A More Proactive Approach to Addressing Gender-related Employment Disparities in the United States

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Purpose: The purpose of this paper is to propose a proactive public policy approach to complement relatively reactive existing policies addressing gender-related employment disparities in the U.S, and to provide an initial empirical illustration of the proposal.

Design/methodology/approach: We provide a conceptual application of theories of Total Quality Management (TQM) to the topic of gender-related employment disparities, followed by an empirical illustration using U.S. Current Population Survey data and a Gender Equal Employment Opportunity (EEO) Scorecard.

Findings: Using the TQM framework, we conceptualize company outliers on the EEO Scorecard as "special" causes of economy-wide equal employment variation and the industries in which companies are situated as "common" causes. We identify two underperforming industries on gender-related employment outcomes: Mining and Construction, and Transportation, Communication and Utilities.

Research Limitations/Implications: We recommend further conceptual work on the application of TQM to gender disparities in employment. Also, the study considered broad industry categories; future research should refine these categories further.

Practical Implications: We recommend that U.S. enforcement agencies incorporate industry considerations more explicitly into their activities. Employer insights may be beneficial to improving equal employment opportunity performance at the industry level.

Originality/Value: The application of TQM theory to the topic of gender-related employment disparities is a novel approach that may motivate new public policies.

Key Words: Equal opportunities, Gender discrimination, Human resources

Paper Type: Research paper

I. Introduction and Background

Many years of equal employment opportunity (EEO) efforts by the U.S. federal government have failed to remedy persistent gender-related employment disparities, and EEO progress may have plateaued (Tomaskovic-Devey, Zimmer, Stainback, Robinson, Taylor, and McTague, 2006). The median gender earnings ratio in the United States stands at .80, with full-time working women in 2007 earning 80 cents for every dollar earned by men (U.S. Department of Labor, 2007). According to a leading text on gender and employment, discrimination explains at least part of the economy-wide gender earnings gap; other explanations include women working in fields, employers, and industries that pay less than those in which men work; women's lower levels of human capital; and fewer hours worked by women (Blau, Ferber, and Winkler, 2006). Because in practice these explanations are so intertwined, there is no consensus on the size of and solutions for unexplained gender disparities in employment, despite substantial research on the topic (Weichselbaumer and Winter-Ebmer, 2006). However, a case can be made for identifying and addressing gender disparities regardless of the source, in order to ensure the economic security of working women (Rose and Hartmann, 2004) and to help promote efficiencies in the operations of U.S. businesses (McAdams, 1995).

Our paper proposes a comprehensive approach to identify persistent gender disparities in earnings and employment in the U.S. This proposal is rooted in the principles of total quality management (TQM) and applies one of its primary tools, statistical process control (SPC) (Deming, 1986). The goal is to provide equal employment opportunity (EEO) enforcement agencies a tool with which they can more proactively and efficiently identify employers and industries for investigation, enforcement, and/or assistance. Although TQM theories typically focus on production processes, it makes sense to apply them in other settings (MacCarthy and Wasusri, 2002), including employer human resource management processes and EEO outcomes. With its focus on prevention and on the

continuous improvement of processes, TQM is also an ideal perspective with which to tackle complex, less visible types of discrimination that may accumulate slowly over time, occur across multiple human resource management practices, or stem from subconsciously-held attitudes (Bendick, 2007; Graham, Hotchkiss and Gerhart, 2000; Reskin, 2000).

Industry is a focal point of this paper since the employment processes of firms, and by extension, gender-related employment outcomes, are shaped substantially by industry norms, practices, and industries' economic and business environments (Baron and Bielby, 1980; Krueger and Summers, 1988).. In other words, the industry in which a firm is situated is associated with both the size and the form of gender disparities (Gersen, 2007). In TQM terms, industry can be considered a "common" cause of gender disparities because all firms within an industry are affected similarly by characteristics that define that industry. Organizational research supports the contention that industry is a strong influence on the EEO performance of individual employers (Fields and Wolff, 1995; Short, Ketchen, Palmer and Hult, 2007).

We begin the paper with an introduction and application of TQM and SPC to the EEO enforcement context, followed by a discussion of the importance of industry setting to gender-related employment disparities. We then suggest new ways of identifying employers for systemic discrimination enforcement and other ideas for accelerated improvements to women's employment outcomes. As part of the latter we provide an empirical illustration with U.S. Current Population Survey data. Finally, we generate policy recommendations for U.S. EEO enforcement agencies and discuss implications for employers.

II. A New Theoretical Lens: TQM, SPC, and EEO Performance

A. Introduction to TQM and SPC

Total Quality Management (TQM) is a management philosophy that relies on statistical principles of variation to identify problems and improve production processes, with the goal of raising product quality (Anderson, Rungtusanatham, and Schroeder, 1994). Statistical process control (SPC) is a key tool of TQM programs, which aim to *prevent* product defects rather than fix flaws in the finished product (Rath and Strong, 2003). SPC rests on the premise that all processes exhibit both common and special variation, and that the type of variation provides clues as to the most effective process improvement interventions (Shewhart, 1939). In essence, SPC is an analysis of variance technique in a format that is more accessible to managers and employees (Kolesar, 1993).

