DEPARTMENT OF ECONOMICS WORKING PAPER SERIES

Is White the New Blue? The Impact on Gender Wage and Employment Differentials of Offshoring of White-collar Jobs in the United States

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Working Paper No: 2007-08

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Abstract

Since the mid-1990s, offshore production has become increasingly important in white-collar, service sector activities in the U.S. economy. This development coincided with a stagnant gender wage gap over this period. This paper categorizes white-collar service sector occupations into two groups based on whether or not an occupation is at risk of being offshored and assesses the relative contribution of these two groupings, through their employment and wages, to the stagnation of the gender wage gap between 1995 and 2005. Applying standard decomposition methods to Current Population Survey and Displaced Workers Survey data shows that in at-risk occupations, low-wage women's employment declined, leading to an artificial increase in the average wage of remaining women thereby narrowing the gender wage gap. This improvement in the gender wage gap was offset by the relative growth of high-wage male employment in at-risk occupations and the widening of the gender wage gap within not-at-risk occupations.

Acknowledgements: We gratefully acknowledge the helpful comments and suggestions of Günseli Berik, Yana van der Meulen Rodgers, Stephanie Seguino and the participants in the Eastern Economic Association Annual Conference 2007, New York City, USA, February 23-25, 2007, where a previous version of this paper was presented. We also extend their thanks to Cynthia Kroll and John Schmitt for help with data acquisition. The data used to generate the results presented in this paper are available from the authors on request.

Introduction

Since the mid-1990s, international relocation of production has expanded beyond manufacturing to include services. Commonly referred to as offshoring of white-collar jobs, the shift of primarily low-end white-collar jobs away from industrial economies to developing countries has been linked to an increase in women's share in service sector employment in developing countries.[1] However, as in the 1980s and the 1990s, when export-oriented manufacturing sectors of these economies brought about growth of female share of employment, these newly created jobs were in low-wage categories, primarily in data processing and call centers. There are growing concerns regarding women's working conditions, such as long work hours at night and during weekends, unsafe working conditions, and lack of equal pay for equivalent work (Tran-Nguyen and Beviglia-Zampetti 2004). In addition, while offshoring initially creates employment opportunities in some developing economies, because the work offshored has low barriers to entry and is subject to automation, it is possible that the employment gains will be reversed in the longer run (Dossani 2006), similar to the trends in manufacturing in the 1980s and the 1990s (Seguino 1997, Standing 1999, Berik 2000). At least in the case of India, trade expansion in services is associated with a relative decline in demand for women workers over time (Chamarbagwala 2006).

Our knowledge of the gender-differentiated wage and employment outcomes in industrial economies of offshoring of white-collar jobs is considerably more limited. While there is a growing literature on the wage and employment outcomes of white-collar offshoring in industrial economies, the main debate in the literature centers around whether or not jobs are being lost and empirical studies on net employment outcomes yield mixed results. The effects on women workers' relative employment and earnings of these developments have yet to be investigated.

The few gender-disaggregated analyses find that workers displaced in non-manufacturing industries are more likely to be women compared to manufacturing industries. Moreover, the traditionally male high-wage occupations in the service sector, such as legal and medical occupations, have been identified as trade winners (Kletzer 2001, Jensen and Kletzer 2006). Focusing on the 1995–2005 period, during which offshoring accelerated, we apply standard decomposition techniques to Current Population Survey (CPS) and Displaced Worker Survey (DWS) data and examine the impact on women's relative employment and wages of offshoring of white-collar jobs.

Trade in Services and Offshoring of White-collar Jobs

Between 1990 and 2006, trade in services almost doubled in the United States: exports increased from $228 billion to $414 billion and imports increased from $181 billion to $341 billion.[2] The empirical evidence on the employment effects of trade expansion in services and offshoring of white-collar jobs ranges from net job losses to net job gains in industrial economies in general and the U.S. economy in particular. Services offshoring does not appear to have a negative impact on employment in Western Europe (Amiti and Wei 2004, van Welsum and Reif 2006a, van Welsum and Reif 2006b). Some research, however, finds relative and absolute declines in employment in the U.S., Canada, and Australia with considerable variation in the magnitude of estimated job losses.[3] Several studies suggest that job losses in the U.S. due to trade expansion in services since the mid-1990s has been minimal (Bhagwati, Panagariya and Srinivasan 2004, Jensen and Kletzer 2006). Offering the U.S. trade surplus in services as an explanation for this benign impact, these studies argue that job gains will offset the losses in the long run. Others estimate a 6.5 % decline in employment due to offshoring over the two-year period between 2000 and 2002 and predict that 14–15 million white-collar jobs that employ 11–11.7 % of the

labor force in the U.S. are at risk of being offshored if current trends were to continue (Bardhan and Kroll 2003, Kroll 2005).

The non-academic literature also offers a wide range of estimates regarding the extent of actual or predicted job losses in the U.S. economy due to offshoring of white-collar jobs. The most publicized estimate is by Forrester Research, which predicts 3.3 million job losses between 2000 and 2015 (McCarthy 2002). Other estimates by consulting firms include Deloitte Research's estimate of 2 million jobs by 2008; Gartner Research's estimate of 15 % of information technology (IT) jobs by 2004; and Goldman Sachs's estimate that 300,000–400,000 services jobs have moved offshore in the early 2000s (Gentle 2003, Gartner Research 2004). White-collar jobs in call centers, research and development (R&D) operations, including those of pharmaceutical companies, IT and computing technical support, comprise the majority of the work that is being offshored (Bronfenbrenner and Luce 2004).

