
Working Late

Do Workplace Sex Ratios Affect Partnership Formation and Dissolution?

Michael Svarer

ABSTRACT

In this paper, I analyze the association between workplace sex ratios and partnership formation and dissolution. I find that the risk of dissolution increases with the fraction of coworkers of the opposite sex at both the female and male workplace. On the other hand, workplace sex ratios are not important for the overall transition rate from singlehood to partnership. The results suggest that the workplace constitutes a more important marriage market segment for individuals who are already in a partnership, presumably due to higher search cost for (alternative) partners in general.

I. Introduction

There is ample evidence that romantic workplace interactions are quite common. Based on a U.S. survey conducted in 1992, Laumann et al. (1994) report that 15 percent of married couples and 18 percent of cohabiting couples met their current partner in the workplace. Åberg (2003) reports that a Swedish survey conducted in 1996 shows that 20 percent of Swedish adults met their current partner in the workplace. In a Dutch Survey from 1995, 8 percent reported to have met their current partner at work (Kalmijn and Flap 2001). Acknowledging that the probability of finding a suitable match at work presumably depends on the workplace composition, the purpose of this paper is to investigate how the sex ratio in the workplace affects marriage market behavior.

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A number of studies have shown how the sex ratio in the local marriage market affects both partnership formation and dissolution (see, for example, Lichter, LeClere, and McLaughlin 1991; Fitzgerald 1991; South and Lloyd 1992, 1995; Brien 1997; Cready, Fossett, and Kielcolt 1997; and Angrist 2002). This project takes a more narrow approach and exploits firm and workplace level data to investigate how partnership formation and dissolution evolves for a group of Danish individuals conditional on the gender composition of their workplaces.

In terms of analyzing partnership formation from the perspective of workplace interactions, the author of this paper does not know any other literature that addresses this aspect, whereas the association between sex ratios in the workplace and the risk of divorce are analyzed in (at least) three other studies. Both Åberg (2003) and McKinnish (2004, 2007) provide evidence that married individuals working in firms or occupations where the fraction of workers of the opposite sex is high have an increased risk of divorce.

In relation to the latter studies, this paper also contributes to the literature on workplace composition and divorce. Compared with McKinnish (2004, 2007), who uses industry-occupation level data, I have access to much more precise information on the actual sex ratio of the workplace. In addition, the data set enables me to identify whether a new match is formed between two persons who, prior to partnership formation, worked for the same employer. This makes it possible to get a clearer test of one of the main mechanisms through which the sex ratio at the workplace affects marriage market behavior—namely, finding of a (new) partner at work.

The main finding of the paper is that the risk of dissolution increases with the fraction of coworkers of the opposite sex at both the female and male workplace. This is also the case for those who leave the current partnership to start a new one. On the other hand, workplace sex ratios are not important in relation to partnership formation for single individuals. I argue that these results are consistent with a simple search model in which the costs of searching for partners increase if an individual is already in a partnership, and accordingly that the workplace becomes more important as a marriage market segment. In fact, the data set used in the present analysis support this presumption since the fraction of individuals who leave a partnership to form a new relationship with a coworker is twice the size of the fraction of single individuals who form a partnership with a colleague.

The structure of this paper is as follows. In Section II, I provide a brief theoretical discussion. Section III presents the data and outlines the empirical strategy. Section IV and V give the results of the partnership formation and partnership dissolution analyses, respectively. Section VI concludes.

II. Theoretical considerations

For some time, sex ratios have been recognized as important for marriage market outcomes. Becker (1973), Keeley (1977), and Oppenheimer (1988) all emphasize that marriage timing is a function of available partners and therefore that women marry faster if living in a male dominated marriage market and vice versa for men. Empirically, it has also been established that sex ratios affect both marriage formation and dissolution (see, for example, Lichter, LeClere, and McLaughlin 1991;

Fitzgerald 1991; South and Lloyd 1992, 1995; Brien 1997; Cready, Fossett, and Kielcolt 1997; and Angrist 2002). Whereas these and related studies have investigated the effect of sex ratio in a geographically restricted area on marriage market outcomes, the purpose of the current study is to narrow the measure of sex ratios even further. I investigate the effect of sex ratio in the workplace on marriage market outcomes.

