, the effective response rate is 37%. We did not identify significant differences in response rates by discipline or rank. Women were

slightly more likely to respond to the survey. This particular analysis includes 1,754 respondents with valid responses on faculty job satisfaction; missing data appear to be at random in sensitivity analyses.

Job Satisfaction

Job satisfaction is viewed as a multidimensional concept (Brief & Weiss, 2002; Locke, 1969), which implies the need for multiple indicators. In our study, it would have been desirable to have employed one of the several "standard" multivariate job satisfactions scales (Ironson, Smith, Brannick, Gibson, & Paul, 1989), among which the scales from the Job Description Index (JDI) are now perhaps the most commonly used (Smith, Kendall, & Hulin, 1969). In one study comparing multidimensional measurement of job satisfaction and single item measures, Oshagbemi (1999) found that a single item measure overestimated the percentage of persons satisfied with their jobs and underestimated those dissatisfied and indifferent.

The data we employ here were gathered for a wide variety of purposes and assessing job satisfaction was not among the leading objectives of the survey. Thus, we are led to the question of how useful is research based on the single measure of job satisfaction we have? Scarpello and Campbell (1983) note that a single item global measure of job satisfaction may be more inclusive and more stable than the aggregation of responses to multiple items. Wanous and colleagues (1997) conduct a meta analysis of 17 studies using single item global job satisfaction measures, finding that single-item measures are reliable, correlating 0.63 to 0.72 with other measures of job satisfaction. In a study that correlated a single item measure to each of five facets of the JDI, Nagy (2002) found correlations between the single items and the JDI facets ranging from 0.60 to 0.72. Although we do not in any sense claim that a global single item measure of job satisfaction is to be preferred over a multidimensional approach, we do suggest that there is sufficient evidence to warrant the use of a global single item measure and to expect that results will have reliability and validity.

Results

Our results are provided in two sections. In the first section below we provide descriptive findings and comparative findings, giving the job satisfaction levels for our respondents, according to demographic groups, as well as providing some comparative analysis. In the second section we present our multiple regression results.

TABLE 1
Weighted Descriptive And Bivariate Analyses Of Job Satisfaction

Sample Size	AI ^a 1754	No Tenure	Tenured	White	Other Race	Men	Women	Engineer	Social & Natural
Satisfaction With Job	3.2 (0.03)	3.09 (0.05)	3.24 (0.03)	3.21 (0.03)	3.19 (0.06)	3.22 (0.03)	3.07 (0.04)	3.13 (0.05)	3.24 (0.03)
Individual Attributes									
Male	0.88 (0.01)	0.81 (0.02)	0.9 (0.01)	0.87 (0.01)	0.93 (0.01)	—	—	0.94 (0.004)	0.85 (0.01)
White	0.79 (0.01)	0.7 (0.03)	0.82 (0.02)	—	—	0.78 (0.02)	0.88 (0.01)	0.7 (0.03)	0.83 (0.02)
Tenured	0.77 (0.01)	—	—	0.79 (0.02)	0.66 (0.04)	0.79 (0.02)	0.63 (0.02)	0.73 (0.03)	0.78 (0.02)
Engineer	0.31 (0.02)	0.35 (0.03)	0.3 (0.02)	0.28 (0.02)	0.44 (0.04)	0.33 (0.02)	0.17 (0.01)	—	—
Family Dynamics									
Married/Partner	0.89 (0.01)	0.85 (0.02)	0.9 (0.01)	0.9 (0.01)	0.89 (0.03)	0.9 (0.01)	0.81 (0.02)	0.9 (0.02)	0.89 (0.01)
Institutional Milieu									
Center	0.34 (0.02)	0.38 (0.03)	0.33 (0.02)	0.35 (0.02)	0.3 (0.04)	0.33 (0.02)	0.39 (0.02)	0.39 (0.03)	0.32 (0.02)
Industrial Activity	0.95 (0.05)	0.73 (0.08)	1.01 (0.06)	0.98 (0.06)	0.82 (0.09)	1.00 (0.05)	0.56 (0.04)	1.77 (0.10)	0.58 (0.05)

TABLE 1 (continued)

Sample Size	All ^a 1754	No Tenure	Tenured	White	Other Race	Men	Women	Engineer	Social & Natural
Job Composition									
Hours On Research	18.65 (0.38)	21.25 (0.84)	17.85 (0.42)	18.58 (0.42)	18.89 (0.91)	18.85 (0.43)	17.18 (0.46)	17.51 (0.55)	19.16 (0.50)
Hours On Teaching Ug	9.76 (0.28)	9.97 (0.54)	9.69 (0.33)	9.89 (0.32)	9.26 (0.56)	9.6 (0.31)	10.9 (0.39)	9.96 (0.45)	9.67 (0.35)
Hours On Grant Writing	4.28 (0.15)	5.47 (0.33)	3.92 (0.17)	4.17 (0.17)	4.71 (0.35)	4.19 (0.17)	4.95 (0.25)	5.11 (0.26)	3.91 (0.19)
Colleague Interactions									
% Time Working Alone	24.02 (0.96)	27.49 (1.93)	22.96 (1.11)	22.95 (1.06)	28.04 (2.22)	24.15 (1.08)	23.13 (1.35)	20.42 (1.43)	25.63 (1.23)
Colleagues Respect	2.89 (0.03)	2.91 (0.05)	2.89 (0.03)	2.9 (0.03)	2.88 (0.06)	2.9 (0.03)	2.86 (0.04)	2.84 (0.05)	2.92 (0.03)
Collaborations	10.72 (0.58)	10.12 (0.83)	10.9 (0.71)	10.85 (0.66)	10.26 (1.18)	10.82 (0.66)	9.96 (0.37)	11.3 (0.44)	10.46 (0.82)
Extrinsic: Pay									
Paid What I Am Worth	2.54 (0.03)	2.57 (0.06)	2.53 (0.04)	2.59 (0.04)	2.36 (0.07)	2.54 (0.04)	2.54 (0.04)	2.56 (0.05)	2.53 (0.04)

Note: ^astandard errors shown in parentheses. All time variables based on self report of weekly time expenditures. Bivariate tests of differences, independent two-tailed *t*-tests. **p* < 0.05; ***p* < 0.01; ****p* < 0.001.