Although there is no consensus over the net employment outcomes of trade expansion in services and offshoring of white-collar jobs in the U.S., it is now well established that these developments affected low-wage and high-wage workers differently, favoring high-wage workers (Bardhan and Kroll 2003, Kroll 2005, Jensen and Kletzer 2006). Given their predominance in low-wage white-collar occupations, women are likely to have been adversely affected by these developments, but little if any empirical evidence to date supports this expectation. The 1990s are characterized by a slowdown in the narrowing of the aggregate gender wage gap in the overall U.S. economy (Blau and Kahn 2006). The links between the gender wage gap and services offshoring have yet to be investigated. In the 1980s and the 1990s, offshoring of low-wage blue-collar jobs to developing countries and increased import competition in low-wage labor-intensive industries such as apparel, footwear, and leather were

associated with disproportionate job losses for women who predominated in these occupations and industries in the U.S. economy (Kucera and Milberg 2000). Some evidence suggests that the loss of low-wage blue-collar occupations for women led to an artificial increase in women's average wages and hence contributed to the narrowing of the gender wage gap in the 1980s (Kongar 2007). In this paper, we investigate whether or not services trade and offshoring had similar impacts on women's relative employment and wages in the U.S. economy over the 1995–2005 period.

Data Sources

The study uses data drawn from the March CPS of 1996–2006 and the DWS of 2004 and 2006. We analyze the 1995–2000 and 2002–2005 periods separately because the data for the two periods are not strictly comparable due to changes in occupation and industry codes.[4] The year 1995 is chosen as the beginning year when offshore production has begun to be significant in services and white-collar activities (Kroll 2005). We chose 2000 as the end year because it marks the end of the 1995–2000 business cycle for the U.S. [5]

The earnings measure used in this study is the residual gender wage gap.[6] This is the portion of the gender wage gap that remains unexplained after controlling for gender differences in human capital, locational, institutional, and worker-family characteristics. Controlling for these variables makes it possible to isolate the impact of offshoring from that of contemporaneous changes in human capital, locational, institutional, and worker-family characteristics. For instance, the residual gender wage gap controls for the improvements in women's relative education over the 1995–2000 period. Residual wages are calculated as follows: Log real hourly earnings are first regressed on four categorical education variables (less than high school, high school, some college and college or more); potential experience, which is

defined as either "age - years of schooling -7" or "age - 17", whichever is the smaller; potential experience squared; and indicator variables for non-White, marital status, union membership, part–time employment, region, and metropolitan status.[7] The average occupation residual wage gap is then calculated as the difference between average residual wages of men and women separately for each year in the sample.

Empirical analysis of the wage and employment outcomes of trade in services and offshoring of white-collar jobs is complicated by data limitations. Due to lack of detailed industry-level services trade data and data on offshoring, studies on the wage and employment outcomes of trade expansion in services and offshoring of white-collar jobs use indirect measures. One widely used measure in the literature is to identify the occupations that are "potentially affected by offshoring" on the basis of certain job characteristics. The commonly agreed upon characteristics of an occupation potentially affected by offshoring (or "offshorability attributes") are (1) the intensive use of information and computer technologies (ICTs) within an occupation; (2) the output can be easily traded/transmitted through ICTs; (3) the tasks are highly codifiable; and (4) face-to-face contact with customers is not required (Kroll 2005, van Welsum and Vickery 2005, van Welsum and Reif 2006a). Using these criteria, van Welsum and Vickery (2005) provide a list of U.S. occupations that are potentially affected by offshoring. A second measure is defined by Kroll (2005), who expands the list of offshorability attributes of an occupation listed above to include low set-up barriers, low social networking requirements, and high wage differentials compared to the receiving country. In this paper, we categorize the service sector occupations into two categories: tradable and non-tradable. For the 1995–2000 period, our tradable occupations are the same as those identified by van Welsum and Vickery (2005) and are provided in Appendix Table I. Due to changes in occupation and industry

codes in the March CPS data after 2001, this categorization is not applicable to the post-2001 data. Hence, for the 2002–2005 period, we use the list of occupations identified by Kroll (2005) as "at risk to outsourcing."[8] This list of occupations is provided in Appendix Table II.

Data on trade-displaced workers come from the DWS of 2004 (reporting displacements in the 2001–2003 period) and 2006 (reporting displacements in the 2003–2005 period). The DWS defines workers as displaced if they permanently lost their jobs because their plant or company closed down or moved, their positions or shifts were abolished, or there was insufficient work. In addition, to qualify as displaced, workers must not expect to be recalled in the next six months and not be self-employed at the lost job. Following the Bureau of Labor Statistics (BLS) convention in analysis of displaced workers, we restrict our analysis of displacement rates to a sample of long-tenured workers, i.e. workers displaced from jobs they had held for 3 or more years.[9]

Wage and Employment Trends in the Service Sector

In 1995, when offshoring of services began to accelerate, women's share of employment in tradable occupations was no different than that in non-tradable occupations; both stood at 66 % (Table 1). However, the occupational composition of the female workforce across the tradable and non-tradable categories was significantly different: while women comprised the majority of low-wage clerical workers in both categories, their share was significantly higher in the tradable category (Columns V and VIII). Moreover, in high-wage non-clerical occupations, women comprised nearly 64 % of the workforce in the non-tradable category (Column IX), but only 45 % in the tradable category (Column VI).