In the TQM setting, work teams isolate and try to eliminate special causes of variation in order to stabilize production processes and render them more predictable. For example, teams identify and investigate the sources of production runs with extremely poor quality output, and make changes in order to avoid similar future problems. The creation of a stable process is a necessary condition for further process improvements (Deming, 1986; Shewhart, 1939). Importantly, *erroneously* attributing variation to special causes and designing special cause remedies will destabilize and actually increase process variation, an undesirable result (Deming, 1986; Shewhart, 1939).

In the SPC literature there is widespread consensus that the majority of process variation is attributable to *common* factors, or inherent process features (Shewhart, 1939; Latzko and Saunders, 1995). For example, Deming estimates that common causes account for 94% of total variation in production processes, and that special causes account for only the remaining 6% (Deming, 1986: 315). While lower proportions of common cause variation have been reported (Grabov, 1998), almost all

scholars and practitioners acknowledge substantial, consequential common cause influence on production variation.[i]

B. TQM, SPC, and Current EEO Enforcement Efforts

TQM concepts can be extended from company-level production processes to federal agency responsibility for ensuring equal opportunity. Whereas companies aim to stabilize and improve their production processes, EEO agencies aim to promote equal opportunity by encouraging and enforcing improvement in employment processes. Just as a poor quality batch of raw materials may serve as a "special" cause of production process variation in a company, a discriminatory employer may serve as a "special" cause of equal employment opportunity variation within an industry or the economy as a whole. Similarly, a "common" cause of production process variation such as old equipment that affects every production run is analogous to the "common" cause of industry that influences all firms in a particular product market. Next we briefly assess the presence of TQM tenets in current EEO enforcement efforts.

The Equal Employment Opportunity Commission (EEOC) of the U.S. Department of Labor enforces employment discrimination statutes (e.g., Title VII of the Civil Rights Act of 1964) through the following efforts: a) collecting annual staffing data (form EEO-1) from employers with 100 or more employees or federal contractors with 50 or more employees; b) receiving, investigating, conciliating, and litigating employment discrimination complaints; c) initiating systemic discrimination charges against employers with potentially egregious or widespread discriminatory practices; and d) educating and offering assistance to employees and employers on EEO requirements and procedures. A second agency, the Office of Federal Contract Compliance Programs (OFCCP) of the U.S. Department of Labor oversees the EEO efforts of federal contractors by monitoring required

affirmative action plans, auditing employers on their compliance efforts, and to a lesser extent, conducting employer outreach and education, and receiving employee complaints.[ii]

While both agencies recently have intensified their focus on *systemic* employer discrimination, or "pattern or practice, policy and/or class cases where the alleged discrimination has a broad impact on an industry, profession, company, or geographic location" (Silverman, 2006), the current enforcement strategies of the EEOC and OFCCP are aligned only partially with TQM and SPC tenets. Neither agency's systemic efforts appear to have a theoretical justification for identifying poor EEO performance relative to other firms in the industry. Moreover, the EEOC's system of developing systemic discrimination charges based upon the judgments of district offices and anecdotal evidence (Silverman, 2006) and the OFCCP's formula for selecting employers for compliance audits (U.S. Department of Labor, 2008c) potentially would be characterized as harmful tampering according to SPC theories. Finally, the EEOC and the OFCCP place little priority on broad-based outreach and education interventions, which would be most likely to remediate industry-based common causes of poor employer EEO performance. For example, in Fiscal Year 2007, the EEOC devoted only 5.2% of its total expenditures to outreach and training on EEO compliance.[iii]

C. Industry Context as a Critical Common Cause of EEO Performance.

We advocate parsing the sources of gender-related employment disparities into common causes and special causes, to help improve the U.S. EEO enforcement agencies' attempts to reduce gender-related employment disparities. In as much as an individual firm's EEO performance might be considered a special cause of overall EEO performance, addressing that firm's performance is warranted. However, identifying and addressing *common* causes of gender related employment disparities must be undertaken at a level other than that of the firm. This paper suggests industry as an important and appropriate level of investigation.

The industries in which firms operate influence firm-level economic performance, employment processes, and the levels of gender-related employment disparities in the U.S. economy (Baron and Bielby, 1980; Krueger and Summers, 1988). To a substantial degree, firms in the same industry will experience similar outcomes across business cycles and over time, due to the influence of industry characteristics of product demand, domestic and international competition, growth rates, profitability, technological advancements, and other factors (McGahan and Porter, 2002; Short et al., 2007).

Industry is also a key component of the social structures in which firms operate (White, 1981). Firms are subject to normative, resource-dependence, and economic pressures to conform to accepted industry practices (Alessandri and Khan, 2006; DiMaggio and Powell, 1983), including employment processes that reflect discriminatory norms or "tastes" for discrimination (Black and Brainerd, 2002; Gersen, 2007; Johnson and Solon, 1986). The supply-side determinants of employment outcomes are best described from a human capital perspective and manifest themselves in differences across educational levels and occupational attainment (Becker, 1993).[iv] But even such supply-side factors can be influenced by the actions of employers (Cain, 1986). Although there is empirical support for product market competition reducing employment discrimination over time (Ashenfelter and Hannan, 1986; Heywood and Peoples, 2006), firms' responses to competition may be inhibited by industry norms and imperfect markets (Akerlof, 1985; Coleman, 2004). Human tendencies to favor similar others (e.g., men favoring men in employment decisions) may counteract competitive pressures as well (Ashforth and Mael, 1989; Wooten and James, 2004).