It is useful to approach the topic from a search theoretical perspective along the lines of among others Oppenheimer (1988) and Mortensen (1988). Any given individual might occupy one of two states: single or married. In both states, partnership search can take place. It is however obvious that searching for a new partner while already in a marriage might be more expensive than searching when single. This observation is important for the present analysis, because I am focusing on workplace encounters and since workplaces presumably constitute a larger part of the potential marriage markets for married persons than for singles. With this in mind, I imagine that individuals search for partners to marry. Marriage offers arrive at a finite rate. The decision to accept a given marriage proposal depends on the expected return to the current partnership compared to continued search for another partner. In standard stationary search models, the optimal behavior for individuals is to follow a reservation level strategy, where the first individual who proposes marriage and has a quality that satisfies the reservation level is accepted. For a given reservation level, an increase in the number of potential partners will increase the probability of marriage. In this case, I expect that individuals who are working in firms with a higher fraction of employees of the opposite sex are more likely to find a (new) partner. As workplace encounters are assumed to be more important for individuals already married (due to the higher cost of searching in other segments of the marriage market), I expect this effect to be more pronounced for married individuals than for single individuals. Clearly, individuals might increase their reservation level when they realize that the arrival rate of marriage offers increases (they become choosier). A higher reservation level has an offsetting effect on the probability of observing a match. In the job-search literature it has been shown that the former effect dominates for most parametric configuration of the distribution of offers (see van den Berg 1994). In light of this literature, I expect to find a positive association between sex ratios in the workplace and partnership formation for both single and married people, where the effect for married people in terms of divorce is expected to be more pronounced.

III. Data and empirical strategy

The data set used in the present analysis come from IDA (Integrated Database for Labour Market Research) created by Statistics Denmark. The information comes from various administrative registers that are merged in Statistics Denmark. The IDA sample used here contains information on marriage market conditions as well as demographic, socioeconomic, and workplace-related variables for a randomly drawn subsample of all individuals born between January 1, 1955 and January 1, 1965 and their partners. The individuals are followed from 1980 to 1995. When a partnership ends, the data set does not follow the partner; thus, we have no information on the marriage market history that comes after a break with an individual from the original sample.

The main variable of interest is the fraction of workers of opposite sex at the workplace. This number is simply calculated as the number of workers of the opposite sex divided by the total number of employees at the workplace each year. A workplace is defined as a unit of a firm that has its own address and produces a given good or service. In comparison, the label “firm” is used for a legal entity that encompasses one or more workplaces. The data set contains information on the number of male and female workers on both workplace and firm level. In terms of the issue of interest in this paper, which is proximity of potential partners, the workplace level data presumably offer a more direct measure of the group of individuals that surrounds the unit of observation than firm level data do. The distribution of workplace size in Denmark is very right-skewed. There is a majority of smaller entities. This is also the case for the distribution of the fraction of colleagues of the opposite sex. In around 40 percent of the workplaces in the sample, individuals have less than 10 colleagues of the opposite sex and around 70 percent have less than 50. The median number of coworkers of the opposite sex is 16 for men and 27 for females. This pattern is consistent with McKinnish (2007) for the United States and shows that the labor market to some extent is segmented according to sex.

Not all working individuals have workplace identification numbers. This happens when the individual is a full-time student, is unemployed, or if the individual performs a task that does not take place at a given workplace—that is, taxi drivers, cleaning personal, insurance salesmen, and all other individuals who do not have a fixed address at which they perform their job. The latter group might be in contact with a workplace and meet others through this contact; information on the sex ratio of their workplace is, however, missing. In the following, the fraction of workers of the opposite sex for these individuals as well as for individuals who are out of work because of school or lack of employment is set to 0. To distinguish from workers who do not have coworkers of the opposite sex, I include three indicator variables that take the value 1 if the fraction of coworkers is missing due to one of the mentioned reasons and 0 otherwise.