Given their predominance in low-wage clerical jobs at risk of being offshored, and underrepresentation in high-wage non-clerical occupations that are expected to gain as a result of

export growth in services, women are likely to have been more adversely affected than men by trade expansion in services and the increase in offshoring of white-collar occupations over the 1995–2000 period. This hypothesis is supported by the trends in men's and women's employment over this period. Table 2 shows that, in tradable occupations, men's employment increased more compared to women over the 1995-2000 period, resulting in a significant decline in women's share in employment (Column I). Moreover, while employment increased for both men and women in non-tradable occupations (Columns IV–VI) and also in non-clerical tradable occupations (Column III), women in tradable clerical occupations experienced significant job losses over the 1995–2000 period (Column II).

In the tradable category, women's employment increased more than men's in non-clerical occupations, leading to a 1 percentage point increase in women's share in employment in these occupations (Column III). In the non-tradable category, there was virtually no change in the share of women in non-clerical occupations (Column VI).

The trends in the "residual" gender wage gap (hereafter referred to as "the gender wage gap") also seem to support the hypothesis that offshoring of white-collar jobs had a more adverse effect on women, compared to men. Figure 1 shows that, between 1995 and 2000, the gender wage gap in the service sector increased by more than 1 percentage point. This increase was driven primarily by the trends in tradable occupations, where the gender wage gap increased by 3 percentage points due to a larger increase in men's wages compared to women. In non-tradable occupations, the gender wage gap increased slightly as women's wages declined more, compared to men.

While the increase in the gender wage gap in tradable occupations appears to have contributed to the widening of the gender wage gap within services over the 1995–2000 period,

the potential impact on the gender wage gap of the shifts in men's and women's employment between and within tradable and non-tradable occupations are harder to predict. In 1995, both men's and women's wages were higher in tradable occupations compared to their counterparts in non-tradable occupations (Figure 1). Because the wage premium associated with employment in a tradable occupation was significantly higher for men, the gender wage gap in tradable occupations was larger compared to non-tradable occupations. Between 1995 and 2000, women's employment shifted towards non-tradable occupations characterized by a lower gender wage gap but also lower wages (Table 2 and Figure 1). The relative growth of men's employment in high-wage tradable occupations is likely to have contributed to the widening of the gender wage gap in services over the 1995–2000 period. However, the shift in women's employment towards the more equitable non-tradable occupations is likely to have worked in the opposite direction. The next section decomposes the change in the gender wage gap in services over the 1995–2000 period to see if there is any support for these hypotheses.

Decomposition of the Gender Wage Gap

In an effort to disentangle the effects on the gender wage gap of the trends in employment and wages between and within tradable and non-tradable service sector occupations, following Zveglich and Rodgers (2004), the gender wage gap is first partitioned into its two components: the gender wage differentials across tradable and non-tradable occupations and gender wage differentials within each set of occupations.[10] Accordingly, the gender wage gap can be written as

$$W_{mt} - W_{ft} = \Sigma_i(\alpha_{mit} w_{mit} - \alpha_{fit}\, w_{fit}) \quad (1)$$

where, at time t, W_{mt} and W_{ft} denote overall mean wages for male and female workers, w_{mti} and w_{fti} represent the corresponding mean wages within occupation i, α_{mit} is the share of total men's employment in occupation i, and α_{fit} is the share of total women's employment in occupation i.

With some elementary manipulations, (1) can alternatively be expressed as

$$(2) \qquad W_{mt} - W_{ft} = \Sigma_i(\alpha_{mit} - \alpha_{fit})w_{mit} + \Sigma_i\alpha_{fit}(w_{mit} - w_{fit})$$

The first term on the right-hand side of the equation measures the portion of the gender wage gap attributable to women's overrepresentation in the low-paying non-tradable occupations. The second term measures the portion attributable to women's lower pay within each category. Thus, (2) decomposes the wage gap into its within- and across-occupations components.

Letting Δ denote the gender difference in any variable, the change in the gender wage gap between any two periods, s and t, can be written as follows:[11]

$$(3) \qquad \Delta W_t - \Delta W_s = \Sigma_i(\Delta\alpha_{it} - \Delta\alpha_{is})w_{mis} + \Sigma_i\Delta\alpha_{it}(w_{mit} - w_{mis}) + \Sigma_i(\alpha_{fit} - \alpha_{fis})\Delta w_{is} + \Sigma_i\alpha_{fit}(\Delta w_{it} - \Delta w_{is}).$$

This decomposition breaks the change in the gender wage gap over time into four components. The first term on the right-hand side of the equation, *across-occupations employment effect*, captures the contribution of the change in gender segregation in employment across tradable and non-tradable occupations. We expect that the relative decline in women's employment in the high-wage tradable occupations over the 1995–2000 period would have led to a decrease in women's relative earnings and hence an increase in the gender wage gap.

The second term, *across-occupations pay effect*, expresses the contribution of the changes in relative pay between tradable and non-tradable occupations. The impact on the gender wage gap of the relative wage growth in tradable occupations over the 1995–2000 period would

depend on whether or not there is a significant difference in the gender composition of employment in tradable occupations, compared to non-tradable occupations. For instance, if in 1995, tradable occupations were male dominated, the increase in the relative pay in these occupations would have benefited men more compared to women thereby widening the gender wage gap over the 1995–2000 period. However, in 1995, there was not a large difference between the two occupational categories in terms of the gender composition of employment (Table 1), so we do not expect the increase in the relative pay in tradable occupations between 1995 and 2000 to have had a significant impact on the gender wage gap.