Despite substantial empirical and theoretical support for the influence of industry on employment outcomes, there appears to be inconsistent consideration of industry in the efforts of the U.S. EEO enforcement agencies. On the one hand, the EEOC has considered industry in carrying out its responsibilities for many years (Ronald Edwards, Ph.D., Director of Program Research and Surveys

Division, Office of Research, Information and Planning, EEOC, personal interview, June 21, 2007). For example, EEOC researchers have examined industry-based options for identifying systemic discriminators (Cartwright and Edwards, 2003). On the other hand, industry considerations are virtually absent in the 2007-2012 strategic plan of the EEOC, which calls for proactive prevention of employment discrimination and the use of strategic enforcement and litigation (U.S. EEOC, 2006). In addition, the plan delegates strategic planning regarding systemic discrimination to 15 EEOC district offices, enabling inconsistent emphases on industry context.

There appears to have been inconsistent consideration of industry at the OFCCP as well. From 2001-2007, an average of approximately 4,500 compliance audits were conducted per year, or about 2.4% of the approximately 93,000 non-construction and 100,000 construction firms that are federal contractors (U.S. Department of Labor, 2008a, 2008b).[v] Since 2006, the OFCCP has used the Federal Contractor Selection System (FCSS) for selecting federal contractors for compliance reviews (U.S. Department of Labor, 2008c), and at least two other systems preceded it. The OFCCP emphasizes the "neutrality" of procedures for selecting employers for audits but it does not disclose details of the FCSS (Patsy Blackshear, Ph.D., OFCCP Director of Program Operations, personal interview, February 12, 2008). However, the OFCCP website indicates that the agency attempts to identify the "worst offenders" (U.S. DOL, 2008d), and that it norms contractor performance within industry (U.S. DOL, 2008c). These ambiguities, combined with previous research findings raise serious questions about the rationality of the OFCCP's overall enforcement process (Heckman and Wolpin, 1976; Leonard, 1985; and Hodgson and Cooper, 2000).

III. Applying TQM to Address Employment Disparities: An Illustration

The proposed application of SPC by federal enforcement agencies involves the identification of special causes of within-industry EEO variation, in addition to conceptualizing industry-wide EEO

outcomes as a form of common causes. The first step is the identification of employer outliers within industries. Having been fully explicated in Graham and Hotchkiss (2002), this step will be discussed only briefly. The second step, a comparison of industries, is the focus of this paper.

A. The Systemic Gender Disparity Scorecard as a Means to Assess EEO Performance

The Systemic Gender Disparity Scorecard is a comprehensive tool for assessing gender-related EEO performance at the employer or industry level (Graham and Hotchkiss, 2002). Because the Scorecard assesses multiple types of gender-related employment disparities simultaneously, it recognizes the possibility that firms within an industry may discriminate across multiple HR activities, and that the forms of discrimination may shift in over time.

The five components of this Scorecard are as follows (additional detail on the construction of each component, and how the components are combined into a single index, is presented in Appendix A):

1) The "Equal Pay Component" measures the extent to which the employer pays women and men in the same jobs and the same human capital characteristics the same pay.

2) The "Occupational Segregation Component" measures the extent to which an employer's workforce is integrated, by gender, across jobs and occupations.

3) The "Glass Ceiling Component" measures the extent to which women are represented in the upper levels of the organization.

4) The "Hiring Component" measures the extent to which women and men are proportionally represented in occupations and firms relative to their levels of availability in the relevant labor market.

5) The "Related Discrimination Component" considers the scores on the separate components from the perspective of race/ethnicity.[vi]

The Scorecard provides a more comprehensive picture of EEO performance than current methods, because it evaluates all aspects of the employment process. For example, both the OFCCP and EEOC sometimes analyze employers' annual EEO-1 reports for potential signs of systemic discrimination, but EEO-1 reports contain only staffing data, to the neglect of information on other important employment decisions (e.g., pay). Underscoring this point, human resource management scholars recognize that staffing is but one part of an inter-related human resource system (Becker, Huselid, and Ulrich 2001). The Scorecard also has advantages over gender claim rate data as well because complaint filing statistics may be driven by factors other than the actual degree of discrimination (Goldman, 2003; Stangor, Swim, Van Allen, and Sechrist, 2002).

Several other EEO-related scorecards exist, but ours appears to be the most developed in terms of metrics and theory, and therefore of most immediate use in EEO enforcement agencies. For example, Mehri, Giampetro-Meyer, and Runnels (2004) strongly advocate the inclusion of a diversity scorecard into publicly-traded firms' annual Securities and Exchange Commission (SEC) reports, but provide just a "sample" report card. Our Scorecard also remedies a common problem with internal EEO and corporate diversity metrics, namely that companies are usually not assessed relative to other firms or industries (e.g., Hubbard, 2004). Finally, our Scorecard relies on objective, rather than self-report data, unlike some publications that evaluate the "best places to work" for women or minorities (e.g., Minority Law Journal, 2006).