Univariate and Bivariate Sample Characteristics

Because of the over-sampling of women, all analyses are weighted by sampling probability, with adjustments for nonresponse bias. More than three-quarters of the faculty members are tenured, but men and Whites are more likely to be tenured, consistent with national trends. Four-fifths of the scientists are White, and they are more likely to be tenured. Twenty-two percent of men in the sample do not self-identify as White, compared to 12% of women.

Our respondents are generally quite satisfied with their jobs, averaging 3.2 on a 4-point Likert scale. Consistent with other research on this population, the tenured are more likely to be satisfied and men report being more satisfied. More so than the general population, professors tend to be in marriages or domestic partnerships; we find no differences in satisfaction by race or by discipline group. Not surprisingly, the (older) tenured faculty members are more likely to be living with a spouse or partner. Women are significantly less likely to live with a spouse or partner (81%) compared to their male colleagues (90%). These characteristics are highly inter-correlated, emphasizing the importance of controlling for these types of compositional differences in all models.

The actual work activity and attitudes of faculty are likely to be more important to explaining work satisfaction than issues related to family composition. Faculty work in complex institutional arrangements may include affiliations with multidisciplinary research centers or involvement with industry. One-third of faculty members are affiliated with multidisciplinary research centers in addition to their primary departmental affiliations. Women and engineers are more likely to be affiliated with such centers. Faculty members tend to have relatively low levels of industrial activity overall, but with significant differences: tenured, white, males and engineers tend to be associated with significantly higher levels of industrial activity.

Overall, faculty members spend the majority of their time on research (18.65 hours per week), followed by undergraduate teaching (9.76 hours), and then grant writing (4.28 hours). This distribution varies by control characteristics, however: untenured faculty members spend significantly more time on research and grant writing. Men spend an hour and a half more per week on research than do women; by contrast, women spend almost an hour and a half more on undergraduate teaching than men. Those devoting more time to grant writing include the untenured, women, and engineers.

Faculty work at research universities also relies in important ways on interactions with colleagues. As with other characteristics, we note differences among groups in these types of interactions. Overall, faculty members spend one-quarter of their research time working alone, and in their

collaborative time have an average of almost 11 collaborators. Untenured faculty members spend more than 27% percent of their research time working alone, in contrast with 23% percent by tenured faculty. Whites spend significantly less time working alone than those in other racial and ethnic groups (23% vs. 28%). Finally, engineers spend significantly less time working alone (20.42%) compared to the social and natural scientists (25.63%). Faculty report a lukewarm sense that colleagues in their own department appreciate their research contributions. The overall average of 2.89 falls between somewhat agree and disagree; this sense of collegial appreciation does not differ by the demographic variables. Overall, faculty members were least likely to agree that they were “paid about what I am worth in the academic market,” with an average score of 2.54 on a 4-point scale. Whites agree with this statement significantly more than members of other racial groups. To the extent that these types of work activities may be related to job satisfaction, it is therefore important to control for the demographic and structural differences among the faculty.

Multivariate Statistical Models

In connection with the current data, we assessed the two preferred approaches to analysis of ordinal scale dependent variables assessing job satisfaction. One approach is to employ a technique using a multinomial distribution, typically multinomial logistic regression. Although the model has specification advantages with respect to ordinal dependent variables, it often presents problems of interpretation, including the magnitudes of the parameters. These limitations generally result in an interpretation focused on direction of effects and statistical significance (Long, 1987). Even with various innovations (e.g. maximum likelihood and pseudo r-squares) the interpretations remain based on assumptions that are not particularly robust.

Another approach, a much simpler one that provides advantages of interpretation, is to use multiple regression. The chief disadvantage is that the use of multiple regression for ordinal data violates a major assumption of technique—the requirement that metric distance between points is meaningful in its measurement. In this research, we follow an established approach to conducting regression analysis by converting the dependent variable of job satisfaction to z-scores, and then using ordinary least squares regression analysis to specify the models (Freeman, 1978; Fuller, 1980; Aiken & West, 1991). According to Freeman (1978, p. 135) a rescaling of ordinal data and its conversion into z-scores (observation-mean, divided by the standard deviation) provides a variable in which the interval among responses are meaningful and, thus, suitable as dependent variables in multiple regression. We begin by specifying the

baseline model, which includes only the tenure, race, gender, and discipline controls. We then specify alternative models for explaining job satisfaction: industrial interaction, family dynamics, job composition, colleague interactions, and extrinsic pay satisfaction. In the final model, we present trimmed models that include significant effects from the alternative models.