The third term, *within-occupations employment effect*, captures the contribution of the changes in women's distribution across tradable and non-tradable occupations. Tradable occupations are characterized by a wider gender wage gap compared to non-tradable occupations. The relative shift in women's employment away from tradable occupations with larger gender wage gaps toward tradable occupations with smaller gaps would have narrowed the gender wage gap. Finally, the last term, *within-occupations pay effect*, captures the effect of the changes in gender wage gap within each occupational category. This effect is the employment-weighted sum of the changes in the gender wage gap in tradable and non-tradable occupations. Given that the gender wage gap increased within tradable and non-tradable occupations, this component is expected to have contributed to the widening of the gender wage gap in services over the 1995–2000 period.

Table 3 presents the results from decomposition of the change in the gender wage gap over the 1995–2005 period. All the results are as expected. The positive and statistically significant coefficient on the across-occupations employment effect indicates that, between 1995 and 2000, as more women than men moved away from high-wage tradable occupations to low-

wage non-tradable occupations, women's relative wages decreased and the gender wage gap widened. This growing segregation in employment by gender accounts for an increase of about 0.5 % between 1995 and 2000 in the gender wage gap.[12] While across-occupations employment effect contributed to a widening gap, within-occupations employment effect worked in the opposite direction. The shift in employment away from tradable occupations, characterized by relatively higher gender wage differentials, toward non-tradable occupations with the opposite characteristic slowed down the widening of gender wage gap over the 1995–2000 period. The coefficient on the across-occupations pay effect is statistically insignificant indicating that the change in the relative pay in tradable occupations compared to non-tradable occupations did not have a significant impact on the gender wage gap between 1995 and 2000. The positive and statistically significant coefficient on the within-occupations pay effect indicates that this effect is the largest source of the widening in the gender wage gap, accounting for 1 % of the increase in the gender wage gap over the 1995-2000 period.

The within-occupations pay effect is the employment-weighted sum of the changes in the gender wage gap in tradable and non-tradable occupations. The last two rows of Table 3 decomposes the within-occupations pay effect into its two components and show that the gender wage gap widened within non-tradable occupations but stayed constant in tradable occupations. One possible explanation for the constancy of the gender wage gap in tradable occupations over the 1995–2000 period is as follows: As women's share in employment increased in the traditionally male-dominated non-clerical occupations and decreased in the low-paying clerical occupations, the gender wage gap narrowed. However, given that non-clerical occupations are characterized by a wider gender wage gap compared to the clerical occupations, the shift in women's employment away from the more equitable clerical to less equitable non-clerical

occupations worked in the opposite direction. The net effect was a stagnant gender wage gap in tradable occupations.

To see if there is any support for this hypothesis, we decompose the change in the gender wage gap in tradable occupations into its four components of across-occupations pay effect, across-occupations employment effect, within-occupations employment effect, and within-occupations pay effect. Across-occupations employment effect is expected to capture the improvement in the gender wage gap due to the shift in women's employment away from the low-paying clerical occupations and into the high-paying non-clerical occupations. This effect is expected to be offset by the within-occupations employment effect, which captures the widening of the gender wage gap due to the relative shift in women's employment away from the more-equitable clerical occupations to the less-equitable non-clerical occupations. We do not expect the two pay effects, namely the across-occupations pay effect and the within-occupations pay effect to have a significant impact on the gender wage gap. Table 4 presents the results of this decomposition and shows that all the results are as expected: Women's entry into high-paying non-clerical occupations and the decline in their employment in low-paying clerical occupations narrowed the gender wage gap. However, the relative shift in women's employment away from the more gender equitable clerical to non-clerical occupations with the opposite characteristic worked in the opposite direction. This effect was large enough to offset the improvement in the gap due to desegregation of employment across clerical and non-clerical occupations. Hence, the gender wage gap within tradable occupations stagnated.

Trade-displaced Workers

Trade expansion in services coincided with a shift in industrial, occupational, and educational composition of displaced workers in the U.S. economy. Less-educated production workers and

workers in the manufacturing sector continued to comprise the majority of displaced workers in the 1990s, but the share of white-collar and service sector workers among the displaced workers increased dramatically over this period Bardhan and Kroll 2003, Rodriguez and Zavodny 2003, Jensen and Kletzer 2006). These developments have been linked to an increase in services offshoring (Gardner 1993, Bardhan and Kroll 2003, Jensen and Kletzer 2006). Job loss rates for white-collar workers in the service sector of the U.S. economy over the 2001-2003 and 2003-2005 periods in Table 5 are consistent with this explanation. In both periods, displacement rates are higher for both men and women in tradable occupations compared to their counterparts in non-tradable occupations. This difference is more pronounced and the displacement rates are higher in the 2001-2003 period, which covers the dot.com bust and the 2001 recession.

In both periods, clerical workers comprise a larger share of displaced workers in tradable occupations, compared to non-tradable occupations (Table 5). Specifically, over the 2001-2003 period, clerical workers represent 42.6 % of the displacements in tradable occupations compared to 14.9 % in non-tradable occupations. This difference is even more pronounced in the later period where clerical workers comprise 48.2 % of the workers displaced from tradable occupations and 14.2 % in non-tradable occupations. The larger share of relatively low-wage, less-skilled clerical workers among workers displaced from tradable occupations is consistent with the U.S. comparative advantage in high-wage, more-skilled service occupations.