B. Identification of Special (Employer) Causes of EEO Variation

The first step in the SPC process is to chart EEO outcomes for firms in each industry, consistent with Shewhart's (1939) and other quality experts' recommendation to employ SPC within meaningful subgroups. Two types of charts would be useful in the context of our paper: 1) an X-bar chart, to draw attention to employers with unusually high or low EEO performance relative to other

firms in the industry, and 2) a range chart to highlight unusually wide variation in an employer's EEO outcomes over time. The application of standard SPC procedure in the EEO context recommends that poorly performing firms on these metrics be investigated further for the possibility of systemic discrimination charges by the EEOC or sanctions by the OFCCP. Further investigation is essential because there may be legitimate explanations for employer outliers, such as employer seniority systems. It is estimated that between 6.5% and 12% of employers are systemic discriminators (Bendick and Egan, 2000; Federal Register, 2006).

This type of analysis is most closely aligned with current investigative practices of the EEOC and OFCCP, although the use of the SPC toolkit would contribute a greater degree of objective rigor to the current process. The next section turns to the focus of this paper, which is illustrating the identification of common causes in EEO variation.

C. Identification of *Common* (Industry) Causes of EEO Variation

We begin with the assumption drawn from total quality management that firm-level employment variation across industries is due substantially and perhaps primarily to common causes. Industry is just one of several potential common causes of variation of employer EEO performance but it encompasses other special causes, such as unionization rates, the proportion of white-collar versus blue-collar jobs, and historical artifacts such as company founding dates. To help identify which industries should receive the most intensive intervention from EEO agencies, and to provide clues as to the nature of industry influences, we recommend cross-sectional and longitudinal analysis of the Systemic Gender EEO Scorecard data, by industry.

To illustrate this approach, we compiled data from the combined outgoing rotation groups from the March, April, May, and June U.S. Current Population Surveys (CPS) for 1989-2000 (U.S. Census Bureau, 2009). We report the cross-sectional results for the year 2000. CPS samples from each month

were matched to the March file in order to obtain important determinants of labor market participation (used in the estimation of wage outcomes). These months are combined in order to obtain as large a sample of workers in each industry as possible.

In the CPS, each industry in the data is comprised of multiple employers producing similar goods or services. Six broad industry groups are analyzed: manufacturing; mining and construction; transportation, communication, and utilities; retail and wholesale trade; service; and finance, insurance, and real estate.[vii] In the CPS data, we examine 33,662 observations (std. dev. 3,703) in the year 2000, and the average sample size for the years 1989-2000 is 35,937.[viii] Table I contains some means across industries for the year 2000. The service, retail and wholesale trade, and manufacturing industries employ the greatest percentages of workers. The representation of women is lowest in the mining and construction industry and highest in the finance, insurance, and real estate industry and in the service industry.

[Insert Table I about here]

Table II presents the EEO Scorecard components and results for each industry in the year 2000. The component values are reported along with their standardized values (in **bold**). We designate a one standard deviation difference between an industry and the overall market as noteworthy, consistent with the recommendation that outlier identification be based upon meaningful differences for the context at hand -- in this case, EEO enforcement (Aguinis, Werner, Abbott, Angert, Park, and Kohlhausen, forthcoming). A negative value indicates that the industry is performing worse than the market average, and a positive value means the industry is performing better than the market average. The overall Scorecard is standardized in the same way. The five components combine to produce an overall Scorecard for each industry, as reported in the last row of Table II.

[Insert Table II about here]

Both the manufacturing, and retail and wholesale trade industries performed within one standard deviation of the market average on all components, resulting in Scorecard values that also fall within market norms. The service industry performed above market norms in all but one component, resulting in a Scorecard for that industry that is farthest above the market norm overall. The finance, insurance, and real estate industry is slightly above the market norm overall, with poor performance in Equal Pay being offset by good performance on the Glass Ceiling and Related Discrimination components. Both the mining and construction industry, and the transportation, communication, and utilities industry have scores below the market norm. The mining and construction industry's poor Scorecard was driven by its substantially below average performance on three out of the five components. The poor performance by transportation, communication, and utilities on the Hiring Component was enough to push that industry outside the market norm overall.

The Systemic Gender EEO Scorecard can be mapped over time, as well, to illustrate trends in industries' EEO performances and to establish the robustness of the cross-sectional results. We plotted each industry's annual standardized Scorecard for the years 1989-2000. These results indicate that mining and construction industry has fallen consistently below the market norm. And while consistently above the market norm, the service industry has shown a slight, steady decline over the time period ($p < .05$). Finance, insurance, and real estate is an example of an industry that has improved its performance over the period ($p < .01$), falling above the market norm in the most recent two years. All other trends are not significant. This trend analysis should be interpreted with some caution as it does not fully consider changes in industry composition and structure over time (Tomaskovic-Devey et al., 2006).