Table 2 presents the results of the OLS regression. In model one, the baseline model, men and the tenured tend to be more satisfied with their jobs. It should be noted that only 1% of the variance is explained, however, suggesting that demographic variables alone are weak predictors of job satisfaction. Race is not a predictor variable, suggesting that it is fully mediated by other characteristics of the professor. By contrast, men are consistently more satisfied in all models, a finding to which we will return after the presentation of the alternative models. The effect of being an engineer (compared to other disciplines) varies by the model, which will be discussed subsequently; in the baseline model, we find no difference between engineers and other kinds of scientists. In an alternative specification of the model, not presented here but available from the authors, we examined effects of all the disciplines included in the database, and found no significant, independent effects of discipline on job satisfaction.

Model 2 evaluates the effect of family dynamics. As in the general population, the married/partnered are significantly more satisfied than those without partners. In an alternative model specification (not shown), we tested an interaction term of gender and marriage to see if marriage was differentially advantageous to men. The effect was insignificant: marriage/partnership has similar positive effects on job satisfaction for both men and women. This model explains only 2% of the variance.

Model 3 controls for the institutional milieu in which the professor works. We control for affiliation with a multidisciplinary center (bearing in mind that such people must also have a departmental affiliation), and for the degree of industrial involvement in which the researcher engaged in the last year. Center affiliation significantly improves job satisfaction, but engagement with industry does not. In this model, and in a subsequent model in which satisfaction with pay is accounted for, engineers are less satisfied than other scientists. As with the baseline model, this is a fairly poorly performing model, explaining only 3% of the variance.

In the next models, we evaluate explanations that are more closely tied to the work of professors in research universities. In Model 4, we look at how the hours that faculty spend doing various parts of their work affect their job satisfaction. Apart from the gender and tenure char-

TABLE 2
Regression^a Job Satisfaction^b On Alternative Explanations

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Individual Attributes							
Male	0.14 **	0.12 *	0.15**	0.13 **	0.12 **	0.13 **	0.11 **
White	-0.01	-0.01	-0.03	-0.0003	-0.02	-0.1	
Tenured	0.14 *	0.13 *	0.14*	0.14 *	0.14 *	0.16 **	0.14 **
Engineer	-0.11	-0.11	-0.14*	-0.11	-0.07	-0.14 *	-0.08
Family Dynamics							
Married/Partner		0.2 *					0.09
Institutional Milieu							
Center affiliation			0.18***				0.01
Industrial activity			0.01				
Job Composition							
Hours on research ^c				0.001			
Hours teaching UG				-0.01 ***			-0.002
Hours on proposals				0.002			
Colleague Interactions							
% Time working alone					-0.0004		
Colleagues respect					0.46 ***		
Collaborations					0.004*	0.004	0.37 ***
Extrinsic: Pay							
Paid what I am worth		2.86 ***	2.96***	3.1 ***	1.66 ***	0.36 ***	0.25 ***
Intercept	3.02 ***	0.02	0.03	0.03	0.25	2.17 ***	1.22 ***
R²	0.01					0.18	0.32

^aNote. ^aRegression is weighted to adjust for over-sampling and non-response bias. ^bAs discussed in measurement section, the dependent variable is the Z-score of Job Satisfaction. ^cAll time variables based on self report of weekly time expenditures. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

acteristics already noted, spending more hours each week teaching undergraduates tends to reduce job satisfaction. The hours spent on research and on writing grants do not have an effect on job satisfaction. Overall, this is a poor model explaining only 3% of the variance. In Model 5, we turn to a consideration of collegial relations. Believing that one's departmental colleagues appreciate one's research contributions is the most important predictor of all variables tested. Furthermore, more collaborators tend to be associated with improved job satisfaction. Of the alternative models, this is the best-performing model, explaining 25% of the variance in job satisfaction. Finally, in model six we evaluate the effect of perceiving that one is paid what one is worth in the academic market on job satisfaction. This variable is highly predictive, explaining 18% of the variance.

In the final model, we present a comprehensive model trimmed to include only the significant effects from the alternative model specifications. We find that men and the tenured have significantly higher job satisfaction than women and the untenured. In a specification test (not shown), we tested an interaction effect between gender and tenure; the interaction term is not significant, indicating that gender and tenure constitute independent, direct effects. Work related variables are strong predictors, with the respect of department colleagues and being paid what one is worth being particularly important. These are largely effects that are independent of one another, as the coefficient of each predictor is only partially mediated by the other in the final model. In contrast to the results from alternative models, we find in the trimmed model that center affiliation, marriage, hours teaching undergraduates, and being an engineer do not contribute to the explanation of job satisfaction. The final model explains 32% of the variance in job satisfaction.

Discussion and Limitations

We find that determinants of faculty job satisfaction fall into three major categories in the full model: demographic characteristics, colleague interactions, and extrinsic pay motivation. We begin our discussion by noting that our sample is limited to tenured and tenure-track faculty working in the STEM departments of research universities. We feel confident that our findings generalize to this population, and have no a priori reason to assume that they may not generalize to faculty working in other disciplines or types of universities. Nevertheless, the generalizability of our findings to professors in the humanities and social sciences, or to professors in less research intensive environments is an empirical question we cannot answer with our sample. We now turn to a

discussion of findings, both supported and not. We summarize the direction of those original hypotheses in Table 3.

One of the limitations of much (but by no means all) of the research on job satisfaction is its failure to account for the unique characteristics that make up the job of professor. We believe a strength of this study is its ability to operationalize and test hypotheses directly related to the production function of professors. We did not find support for the hypothesis that research time increases job satisfaction, or that writing grant proposals and teaching undergraduates reduces job satisfaction. We suggest that these findings are in part a function of the selected sample we use. In general, all of the professors in this sample are expected to expend high levels of energy on research and grant writing, and they do. To the extent that expectations affect job satisfaction, one can reasonably assume that professors in these settings expect to spend a great deal of time on these activities. The case may well be different for professors working in colleges and universities that are strongly teaching oriented but that have lesser research expectations.