Table 6 shows that women and men were affected differently by services offshoring: While, in both periods, there does not seem to be a significant gender difference in displacement rates in non-tradable occupations where about 50 % of all displaced workers were women, in tradable occupations, women comprised the majority (61 percent) of displaced workers in both periods (Columns I and V). The disproportionate share of women among low-wage, clerical

workers who bore the brunt of services offshoring is a plausible explanation for this gender difference.

According to Table 6, compared to their counterparts in non-tradable occupations, both men and women displaced from tradable occupations had higher earnings and were more likely to have had health insurance. But in both tradable and non-tradable occupations, women in their pre-displacement jobs had lower earnings and were less likely to have had health insurance compared to men. The loss of tenure was greater for women compared to men in both periods: about 30 % of women (Columns I and V) compared to 17 % of men (Columns II and VI) who were displaced from tradable occupations were displaced from jobs they held for more than 10 years. In both periods, women displaced from tradable service occupations were less likely to be re-employed compared to men (Columns I, II, V, and VI). When re-employed, both men and women were more likely to have found employment in a non-tradable occupation in both periods (Columns I, II, V, and VI).

Conclusions

Our findings suggest that offshoring of white-collar jobs had similar effects on women's employment and wages in the U.S. as did the relocation of manufacturing operations overseas. In both sectors, women who predominated in the low-wage occupations experienced disproportionate job losses due to internationalization of production. Moreover, the shedding of women in low-wage occupations led to an artificial increase in the average wage for the women workers who remained, thus contributing to a smaller gender wage gap. At least in this sense, the white-collar represents the new blue-collar in the U.S. economy.

Our study also shows that while globalized production of services contributed to a smaller gap through job losses for low-wage women, two other effects pulled in the opposite

direction: the relative growth of male employment in tradable white-collar occupations characterized by high-wages and the increase in the gender wage gap within non-tradable occupations over this period. Within tradable occupations, the gender wage gap stagnated. This was due to a combination of the two effects working in opposite directions: Women's entry into high-paying non-clerical occupations and the decline in their employment in low-paying clerical occupations narrowed the gender wage gap. However, this was offset by the widening impact of the relative shift in women's employment away from the more gender equitable clerical to non-clerical occupations with the opposite characteristic.

Our results are consistent with those of earlier research that job displacement due to offshoring of white-collar jobs is real (Bardhan and Kroll 2003, Jensen and Kletzer 2006, Kroll 2005). In deindustrializing economies like the U.S. the growth of service sector jobs has been expected to provide jobs in communities where unemployment rates have increased as manufacturing production moved offshore (Bronfenbrenner and Luce 2004, Labour Research 2004). Our findings suggest that this has not been the case in the U.S. economy over the 1995-2005 period. We showed that women who comprised a disproportionate share of employment in low-wage white-collar occupations at risk of being offshored, experienced greater job losses compared to men in the first few years of the 21st century. Moreover, displaced women were less likely to be re-employed compared to men. Since offshoring of service sector jobs is likely to continue in the future, there is need to improve the safety net for easing job transitions for displaced workers. Trade Adjustment Assistance (TAA) program, which has been available to manufacturing workers since 1994, needs to be extended to displaced service workers, after a reevaluation of the effectiveness of these programs in meeting the needs of service workers.[13] There is also need to increase funding for the TAA program since the evidence suggests that this

program has not been effective in fostering adjustment in part due to low levels of federal funding. Given the increase in the share of college-graduates in trade-displaced workers due to services offshoring, more education, which has been widely argued as a solution to manufacturing displacements does not seem to be the answer to unemployment due to trade expansion in services. Future research that utilizes alternative measures of offshoring of white-collar jobs that better isolate the effects of these developments on gender wage and employment differentials would enhance our understanding of the gendered outcomes of these developments in the U.S. economy.

ENDNOTES

[1] "Offshoring" refers to the moving of functions previously performed in the same country as the product market to an arms-length contractor operating outside the nation's borders. The commonly known examples are call centers and back-office services. According to the Interagency Task Force on Statistics of International Trade in Services (2002), trade in services can be divided into four categories based on the mode of delivery. Mode 1 refers to offshoring. Mode 2 is trade in services such as tourism and health care where the services are supplied by bringing the buyer to the location of the seller. The trade in services when the seller is commercially present at the buyer location (e.g. insurance companies) is categorized as Mode 3. Finally, Mode 4 refers to the trade in services where the seller moves to the location of the buyer (e.g. H1B visa holders).

[2] Authors' calculations from Bureau of Labor Statistics (BLS) data. All figures are deflated by the Consumer Price Index and are in 2006 dollars.

[3] Relevant studies that find declines in employment in the U.S., Canada, and Australia include Blinder 2005, Jensen and Kletzer 2006, Kroll 2005 and, van Welsum and Reif 2006b.

[4] In January 2003, the CPS adopted the 2002 Census occupational and industry classification systems replacing the 1990 Census classifications.

[5] In the U.S., the 1995–2000 period was characterized by rapid output growth and low inflation rates. This upward trend in the economy ended in March 2001 when the economy entered a recessionary period.

[6] The sample includes individuals aged 18 to 64 who worked in the civilian sector in the year prior to the survey. Self-employed individuals and individuals working without pay are excluded from the analysis. The wage data refer to real hourly earnings. Wages are deflated by the Consumer Price Index. Workers earning less than $0.69 and more than $138.87 in hourly wages in 2000 dollars are excluded from the analysis. These data refinements are similar to those of Katz and Murphy (1992), Borjas and Ramey (1995), and Black and Brainerd (2004).