[Insert Figure I about here]

The importance of the objectivity afforded by the Scorecard becomes apparent when comparing industry Scorecard performance with actual discrimination complaints received by the EEOC, information we obtained for each industry from a "Freedom of Information Act" request to the agency. We expect a high degree of consistency between Scorecard outcomes and EEOC complaints, and indeed, across all industries and nine years of available complaint data (1992-2000), there is a positive and significant ($p<.01$) correlation of 0.85 (Scorecard values are reverse-coded for this analysis). However, the ability of the Scorecard to consider multiple types of EEO performance results in slightly different rankings of industries by performance. For example, while both the Scorecard and complaint data ranked the financial and service sectors as top EEO performers, a low complaint rate placed retail and wholesale trade as the very top performer. However, the latter industry ranks in the bottom half of performers based on the Scorecard data. This difference is one illustration of the value of not relying solely on complaint data to address gender employment disparities that might pervade an industry.

IV. Discussion

Our paper presents a proactive, industry-based approach designed to complement existing public policies aimed at identifying and addressing gender disparities in employment in the U.S. economy. We apply statistical process control concepts from the quality management literature (Deming, 1986; Shewhart, 1939) to the federal enforcement of EEO laws, for the purpose of accelerating EEO progress in a manner that is theoretically sound and potentially more resource efficient. The approach presented in this paper is motivated in part by past and current research that raises serious questions regarding the rationality and efficacy of the EEOC's and OFCCP's enforcement efforts (Heckman and Wolpin, 1976; Hirsh, 2008; Leonard, 1985), particularly given today's more complex forms of gender discrimination (Graham et al., 2000; Krieger and Fiske, 2006).

With its focus on identifying true outliers, TQM and SPC encourage more formal methods of systemic discrimination charge development than that currently utilized by the EEOC and OFCCP. A potentially greater contribution of TQM theory to the EEO enforcement process, however, lies in its focus on "common causes" of EEO variation. TQM theories suggest that incorporating the concept of common causes into enforcement activities will enhance future EEO progress because common causes are key determinants of EEO outcomes.

A. Employer-Focused Public Policy Recommendations

We recommend the adoption of more formal statistical methods of outlier identification in systemic charge development by the EEOC and OFCCP. Consistent with TQM concepts, enforcement agencies should consider systemic charges only for employers with substantially worse EEO performance than their industry peers (Bendick and Egan, 2000; Leonard, 1985). Focusing systemic investigations primarily on outlier employers has the dual benefit of avoiding unproductive and disruptive systemic investigations as well as enhancing the likelihood of detecting egregious employer discrimination (Petersen and Saporta, 2004; Selmi, 2006). Although there are concerns with relying on employee complaints as the primary means of eradicating employment discrimination (Hirsh 2008; Krieger & Fiske, 2006; Selmi, 2006), we recommend retention of the complaint-filing system as part of a comprehensive EEO enforcement approach, since meritorious discrimination complaints can serve as another signal of special causes.

B. Industry-Focused Public Policy Recommendations

We recommend that the EEOC and OFCCP incorporate industry considerations more explicitly into their enforcement and outreach activities. Drawing on TQM and SPC foundations, EEOC Districts could identify particular industries for intervention, perhaps modeled on OSHA's Local Emphasis Programs (U.S. OSHA, 2008a). As mentioned earlier, it would be counterproductive to automatically

increase the systemic charge rates for employers in industries with poor EEO records, unless the targeted employers are in fact outliers in their EEO performance. In addition, both the EEOC and OFCCP could promote substantive partnerships with industry trade groups and employers to develop innovative approaches to remove industry-related impediments to EEO progress.

Collaborative enforcement agency / business efforts can be modeled on the quality improvement methods used by corporations. For example, manufacturing plants utilize teams comprised of production workers, production engineers, and a facilitator to share information on current and longer-term production issues; and to help remediate special and common causes of variation (Field and Sinha, 2005). Collaboration in the EEO context could also be based on the well-developed cooperative programs of the Occupational Safety and Health Administration (U.S. OSHA, 2008b). For example, under the Alliance Program, OSHA works with trade groups and other stakeholders to develop compliance assistance tools and to share information with employers. The primary advantages of these collaborative approaches are that they tap into the knowledge of those who are most familiar with the processes in question (Field and Sinha, 2005), and collaboration is more likely to be embraced by employers than are sanctions (Gilliland and Hoffman, 2004).

Employers may view our proposed public policy approach as unwelcome pressure to enhance their EEO efforts and to report more human resource data to the federal government. On the other hand, our industry-based approach may protect employers that have relatively good EEO performance, from unwarranted systemic charges. Furthermore, employers may use the Scorecard in their own EEO benchmarking relative to industry peers. The focus on *industry* as a common cause of EEO performance has the potential to broaden the public policy debate beyond the actions of individual employers to encompass collaborative problem-solving by industry and enforcement agencies. Total quality management principles have the additional advantage of being diffused widely, and being

accepted in the business world as an effective continuous improvement approach (Corbett, Montes-Sancho, and Kirsch, 2005).