We do not find that having a current marital or cohabitating partner improves job satisfaction. However, *collegial* social interaction tells us

TABLE 3
Summary of Hypotheses and Results

	Effect on Job Satisfaction	
	Hypothesized	Observed
Individual Attributes		
Male	+	Support
White	+	
Engineer	-	Partial
Ever tenured	+	Support
Family Dynamics		
Married/Partner	+	
Institutional Milieu		
Center affiliation	Null	Support
Industrial activity	Null	Support
Characteristics of Faculty Work		
Job Composition		
Hours on research	+	
Hours on teaching UG	-	
Hours on grant proposals	-	
Colleague Interactions		
% Time working alone	-	
Colleagues respect	+	Support
Collaborations	+	
Extrinsic: Pay		
Paid what I am worth	+	Support

much about job satisfaction. Satisfaction is very much dependent on one's views about colleagues' perception of oneself and one's work. The job of being a professor is considered to involve a great deal of autonomy over work activities. Such activity should not be confused with isolation, however. Rather, the job of being a professor involves a complex array of social relationships, which are organized at many levels of the organization. For example, being awarded tenure is an explicit recognition of belonging by proximate and distal university colleagues. It also helps that tenure confers a degree of job security not enjoyed by the tenure-free. Therefore, the supported hypothesis of positive effects of tenure is consistently found in the explanatory models we test. We found that the strongest predictor of job satisfaction is for the respondent's research to be recognized by departmental colleagues. It would have been interesting to include measures of the respondent's perception of research recognition from the university, nationally or internationally. As currently specified, we are unable to disentangle whether colleague's esteem serves as a proxy for general recognition of the professor's research accomplishments, or whether it is a measure of departmental climate. It is also important to note that respondents likely vary in their ability to make valid judgments about their colleagues' views.

We include consideration of pay perceptions, specifically whether one feels he or she is paid market value. The perception of being paid what one is worth predicts job satisfaction. An obvious limitation of this measure is that we do not know our respondent's actual wages. Nevertheless, as with other human endeavors, it is the perception of fairness (and perhaps not actual fairness) that appears to be driving job satisfaction. Motivation models tend to focus on expectations as much as tangible outcomes (e.g. Erez & Isen, 2002). We certainly do not wish to suggest, however, that matters of actual pay and actual fairness are unimportant. Perhaps future research will examine closely the relationship of pay perception and actual pay for faculty members. An additional limitation is that the measure of feeling one is paid what one is worth may be a part of the overall construct of job satisfaction; hence, this finding is correlational, and the ability to make strict causal inferences is limited.

Finally, let us turn to the support for the hypothesis that faculty men are more satisfied with their jobs than faculty women. Before speculating about this finding, allow us to qualify it. In a robust and conservative test of the full model, it is the weakest of the significant effects, explaining the smallest percentage of the variance (1%). Thus, when we consider other demographic attributes, the gender effect on job satisfaction is small. That is unlikely to satisfy fully; however, it remains statistically significant. The current work on women in science is quite active (for a

review see Xie & Shauman, 2003). From it, the institutional structure and climate explanations are the ones we think would be most likely to “explain away” the gender effect. We have already acknowledged that a weakness of this paper is its inattention to inter-university differences; we have assumed that each of the 150 universities in which these professors work has a fixed effect. Structural explanations of gender inequality in universities posit that characteristics of university practices and policies create different working conditions for men and women. We do not have measures of such policies and practices, however, so we are unable to evaluate this potential explanation for the gender difference. Climate-based explanations tend to be more cultural, theorizing that macro or micro climates can be more or less “chilly” (Sandler, 1996). As with the structural explanation, the “chilly climate” hypothesis would require data at the departmental or university levels to test, which we do not have.

We conclude this section by noting our inability to include some measures of faculty job satisfaction that have been demonstrated to be predictive (August & Waltman, 2004). Specifically, we have no measures (or reasonable proxies) of chairperson relationships or mentoring, and we have already noted the absence of measures relating to departmental climate. We also do not have the ability to look at change factors, such as change in rank or change in institution, which are predictive (Hagedorn, 2000). Despite these limitations, we have been able to test a number of hypotheses related to the conceptual framework of faculty job satisfaction proposed by Hagedorn (2000).

Conclusion

We began this study asking whether university faculty members’ job satisfaction is determined by the same factors as determine other workers’ job satisfaction or whether there are peculiar aspects of the academic faculty job determining job satisfaction. In some ways faculty job satisfaction resembles other workers. Faculty members, like other types of workers, tend to be satisfied if they feel their pay reflects their market value and if they have the respect of their co-workers. This is not a new finding and the results are not much different from those for assembly line workers (e.g. Roethlisberger & Dickson, 1939). At the same time, university faculty satisfaction is in some ways distinctive. The career benchmark of tenure plays a pivotal role. Although there is something akin to tenure in a few jobs (e.g. certain government and public service jobs), there is really nothing quite like the tenure system found in U.S. universities. Those seeking tenure face distinctive requirements and challenges.