[7] The residual wage calculation is similar to that used by Katz and Murphy (1992) and Black and Brainerd (2004). March CPS does not include a measure for actual work experience. The potential experience variable likely overestimates the experience levels of women, as they are more likely to have breaks in their labor force participation for childbearing, their disproportionate share in care work and other reasons. However, given the rise in women's labor force participation and attachment over time, this overestimation is less likely to be a problem in the 1990s than it was in the past (Boraas and Rodgers 2003).

[8] The CPS uses the 1990 Census occupational classification system to report data for the 1995–2000 period and the 2002 system for the post-2001period. We use the list of occupations identified by van Welsum and Vickery (2005) for the 1995–2000 period and those identified by Kroll (2005) for the post-2001 period, because these occupations are comparable with the March CPS data for the 1995-2000 and post-2001 periods, respectively.

[9] This assumes that three or more years with the same employer denotes a substantial mutual commitment between employer and employee. The measured job loss is thus more likely to be the result of labor market conditions rather than a "bad match".

[10] Similar methods have been utilized to explain the trends in the Black/White wage gap by the relative changes in public-sector/private-sector wages and employment shares (Carrington, McCue and Pierce 1996), and changes in overall wage structure (Juhn, Murphy and Pierce 1991).

[11] Following Zveglich and Rodgers (2004), the average across all years is used as the base year, *s*, to avoid possible extremes within any given year.

[12] The coefficients reported are the contributions of each effect to the annual change in the residual gender wage gap. For instance, the coefficient on the across-occupations employment effect, 0.102, indicates that this effect accounts for about 0.1 % of the widening gender wage gap annually or about 0.5 % over the 1995 and 2000 period.

[13] Trade adjustment assistance programs were designed for less-educated workers laid off in manufacturing and lower skilled services jobs and hence may need to be reevaluated to meet the needs of more-educated workers displaced from high-skilled service occupations.

Table 1 Women's Share in White-collar Employment in the service sector, 1995–2000 (percent)

	Service			*Tradable*			*Non-tradable*		
	all	*clerical*	*nonclerical*	*all*	*clerical*	*nonclerical*	*all*	*clerical*	*nonclerical*
	(I)	*(II)*	*(III)*	*(IV)*	*(V)*	*(VI)*	*(VII)*	*(VIII)*	*(IX)*
1995	65.7	87.0	60.6	65.7	94.0	44.8	65.6	80.0	63.6
1996	66.3	86.6	61.5	65.9	92.9	46.5	66.4	81.1	64.3
1997	66.1	86.4	61.2	66.0	93.4	46.2	66.2	79.9	64.1
1998	66.4	87.2	61.6	64.6	93.2	45.2	67.0	81.5	64.9
1999	65.7	87.1	60.8	63.9	93.5	44.7	66.2	81.6	64.0
2000	65.8	86.5	61.0	63.5	93.3	45.8	66.4	81.2	64.1
Change[a]	0.1	–0.5	0.4	–2.2	–0.7	1.0	0.8	1.2	0.5

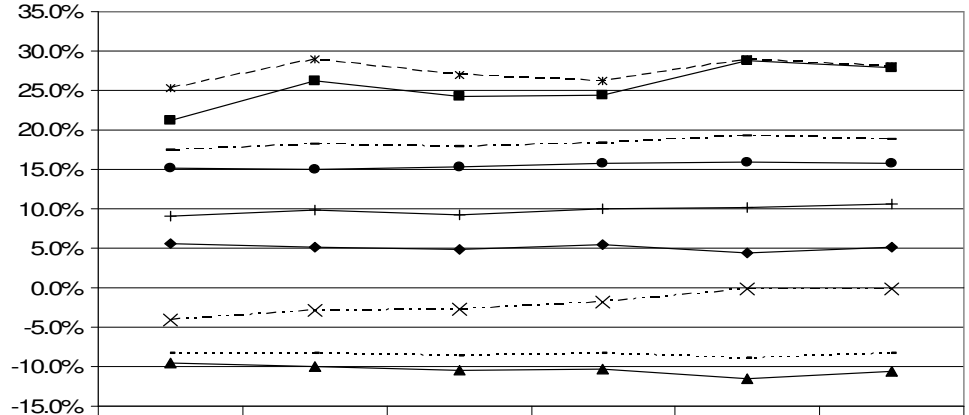
Source: Authors' calculations from March CPS data.
[a] Percentage point change in women's share in employment between 1995 and 2000.

Table 2 Change in Men's, Women's, and Total Employment in Tradable and Non-tradable Occupations, 1995–2000 (percent)

	Tradable			*Non-tradable*		
	all	*clerical*	*non-clerical*	*all*	*clerical*	*non-clerical*
	(I)	*(II)*	*(III)*	*(IV)*	*(V)*	*(VI)*
Total	9.5	–3.9	19.7	13.3	22.6	11.8
Women	5.8	–4.8	22.9	14.8	25.5	12.8
Men	16.5	9.5	17.1	10.3	12.0	10.2
Change in women's share in employment (% point)	–2.2	–0.7	1.0	0.8	1.2	0.5

Source: Authors' calculations from March CPS data.