V. Caveats and Future Research

There are two caveats to our paper that we would like to acknowledge. First, consistent with TQM and SPC, we assume that a substantial portion of gender disparities in the U.S. result from common causes (Shewhart, 1939; Deming, 1986). Further conceptual work on common and special causes of variation in the EEO context is needed in order to guide future enforcement efforts. A second caveat is that we have considered industry in less complexity than its operation in actual employment processes. To be most effective, enforcement agencies and employers need to refine, or disaggregate broad industry categories. Moreover, methods for examining firms operating in multiple industries will need to be developed, and regional and relevant labor market factors will have to be added in to the equation.

VI. Conclusion

The premise of our paper is that in order to effectively reduce gender-related employment disparities in the U.S. economy, the employment processes of entire industries must change. The proactive public policy approach proposed in this paper has the potential to benefit a diverse group of stakeholders: agency personnel with limited enforcement resources, employers seeking to improve EEO practices or gain employment-related efficiencies, and of course, employees seeking non-discriminatory workplaces. We believe that this complement to existing EEO policies has the potential to facilitate progress in eradicating gender-related employment disparities in the U.S.

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Appendix A

Detail on Scorecard Components

1) **Equal Pay Component.** This will be indicated by the existence of a negative and significant gender coefficient in a regression of hourly earnings on employees' gender, race, job characteristics, and human capital characteristics. The wage regression will also control for self-selection into the labor market (Heckman, 1979; Greene, 1981). This essentially amounts to a two-step procedure. In the first step, an estimate of each worker's probability of being observed in the labor market is calculated. This probability is included as a regressor in the second step estimation of the wage equation.

The coefficient on the female dummy variable is what represents the selectivity-corrected percentage wage differential.[ix] This component of the Scorecard is designed to capture equal pay discrimination within employers and is designed to encourage employers to use consistent pay-setting practices and monitor any gender-related pay differences that can not be justified by merit, seniority, or any factor other than sex. At present, the Equal Employment Opportunity Commission (EEOC) receives relatively few equal pay complaints, in part because few employees have access to the pay information of their co-workers. For the years 1992 through 2000, Equal Pay Act charges constituted less than 2% of individual charge filings with the EEOC (U.S. EEOC, 2006), despite the fact that progress in the gender earnings ratio may have stalled (Blau and Kahn, 2007).

2) **Occupational Segregation Component.** This will be measured by the well-known Duncan dissimilarity Scorecard (Duncan and Duncan 1955). The Duncan Scorecard falls between zero and one and indicates the percent of either men or women that would have to change occupations in order for the distributions across occupations to be equal. The closer the Scorecard is to zero, the more equal are the distributions of men and women across occupations. It is calculated as:

$$\text{Occupational Segregation}_j = \frac{1}{2}\sum_{i=1}^{n}|M_{ij} - F_{ij}|,$$

where n is the number of occupations represented in industry j, M_{ij} is the proportion of men employed by industry j found in occupation i, and F_{ij} is the proportion of women employed by industry j found in occupation i. Because women usually work in lower-paying occupations, this component is designed to capture excessive and potentially discriminatory occupational segregation, within employers. Thus employers are encouraged to examine their job placement processes, as well as consider the implementation of programs to train and encourage women to enter non-traditional fields (e.g., computer programming). It is possible to score poorly on Occupational Segregation by reverse occupational segmentation (e.g., if men are over-represented in a traditionally-female occupation); however, these situations would be relatively rare, and likely would have to be analyzed by the EEOC on a case by case basis.

3) **Glass Ceiling Component.** This will be measured as 1 minus the proportion of managerial and professional positions that are held by women in the industry. Attention to this component is designed to encourage employers to eradicate hiring and promotion discrimination, as well as institute programs to encourage and assist women in reaching the upper levels of organizations.

4) **Hiring Component.** This measure is simply the proportion of occupations represented in each firm in which women are under-represented relative to the relevant labor market. Or this component could be modified to consider the degree of under-representation in hiring for each occupation. For example, if only 25 percent of occupation A is made up of women in an industry, whereas market-wide, 60 percent of that occupation is made up of women, then women are considered under-represented in that occupation in that industry. If women are under-represented in 25 percent of all occupations in an industry, then the industry's Hiring Component would be equal to 0.25. Attention to this component will encourage employers to devote attention to their recruitment and selection practices to ensure that they do not result in hiring discrimination.

5) **Related discrimination component.** This component is comprised of the outcome measures on the first four components across racial/ethnic lines. This component is designed to recognize the potential interconnectedness of race, gender, and other types of discrimination, and the potential for employers who are discriminatory in one area (e.g., gender) to be discriminatory in other areas. Supporting this approach, there is a large literature on the inter-relatedness of gender and race, and how being a woman and a member of a racial or ethnic minority group could result in greater levels of discrimination (see for example, Browne and Misra, 2003).