As we noted in the introduction to this paper, issues of faculty job satisfaction may have bearing on both university management and public policy. Most managers and scholars feel that it is important to align incentives and job requirements to promote performance. Our study suggests that if the “production function” is research publications and grants, the incentives are already in alignment. Another managerially-relevant finding is that women are less satisfied than men. We are certainly not the first to find this, but our final model introduces a number of factors that one might expect to mitigate the relationship between sex and satisfaction, factors such as field, age, and composition of work. But the finding remains. It is not a marked difference, but still notable. From a managerial perspective, university administrators are well advised to attend to the “satisfaction gap” between men and women. This is especially the case inasmuch as women voluntarily leave the professoriate at higher numbers and enter in lower numbers.

Although the perceptual factors about pay (feeling that one is paid what one is worth) and colleagues’ respect may seem at first blush to have limited managerial implications, we suggest that a deeper look, especially one drawing from years of accumulated experience in human relations research (see Guzzo & Dickson, 1996) and human resources management, suggests that perceptions are very much within the purview of administrators. Providing a work environment conducive to mutual respect gives positive outcomes in virtually any organization and administrators contribute greatly to setting a cordial and respectful work environment (see for example Ruppel & Harrington, 2000).

Perhaps the primary public policy-relevant finding pertains to industrial involvement. Despite unending controversy about the impacts of industry-university collaboration, there is apparently very little impact on the job satisfaction of university faculty members, at least within this sample of STEM faculty working at research-intensive universities. Our initial models indicated that center affiliation enhances job satisfaction but in the final model these effects disappear. Although our data do not set to rest the hue and cry about the impacts of “academic capitalism” or “the entrepreneurial university,” it is certainly the case that this study brings relevant data to bear and finds that working with industry seems to have little or no impact on job satisfaction. We leave to others to sort out impacts on the educational mission, basic research, academic freedom, innovation, and social relevance.

As with most studies, our research leads us not only to inferences but also to further questions. First, we feel that studies of university faculty and of other workers’ job satisfaction must attend more carefully to the inter-relationship between global life satisfaction measures and job sat-

isfaction. Second, we would like to see a study that carefully examines the relationships among actual pay, satisfaction with pay, pay equity, and colleagues' esteem. The psychological value and the material value of pay are both well known, but the relations among them are always difficult to sort out and may be especially complex in the case of university faculty.

References

- Adams, G. A., King, L., & King, D. (1996). Relationships of job and family involvement, family social support, and work-family conflict with job and life satisfaction. *Journal of Applied Psychology, 81*, 411–420.
- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- August, L., & Waltman, J. (2004). Culture, climate, and contribution career satisfaction among female faculty. *Research in Higher Education, 45*, 177–192.
- Barnes, L. L., Agago, M., & Coombs, W. (1998). Effects of job-related stress on faculty intention to leave academia. *Research in Higher Education, 39*, 457–470.
- Bellas, M. L., & Toutkoushian, R. K. (1999). Faculty time allocations and research productivity: Gender, race, and family effects. *Review of Higher Education, 22*, 367–390.
- Bender, K. A., & Heywood, J. (2006). Job satisfaction of the highly educated: The role of gender, academic tenure and earnings. *Scottish Journal of Political Economy, 53*, 253–279.
- Blackburn, R. T., & Lawrence, J. H. (1995). *Faculty at work: Motivation, expectation, satisfaction*. Baltimore: Johns Hopkins University Press.
- Bok, D. (2003) *Universities in the marketplace*. Cambridge, MA: Harvard University Press.
- Boyer, E. L. (1990). *Scholarship reconsidered: Priorities of the professoriate*. Princeton, NJ: Carnegie Foundation for the Advancement of Teaching.
- Bozeman, B., & Boardman, C. (2007). Role strain in university research centers. *The Journal of Higher Education, 78*, 430–463.
- Bozeman, B., & Corley, E. A. (2004). Scientists' collaboration strategies: Implications for scientific and technical human capital. *Research Policy, 33*, 599–616.
- Bozeman, B., & Gaughan, M. (2007). Impacts of grants and contracts on academic researchers' interactions with industry. *Research Policy, 36*, 694–707.
- Braxton, J. M., Luckey, W. T., & Helland, P. A. (2006). Ideal and actual value patterns toward domains of scholarship in three types of colleges and universities. *New Directions for Institutional Research, 2006(129)*, 67–76.
- Brief, A., & Weiss, H. (2002). Organization behavior: Affect in the workplace. *Annual Review Psychology, 53*, 279–307.
- Campbell, T., & Slaughter, S. (1999). Faculty and administrators' attitudes toward potential conflicts of interest, commitment, and equity in university-industry relationships. *The Journal of Higher Education, 70*, 309–352.