Figure 1 Residual Male and Female Wages and the Residual Gender Wage Gap, 1995-2000



	1995	1996	1997	1998	1999	2000
men_non-tradable	5.6%	5.1%	4.9%	5.4%	4.4%	5.1%
men_tradable	21.2%	26.2%	24.2%	24.4%	28.8%	27.8%
women_non-tradable	-9.6%	-10.0%	-10.5%	-10.3%	-11.6%	-10.6%
women_tradable	-4.1%	-2.8%	-2.7%	-1.8%	-0.2%	-0.2%
gap_tradable	25.3%	29.0%	26.9%	26.2%	29.0%	28.0%
gap_non-tradable	15.1%	15.1%	15.3%	15.7%	16.0%	15.7%
men_service	9.1%	9.8%	9.2%	9.9%	10.2%	10.5%
women_service	-8.3%	-8.4%	-8.7%	-8.4%	-9.0%	-8.3%
gap_service	17.4%	18.2%	17.9%	18.3%	19.2%	18.8%

Table 3 Decomposition of the Change in the Gender Wage Gap, 1995–2000 (average change in log points x 100, standard errors in parentheses)

Total change in the wage gap	0.302**
	(0.077)
Across-occupations employment effect	0.102***
	(0.021)
Across-occupations pay effect	0.004
	(0.006)
Within-occupations employment effect	–0.025*
	(0.011)
Within-occupations pay effect	0.220*
	(0.080)
Share of within-sectors pay effect due to each group of occupations	
Tradable	0.084
	(0.082)
Nontradable	0.136**
	(0.034)

Notes: The decomposition is performed using Equation 3 for each year from 1995 to 2000, which results in 5 observations for each term in the equation that are in turn regressed on a time trend variable. The table reports the coefficients on the time trend variable. A negative (positive) sign indicates that the gap has narrowed (widened) provided that the change is statistically significant. The average across all years is used as the base year to avoid possible extremes within any given year. ***, **, * denote statistical significance at 1, 5, and 10 percent levels, respectively.

Table 4 Decomposition of the Change in the Gender Wage Gap in Tradable Occupations, 1995–2000 (average change in log points x 100, standard errors in parentheses)

	1995–2000
Total change in the wage gap	0.290
	(0.004)
Across-occupations employment effect	-0.268*
	(0.393)
Across-occupations pay effect	1.315
	(1.525)
Within-occupations employment effect	0.159***
	(0.029)
Within-occupations pay effect	-0.916
	(1.636)

Notes: See notes to Table 3.

Table 5 Job Displacement Rates for White-collar Workers in the Service Sector by Gender, 2001–2005

	Tradable occupations					
	2001–2003			*2003–2005*		
	Overall (I)	*Female (II)*	*Male (III)*	*Overall (IV)*	*Female (V)*	*Male (VI)*
Number	948,729	575,409	373,320	645,122	394,886	250,236
Rate (%)	5.6	5.5	5.9	3.7	3.6	4.0
Percent clerical (%)	42.6	53.2	26.3	48.2	63.5	24.1
	Non-tradable occupations					
	2001–2003			*2003–2005*		
	Overall	*Female*	*Male*	*Overall*	*Female*	*Male*
Number	4,380,179	1,743,620	2,636,559	3,170,336	1,344,264	1,826,072
Rate (%)	2.9	2.7	3.2	2.2	2.2	2.3
Percent clerical (%)	14.9	21.1	8.7	14.2	21.7	5.8

Source: Authors' calculations from the 2004 and 2006 DWS, using sampling weights.

Table 6 Characteristics of Workers Displaced from White-collar Service Sector Occupations, 2001-2005

	2001–2003				*2003–2005*			
	tradable		*non-tradable occupations*		*tradable*		*non-tradable occupations*	
	women (I)	*men (II)*	*women (III)*	*men (IV)*	*women (V)*	*men (VI)*	*women (VII)*	*men (VIII)*
Share of Total	60.7	39.3	50.2	49.8	61.2	38.8	53.1	46.9
Age (mean in years)	45	42	45	45	44	43	45	47
Job tenure (mean in years)	9.1	7.4	8.5	9.8	9.6	7.6	9.0	10.2
Job tenure > 10 years	28.5	17.4	25.2	28.5	31.4	17.3	27.9	33.1
Educational Attainment (share)								
Less than high school	2.0	2.8	4.0	4.1	0.9	1.3	4.1	5.5
High school	31.9	8.4	32.4	20.1	26.8	13.8	26.4	20.1
Some college	39.6	28.0	29.5	27.2	40.7	38.2	37.9	26.8
College	22.1	41.2	23.5	32.2	28.2	37.5	23.5	30.2
Advanced	4.5	19.6	10.6	16.4	3.4	9.2	8.1	17.4
In predisplacement job								
Share of with health insurance	74.8	83.3	64.1	73.3	74.6	92.9	61.3	71.8
Full-time	94.6	100.0	86.5	93.3	87.4	98.2	76.5	78.9
If full-time, real weekly earnings (2005 $)	673.0	977.0	626.3	1060.3	759.6	1020.4	650.0	1057.7
Share reemployed	58.3	72.7	66.1	65.7	72.6	80.5	66.2	75.1
Of reemployed, share full-time	79.4	97.3	76.5	83.6	81.6	92.9	75.3	87.6
All reemployed								
Median change	-14.5	-4.9	-0.2	-0.1	-12.4	-13.4	-4.1	-6.7
Share with no loss in earnings	41.4	49.8	36.3	42.4	29.5	38.7	41.5	37.6
Full-time to full-time								
Median change	-13.8	-4.0	-14.4	-9.0	-7.7	-7.0	-2.1	-6.7
Share with no loss in earnings	43.6	50.6	36.6	40.2	33.4	39.7	39.4	35.7

Source: Authors' calculations from the 2004 and 2006 DWS, using sampling weights.