A key issue in constructing the Scorecard is the way in which the five components are combined into a single number. We recommend calculation of the simple arithmetic mean. The arithmetic mean Scorecard for industry *j* is given by:

$$I_{Aj} = \frac{1}{5}\sum_{i=1}^{5} C_{ij},$$

where C_i is the *i*th component for industry *j*. The advantage of the arithmetic mean is that it is a well-known statistic representing a linear average of each of the components. Since all components of the Scorecard are measured on a scale between 0 and 1, the arithmetic mean seems a reasonable choice. A disadvantage is that each component is equally weighted and that extremely poor performance in one are can be exactly offset by extremely good performance in another area. Of course different weights can be applied to the different components as might be deemed necessary by past poor performance in one area or by a particular policy emphasis of the evaluator.

Table I. Sample Means (std. dev.) for the Year 2000, By Industry.

	Full Sample	Finance, Insurance, Real Estate	Mining, Construc-tion	Manufac-turing	Service	Transportation, Commmuni-cation, Utilities	Retail & Whole-sale Trade
Proportion of all workers	1.00	0.08	0.08	0.20	0.35	0.08	0.22
Proportion female	0.48	0.64	0.10	0.35	0.64	0.28	0.50
Wage/hr	$15.78 (10.39)	$18.43 (12.38)	$16.65 (9.69)	$16.79 (9.67)	$15.72 (10.80)	$17.93 (11.38)	$12.75 (8.55)
Hours/wk	40.24 (9.62)	40.81 (8.29)	42.06 (8.71)	42.11 (6.67)	38.60 (10.81)	42.10 (9.90)	39.50 (10.13)
Nonwhite (1=yes)	0.15	0.14	0.09	0.14	0.18	0.17	0.14
College (1=yes)	0.19	0.31	0.08	0.16	0.23	0.17	0.14
Union (1=yes)	0.09	0.01	0.17	0.15	0.06	0.26	0.05
Occupation:							
Professional	0.28	0.36	0.14	0.24	0.43	0.21	0.12
Technical	0.31	0.59	0.07	0.17	0.25	0.28	0.51
Service	0.12	0.03	0.003	0.01	0.23	0.03	0.17
Craft	0.13	0.02	0.56	0.19	0.05	0.16	0.07
Labor	0.16	0.004	0.23	0.39	0.04	0.32	0.12
No. of Obs.	33,662	2,692	2,540	6,862	11,671	2,640	7,257

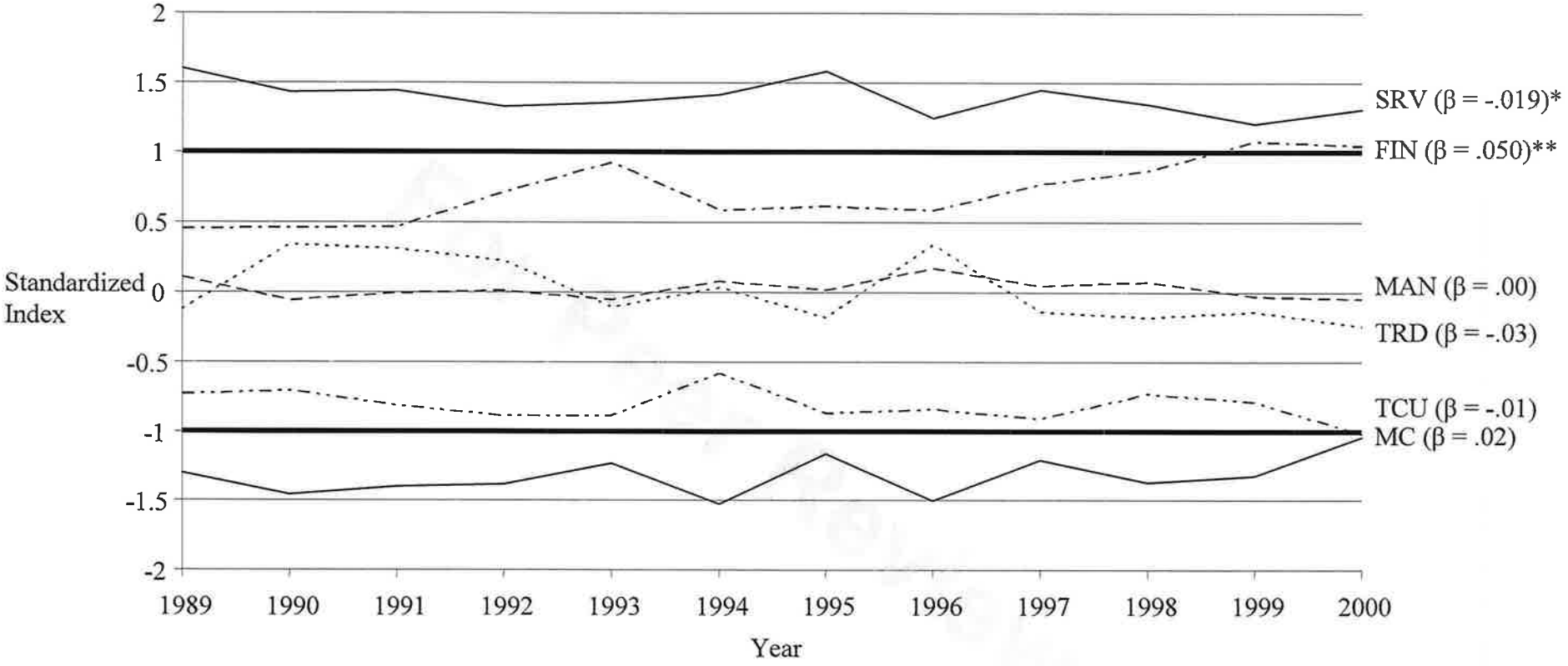
Note: Professional occupation encompasses professional, administrative, and managerial occupations. Technical occupation encompasses technical and related support. Service occupation encompasses service only. Craft occupation encompasses precision production, craft, and repair occupations. Labor occupation includes handlers, equipment cleaners, helpers, and laborers.