- Carnegie Foundation. (2000). Classification of higher education. Retrieved on March 22, 2005, from <http://www.carnegiefoundation.org/Classification/index.htm>
- Carrell, M. R., & Dittrich, J. E. (1978). Equity theory: Methodological considerations, and new directions. *Academy of Management Review*, 3, 202–210.
- Clark, A. E., & Oswald, A. J., (1996). Satisfaction and comparison income. *Journal of Public Economics*, 61, 359–381.
- Crow, M. M., & Bozeman, B. (1998). *Limited by design: R&D laboratories in the U.S. national innovation system*. New York: Columbia University Press.
- Curry, J. P., Wakefield, D. S., Price, J. L., & Mueller, C. W. (1986). On the causal ordering of job satisfaction and organizational commitment. *Academy of Management Journal*, 29, 847–858.
- Donavan, D. T., Brown, T. J., & Mowen, J. C. (2004). Internal benefits of service-worker customer orientation: Job satisfaction, commitment, and organizational citizenship behaviors. *Journal of Marketing*, 68, 128–146.
- Erez, A., & Isen, A. M. (2002). The influence of positive affect on the components of expectancy motivation. *Journal of Applied Psychology*, 87, 1055–1067.
- Fairweather, J. S. (1989). Academic research and instruction: The industrial connection. *The Journal of Higher Education*, 60, 388–407.
- Fairweather, J. S. (2002). The mythologies of faculty productivity: Implications for institutional policy and decision making. *The Journal of Higher Education*, 73, 26–48.
- Fairweather, J. S. (2005). Beyond the rhetoric: Trends in the relative value of teaching and research in faculty salaries. *The Journal of Higher Education*, 76, 401–422.
- Fairweather, J., & Beach, A. L. (2002). Variations in faculty work at research universities: Implications for state and institutional policy. *Review of Higher Education*, 26, 97–115.
- Feller, I. (1990). Universities as engines of R&D-based economic growth. *Research Policy*, 19, 335–348.
- Forgionne, G. A., & Peeters, V. E. (1982). Differences in job motivation and satisfaction among female and male managers. *Human Relations*, 35, 101–18.
- Fox, M. F. (2005). Gender, family characteristics, and publication productivity among scientists. *Social Studies of Science*, 35, 131–150.
- Freeman, R. B. (1978). Job satisfaction as an economic variable. *The American Economic Review*, 68, 135–141.
- Fuller, W. A. (1980). Properties of some estimators for the errors-in-variables model. *The Annals of Statistics*, 8, 407–422.
- Glymour, M., Saha, M., & Bigby, J. (2004). Physician race and ethnicity, professional satisfaction, and work-related stress: Results from the physician worklife study. *Journal of the National Medical Association*, 96, 1283–1294.
- Gmelch, W., Wilke, P., & Lovrich, N. (2005). Dimensions of stress among university faculty: Factor analytic results from a national study. *Research in Higher Education*, 24, 266–286.
- Groot, W., & Brink, H. (1999). Overpayment and earnings satisfaction: An application of an ordered response Tobit model. *Applied Economics Letters*, 6, 235–238.

- Gulbrandsen, M., & Smeby, J. (2005). Industry funding and university professors' research performance. *Research Policy*, *34*, 932–950.
- Guzzo, R., & Dickson, M. W. (1996). Teams in organizations: Recent research on performance and effectiveness. *Annual Review of Psychology*, *47*, 307–338.
- Griffin, M. A., Patterson, M. G., & West, M. A. (2001). Job satisfaction and teamwork. *Journal of Organization Behavior*, *22*, 537–550.
- Groves, R. M. (2004). *Survey errors and survey costs*. New York: John Wiley & Sons.
- Hagedorn, L. S. (1996). Wage equity and female faculty job satisfaction: The role of wage differentials in a job satisfaction causal model. *Research in Higher Education*, *37*, 569–598.
- Hagedorn, L. S. (2000). Conceptualizing faculty job satisfaction: Components, theories, and outcomes. *New Directions for Institutional Research*, *2000*(105), 5–20.
- Hamermesh, D. A. (1977). Economic aspects of job satisfaction. In O. C. Ashenfelter & W. E. Oates (Eds.), *Essays in labor market analysis*. New York: John Wiley.
- Hamermesh, D. A. (2001). The changing distribution of job satisfaction. *Journal of Human Resources*, *36*, 1–30.
- Harry, J., & Goldner, N. S. (1972). The null relationship between teaching and research. *Sociology of Education*, *45*, 47–60.
- Hattie, J., & Marsh, H. W. (1996). The relationship between research and teaching: A meta-analysis. *Review of Educational Research*, *66*, 507–542.
- Hearn, J. C. (1999). Pay and performance in the university: An examination of faculty salaries. *The Review of Higher Education*, *22*, 391–410.
- Hulin, C. L., & Smith, P. C. (1964). Gender differences in job satisfaction. *Journal of Applied Psychology*, *48*, 88–92.
- Huseman, R. C., Hatfield, J. D., & Miles, E. W. (1987). A new perspective on equity theory: The equity sensitivity construct. *Academy of Management Review*, *12*, 222–234.
- Ilgén, D. R., Nebeker, D. M., & Pritchard, R. D. (1981). Expectancy theory measures: An empirical comparison in an experimental situation. *Organizational Behavior and Human Performance*, *28*, 189–223.
- Ironson, G. H., Smith, P. C., Brannick, M. T., Gibson, W. M., & Paul, K. B. (1989). Constitution of a job in general scale: A comparison of global, composite, and specific measures. *Journal of Applied Psychology*, *74*, 193–200.
- Jacobson, R. L. (1992). Colleges face new pressure to increase faculty productivity. *Chronicle of Higher Education*, *38*(32), 16–18.
- Johnsrud, L. K., & Heck, R. H. (1994). A university's faculty: Predicting those who will stay and those who leave. *Journal for Higher Education Management*, *10*, 71–84.
- Johnsrud, L. K., & Rosser, V. J. (2002). Faculty members' morale and their intention to leave: A multilevel explanation. *The Journal of Higher Education*, *73*, 518–542.
- Judge, T. A., Locke, E., Durham, C., & Kluger, A. (1998). Dispositional effects on job and life satisfaction: The role of core evaluations. *Journal of Applied Psychology*, *83*, 17–34.
- Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction–job performance relationship: A qualitative and quantitative review. *Psychological Bulletin*, *127*(3), 376–407.