Appendix Table I Occupations Potentially Affected by Offshoring[a,b]

CPS categories	CPS categories
23 Accountants and auditors	183 Authors
24 Underwriters	184 Technical writers
25 Other financial officers	195 Editors and reporters
26 Management analysts	227 Air traffic controllers
43 Architects	229 Computer programmers
44 Aerospace engineers	233 Tool programmers, numerical control
45 Metallurgical and materials engineers	243 Supervisors and proprietors, sales
46 Mining engineers occupations	253 Insurance sales occupations
47 Petroleum engineers	254 Real estate sales occupations
48 Chemical engineers	255 Securities and financial services
49 Nuclear engineers	257 Sales occupations, other business services
53 Civil engineers sales occupations	304 Supervisors, computer equipment
54 Agricultural engineers	305 Supervisors, financial records processing
55 Engineers, electrical and electronic	306 Chief communications operators
56 Engineers, industrial	308 Computer operators
57 Engineers, mechanical operators	309 Peripheral equipment operators
58 Marine and naval architects	*313 Secretaries*
59 Engineers, n.e.c.	*315 Typists*
63 Surveyors and mapping scientists	*318 Transportation ticket and reservation*
64 Computer systems analysts & scientists	*335 File clerks*
65 Operations & systems researchers & analysts	*336 Records clerks*
66 Actuaries	*337 Bookkeepers, accounting, & auditing clerks*
67 Statisticians agents	*338 Payroll and timekeeping clerks*
68 Mathematical scientists, n.e.c.	*339 Billing clerks*
69 Physicists and astronomers	*343 Cost and rate clerks*
73 Chemists, except biochemists	*344 Billing, posting, and calculating*
74 Atmospheric and space scientists	*348 Telephone operators*
75 Geologists and geodesists	*383 Bank tellers*
76 Physical scientists, n.e.c.	*385 Data-entry keyers*
77 Agricultural and food scientists	*386 Statistical clerks*
78 Biological and life scientists	
79 Forestry & conservation scientists	
machine operators	
83 Medical scientists	
164 Librarians	
165 Archivists and curators	
166 Economists	
173 Urban planners	

a. Source: van Welsum and Vickery (2005), based on the March CPS data files.
b. Clerical occupations are italicized.

Appendix Table II Service Occupations At-Risk to Outsourcing

2002 Census Code	Description	2000 SOC Code
Computer and Mathematical Occupations		
1000	Computer scientists and systems analysts	15-10XX
1010	Computer programmers	15-1021
1020	Computer software engineers	15-1030
1040	Computer support specialists	15-1041
1060	Database administrators	15-1061
1100	Network and computer systems administrators	15-1071
1110	Network systems and data communications analysts	15-1081
1200	Actuaries	15-2011
1210	Mathematicians	15-2021
1220	Operations research analysts	15-2031
1230	Statisticians	15-2041
1240	Miscellaneous mathematical science occupations	15-2090
Medical, Legal and Sales		
2140	Paralegals and legal assistants	23-2011
3320	Diagnostic related technologists and technicians	29-2030
3650	Medical assistants and other healthcare support occupations	31-909X
4940	Telemarketers	41-9041
Graphics, Design and Writing Occupations		
1310	Surveyors, cartographers, and photogrammetrists	17-1020
1540	Drafters	17-3010
2630	Designers	27-1020
2840	Technical writers	27-3042
2860	Miscellaneous media and communication workers	27-3090
Business and Finance Support		
540	Claims adjusters, appraisers, examiners, and investigators	13-1030
600	Cost estimators	13-1051
620	Human resources, training, and labor relations specialists	13-1070
710	Management analysts	13-1111
800	Accountants and auditors	13-2011
820	Budget analysts	13-2031
830	Credit analysts	13-2041
840	Financial analysts	13-2051
860	Insurance underwriters	13-2053
940	Tax prepares	13-2082
Office Support		
5000	First-line supervisors/managers of office and administrative support workers	43-1011
5010	Switchboard operators, including answering service	43-2011
5020	Telephone operators	43-2021

(continued)

Appendix Table II Services Occupations At-Risk to Outsourcing (*Continued*)

5100	Bill and account collectors	43-3011
5110	Billing and posting clerks and machine operators	43-3021
5120	Bookkeeping, accounting, and auditing clerks	43-3031
5140	Payroll and timekeeping clerks	43-3051
5150	Procurement clerks	43-3061
5200	Brokerage clerks	43-4011
5210	Correspondence clerks	43-4021
5230	Credit authorizers, checkers, and clerks	43-4041
5240	Customer service representatives	43-4051
5310	Interviewers, except eligibility and loan	43-4111
5330	Loan interviewers and clerks	43-4131
5350	Order clerks	43-4151
5360	Human resources assistants, except payroll and timekeeping	43-4161
5600	Production, planning, and expediting clerks	43-5061
5800	Computer operators	43-9011
5810	Data entry keyers	43-9021
5830	Desktop publishers	43-9031
5840	Insurance claims and policy processing clerks	43-9041
5920	Statistical assistants	43-9111

Source: Adapted from Kroll 2005.

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