Table II. Industry EEO Scorecard and Standardized Scorecards for the Year 2000.

Scorecard Component	Finance, Insurance, Real Estate	Mining, Construc-tion	Manufac-turing	Service	Transportation, Commmuni-cation, Utilities	Retail & Whole-sale Trade	Market Average (std dev)
Equal Pay	0.2487 **-1.298**	0.1998 **0.8876**	0.2340 **-0.641**	0.1938 **1.1572**	0.2347 **-0.673**	0.2070 **0.568**	0.2197 (0.0224)
Occupational Segregation	0.1743 **0.752**	0.6966 **-1.751**	0.1657 **0.793**	0.2619 **0.3323**	0.4609 **-0.621**	0.2280 **0.4947**	0.3312 (0.2087)
Glass Ceiling	0.4252 **1.095**	0.7545 **-1.123**	0.6876 **-0.672**	0.4118 **1.1852**	0.7027 **-0.774**	0.5448 **0.2894**	0.5878 (0.1485)
Hiring	0.4000 **0.707**	0.6000 **0**	0.6000 **0**	0.2000 **1.4142**	1.0000 **-1.414**	0.8000 **-0.707**	0.6000 (0.2828)
Related Discrimination	0.2440 **1.230**	0.4864 **-1.05**	0.4450 **-0.657**	0.2633 **1.0627**	0.3492 **0.2495**	0.4654 **-0.851**	0.3755 (0.1056)
Overall Industry Scorecard	0.2984 **1.047**	0.5275 **-1.109**	0.4065 **-0.032**	0.2595 **1.2753**	0.5162 **-1.008**	0.4224 **-0.174**	0.4028 (0.1124)

Note: The values in bold type correspond to the standardized value of the component. The standardized score is calculated as the market average for that component minus the industry's score on that component, divided by the market standard deviation for that component.

Figure I. Industry EEO Performance Over Time



Significance: * p > .05 ** p > .01

Industry Key

FIN - Finance, Insurance, Real Estate
MAN – Manufacturing
TCU - Transportation, Communication, Utilities
MC - Mining, Construction
SRV - Service
TRD - Retail & Wholesale Trade

Endnotes

[i] SPC practitioners attempt to balance and minimize Type I errors (i.e., finding a specific cause of variation when there is none) and Type II errors (i.e., not detecting a specific cause of variation when one exists) when developing and using control charts (Shewhart, 1939; Deming, 1986). Initial total quality management efforts, reflecting the systems focus of the engineering profession, minimized the potential for Type I errors (Bayart, 2006). Six Sigma programs (i.e., an updated TQM approach) continue this tradition but more heavily emphasize the reduction of Type II errors (Kolesar, 1993).

[ii] Non-construction contractors with 50 or more employees and $50,000 or more in business with the federal government, are required "to develop and implement a written affirmative action program (AAP) for each establishment" (U.S. DOL, 2008e). Construction contractors and subcontractors with $10,000 or more in federal business are also subject to affirmative action requirements, but their plans and goals are developed by the OFCCP.

[iii] In Fiscal Year 2007 the EEOC spent $14,983,933 on training and outreach excluding revenue generated; with a total of $286,937,746 spent on private sector efforts (U.S. EEOC, 2007).

[iv] The variable of occupation will influence employment processes and EEO outcomes as well (Blau et al., 2006). However, we focus on industry in this paper because of the natural contrast it provides to the employer-focused enforcement policies of the EEOC and the OFCCP, combined with the fact that employing firms are nested within industries.

[v] The other major OFCCP enforcement tool is de-barment of federal contractors, an option which is rarely employed (Leonard, 1990). For example from 2000-2007, less than 10 contractors were de-barred (U.S. General Services Administration, 2008).

[vi] Related components can be added for other protected groups, such as the disabled.

[vii] Due to the small size of the agriculture industry and the unique features of the public sector, the Agriculture and Public Administration industries are excluded from the present analysis.

[viii] The sample sizes for each year are as follows: 1989 - 37,093; 1990 - 40,924; 1991 – 40,808; 1992 – 40,346; 1993 – 39,828; 1994 – 36,235; 1995 – 31,840; 1996 – 32,042; 1997 – 32,781; 1998 – 32,936; 1999 – 32,751; 2000 – 33,662.

[ix] The Equal Pay Component is measured by occupations within industries, which is the closest approximation possible with CPS data. If employer-level data were available, the preferred measure would consist of jobs within firms.