- Kalleberg, A. L. (1977). Work values and job rewards: A theory of job satisfaction. *American Sociological Review*, *42*, 124–143.
- Kane, J. S., & Freeman, K. A. (1997). A theory of equitable performance standards. *Journal of Management*, *23*, 37–58.
- Kay, A. C., Jimenez, M. C., & Jost, J. (2002). Sour grapes, sweet lemons and the anticipatory rationalization of the status quo. *Personality and Social Psychology Bulletin*, *28*(9), 1300–1312.
- Kossek, E., & Ozeki, C. (1998). Work-family conflict, policies, and the job-life satisfaction relationship: A review and directions for organizational behavior-human resources research. *Journal of Applied Psychology*, *83*, 139–149.
- Kreps, D. M. (1997). Intrinsic motivation and extrinsic incentives. *American Economic Review*, *8*, 359–364.
- Lee, Y. S. (1996). Technology transfer and the research university: A search for the boundaries of university-industry collaboration. *Research Policy*, *25*, 843–864.
- Lillydahl, J. H., & Singell, L. D. (1993). Job satisfaction, salaries and unions: The determination of university faculty compensation. *Economics of Education Review*, *12*, 233–243.
- Lin, M., & Bozeman, B. (2006). Researchers' industry experience and productivity in university-industry research centers: A "scientific and technical human capital" explanation. *Journal of Technology Transfer*, *31*, 269–290.
- Link, A., Swann, C., & Bozeman, B. (2008). A time allocation study of university faculty. *Economics of Education Review*, *27*, 363–374.
- Locke, E. A. (1969). What is job satisfaction? *Organizational Behavior & Human Performance*, *4*, 309–336.
- Locke, E. A. (1976). The nature and causes of job satisfaction. In M. Dunette (Ed.), *Handbook of Industrial and Organizational Psychology*. Palo Alto, CA: Consulting Psychologists Press.
- Long, J. S. (1987). A graphical method for the interpretation of multinomial logit analysis. *Sociological Methods and Research*, *15*, 420–446.
- Long, J. S., & Fox, M. F. (1995). Scientific careers: Universalism and particularism. *Annual Review of Sociology*, *21*, 45–71.
- Lydon, R., & Chevalier, A. (2002). Estimates of the effect of wages on job satisfaction. London: Center for Economic Performance.
- Mason, S. E. (1995). Gender differences in job satisfaction. *Journal of Social Psychology*, *153*, 143–51.
- McGee, R. W., & Block, W. E. (1991). Academic tenure: An economic critique. *Harvard Journal of Law and Public Policy*, *14*, 545–572.
- McKeachie, W. J. (1979). Perspectives from psychology: Financial incentives are ineffective for faculty. In D. R. Lewis & W. E. Becker, Jr. (Eds.), *Academic Rewards in Higher Education* (pp. 3–20). Cambridge, MA: Ballinger.
- Milem, J., Berger, J., & Dey, E. (2000). Faculty time allocation: A study of change over twenty years. *The Journal of Higher Education*, *71*, 454–475.
- Mitchell, T. R. (1974). Expectancy models of job satisfaction, occupational preferences, and effort: A theoretical, methodological, and empirical appraisal. *Psychological Bulletin*, *81*, 1053–1077.

- Mitchell, T. R. (1982). Motivation: New directions for theory, research, and practice. *Academy of Management Review*, *7*, 80–88.
- Mottaz, C. J. (1985). The relative importance of intrinsic and extrinsic rewards as determinants of work satisfaction. *Sociological Quarterly*, *26*, 365–385.
- Mottaz, C. J. (1986). Gender differences in work satisfaction, work-related rewards and values, and the determinants of work satisfaction. *Human Relations*, *39*, 359–378.
- Mowery, D. C. (2004) *Ivory tower and industrial innovation: University-industry technology transfer before and after the Bayh-Dole act in the United States*. Palo Alto, CA: Stanford University Press.
- Nagy, M. S. (2002). Using a single-item approach to measure facet job satisfaction. *Journal of Occupational and Organizational Psychology*, *75*, 77–86.
- Olsen, D., Maple, S. A., & Stage, F. K. (1995). Women and minority faculty job satisfaction: Professional role interests, professional satisfactions, and institutional fit. *The Journal of Higher Education*, *66*, 267–291.
- Olsen, D., & Near, J. P. (1994). Role conflict and faculty satisfaction. *The Review of Higher Education*, *17*, 179–195.
- Oshagbemi, T. (1999). Overall job satisfaction: How good are single versus multiple-item measures? *Journal of Managerial Psychology*, *14*, 388–403.
- Oshagbemi, T. (2003). Personal correlates of job satisfaction: Empirical evidence from UK universities. *International Journal of Social Economics*, *30*, 1210–1232.
- Peccei, R., & Lee, H. J. (2005). The impact of gender similarity on employee satisfaction at work: A review and re-evaluation. *Journal of Management Studies*, *42*, 1571–84.
- Perry, J. L. (1996). Measuring public service motivation: An assessment of construct reliability and validity. *Journal of Public Administration Research and Theory*, *6*, 5–22.
- Perry, J. L. (1997). Antecedents of public service motivation. *Journal of Public Administration Research and Theory*, *7*, 181–197.
- Perry, J. L., & Wise, L. R. (1990). The motivational bases of public service. *Public Administration Review*, *50*, 367–73.
- Petty, M. M., McGee, G. W., & Cavender, J. W. (1984). A meta-analysis of the relationships between individual job satisfaction and individual performance. *The Academy of Management Review*, *9*, 712–721.
- Ponomariov, B., & Boardman, C. (2008). The effect of informal industry contacts on the time university scientists allocate to collaborative research with industry. *Journal of Technology Transfer*, *33*, 301–313.
- Roethlisberger, F., & Dickson, W. J. (1939). *Management and the Worker*. Cambridge, MA: Harvard University Press.
- Rosser, V. J. (2004). Faculty members intentions to leave: A national study on their worklife and satisfaction. *Research in Higher Education*, *45*, 285–309.
- Ruppel, C. P., & Harrington, S. J. (2000). The relationship of communication, ethical work climate, and trust to commitment and innovation. *Journal of Business Ethics*, *25*, 313–328.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*, 54–67.

- Rynes, S. L., Gerhart, B., & Minette, K. A. (2004). The importance of pay in employee motivation: Discrepancies between what people say and what they do. *Human Resource Management, 43*, 381–394.
- Sandler, B. (1996) *The chilly classroom climate: A guide to improve the education of women*. Washington, DC: National Association for Women in Education.
- Sax, L. J., Hagedorn, L., Arredondo, M., & Dicrisi, F. A. (2002). Faculty research productivity exploring the role of gender and family-related factors. *Research in Higher Education, 43*, 423–446
- Scarpello, V., & Campbell, J. P. (1983). Job satisfaction: Are all the parts there? *Personnel Psychology, 36*, 577–600.
- Seifert, T. A., & Umbach, P. D. (2008). The effects of faculty demographic characteristics and disciplinary context on dimensions of job satisfaction. *Research in Higher Education, 49*, 357–381.
- Shapira, Z., & Griffith, T. (1990). Comparing the work values of engineers with managers, production and clerical workers. *Journal of Organization Behavior, 11*, 281–292.
- Singell, L., Lillydahl, J., & Singell, J. H. (1996). Will changing times change the allocation of faculty time? *Journal of Human Resources, 31*, 429–449.
- Slaughter, S., & Leslie, L. (1997). *Academic capitalism: Politics, policies, and the entrepreneurial university*. Baltimore: Johns Hopkins University Press.
- Smart, J. C. (1990). A causal model of faculty turnover intentions. *Research in Higher Education, 31*, 405–424.
- Smith, P. C., Kendall, L. M., & Hulin, C. L. (1969). *Measurement of satisfaction in work and retirement*. Chicago: Rand McNally.
- Sousa-Poza, A. B., & Sousa-Poza, A. A. (2000). Well-being at work: A cross-national analysis of the levels and determinants of job satisfaction. *Journal of Socio-economics, 29*, 517–538.
- Sousa-Poza, A. B., & Sousa-Poza, A. A. (2003). Gender differences in job satisfaction in Great Britain, 1991-2000: Permanent or transitory? *Applied Economics Letters, 10*, 691–694.
- Sparrowe, R. T., Liden, R. C., Wayne, S. J., & Kraimer, M. L. (2001). Social networks and the performance of individuals and groups. *Academy of Management Journal, 44*, 316–325.
- Struthers, C. W., Eaton, J., Ratajczak, A., & Perunovic, M. (2004). Social conduct toward organizations. *Basic and Applied Social Psychology, 26*, 277–28.
- Stumpf, S. A., & Rabinowitz, S. (1981). Career stage as a moderator of performance relationships with facets of job satisfaction and role perceptions. *Journal of Vocational Behavior, 18*, 202–218.
- Tang, T. L., Luna-Arocas, R., Sutarso, T., & Tang, D. S. (2004). Does the love of money moderate and mediate the income-pay satisfaction relationship? *Journal of Managerial Psychology, 19*, 111–135.
- Tang, T. L., & Talpade, M. (1999). Sex differences in satisfaction with pay and coworkers: Faculty and staff at a public institution of higher education. *Public Personnel Management, 28*, 345–349.

- Tremblay, M., Sire, B., & Balkin, D. (2000). The role of organizational justice in pay and employee benefit satisfaction, and its effects on work attitudes. *Group and Organization Management, 25*, 269–290.
- Tuch, S. A., & Martin, J. K. (1991). Race in the workplace: Black/white differences in the sources of job satisfaction. *Sociological Quarterly, 32*, 103–116.
- Vroom, V. H. (1964). *Work and motivation*. New York: Wiley.
- Wanous, J., Reichers, A., & Hudy, M. (1997). Overall job satisfaction: How good are single-item measures? *Journal of Applied Psychology, 82*, 247–252.
- Watson, R., Storey, D., Wynaeczyk, P., Keasey, K., & Short, H. (1996). The relationship between job satisfaction and managerial remuneration in small and medium-sized enterprises: An empirical test of “comparison income” and “equity theory” hypotheses. *Applied Economics, 28*, 567–576.
- Weiler, W. C. (1985). Why do faculty members leave the university? *Research in Higher Education, 23*, 270–277.
- Whitehouse, G. (2001). Recent trends in pay equity: Beyond the aggregate statistics. *Journal of Industrial Relations, 43*, 66–78.
- Winship, C., & Radbill, L. (1994). Sampling weights and regression analysis. *Sociological Methods and Research, 23*, 230–257.
- Xie, Y., & Shauman, K. (1998). Sex differences in research productivity: New evidence about an old puzzle. *American Sociological Review, 63*, 847–870.
- Xie, Y., & Shauman, K. (2003). *Women in science: Career processes and outcomes*. Cambridge, MA: Harvard University Press.
- Zumeta, W., & Raveling, J. S. (2001). The best and brightest for science: Is there a policy problem here? In M. P. Feldman & A. N. Link (Eds.), *Innovation policy in the knowledge-based economy* (pp. 121–161). Boston: Kluwer Academic Publishing.

Copyright of Journal of Higher Education is the property of Ohio State University Press and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.