I perform two sets of analysis in the paper. First, I look at partnership formation and how workplace sex ratio affects the transition from singlehood to cohabitation or marriage. I do not distinguish between partnerships that are formal marriages or cohabitation. The latter is widely used in Denmark both as a substitute for marriage and as a stepping stone for marriage (see Svarer 2004). Second, I investigate the issue of partnership dissolution.

A. Empirical strategy

In both the partnership formation analysis and partnership dissolution analysis, I use duration models. I construct two types of spells: single spells and partnership spells. The first type starts when an individual ends a partnership. I then follow the individuals over time until they find a new partner or the observation periods end. In the latter case, the spell is right censored. This strategy implies that I delete all left censored spells.¹ For individuals who start the observation period as single, I have no information on how long time the elapsed duration has been and I therefore ignore

1. I also conduct the analysis including left censored observation to get a picture of how sensitive the results are to the omission of these observations.

these observations in the analysis. I follow the same strategy for the partnership dissolution analysis. Here I sample all individuals who enter a relationship as either cohabiting or married and follow them until the partnership ends or the sample periods stop. Both procedures give a flow sample of single spell/partnerships.

In relation to the partnership formation analysis I also consider a competing-risks specification where I distinguish between single spells that end because an individual finds a partner at work and spells that end when a partner outside work is located. Because workplace information is missing for part of the sample, the probability of finding a partner at work is obviously zero. I address this issue by restricting the cause-specific hazard into partnership with a coworker to zero in the likelihood function. That is, they do not contribute to this part of the model.²

IV. Analysis of partnership formation

The main interest here is to investigate whether the probability of exiting a single spell is affected by the fraction of coworkers of the opposite sex. In addition, I also distinguish between partnerships with a coworker and with a non-coworker. Around 5 percent (7 percent) of the partnerships formed are among coworkers from the same workplace (firm). There are good reasons to believe that this number underestimates the true number of partnerships formed between colleagues.³ Some firms have a policy of not employing couples, which may cause newly matched individuals to change jobs. In addition, if two individuals are employed at the same workplace but the workplace does not have an identification number, they do not count as coworkers. In addition, the data set cannot identify all partnership formations that take place in the sample, since I only consider partnerships formed by single individuals in this part of the paper. I focus on singles because they provide a clear view of how workplace sex ratios affect this group compared with the group of individuals already in a relationship for whom the workplace presumably constitutes a larger segment of their search environment.⁴

In addition to information on workplace sex ratios, I use a range of other time-varying explanatory variables to describe partnership formation. Following the empirical marriage formation literature (see South and Lloyd 1992), I include information on age, income, education, children and occupation.⁵ In Table 1, I present results from the partnership analysis. In Model 1, the main variable of interest is the fraction of coworkers of the opposite sex. In Model 2, I interact the fraction of coworkers of the opposite sex with the size of the workplace. I distinguish between workplaces with

2. To save space I refer to Jensen, Rosholm, and Svarer (2003) for technical details on the econometric model. Here a similar competing risks duration model is presented.

3. If I only consider individuals with workplace information, I find that of those who find a partner 9.4 percent find a partner at the workplace and 12 percent find a partner in the firm in which they work. These numbers are closer to the ones reported by Laumann et al. (1994) and Åberg (2003).

4. In the partnership dissolution analysis in Section V, I address the issue of partnership dissolution that is followed by a new relationship with a coworker.

5. For more details on the variables used, I refer to Svarer (2004), which uses related variables. The descriptive statistics for both the partnership formation and partnership dissolution analysis are presented in Appendix Table A1.

Table 1*Results from model of transitions to partnership for sample of singles*

	Model 1			Model 2		
	All	With coworker	With Other	All	With coworker	With Other
Fraction of coworkers of opposite sex	0.030 <i>0.046</i>	2.320 <i>0.172</i>	-0.156 <i>0.049</i>			
In workplaces with fewer than five employees				-0.242 <i>0.093</i>	-0.142 <i>0.455</i>	-0.301 <i>0.095</i>
In workplaces with 5–30 employees				-0.009 <i>0.059</i>	1.373 <i>0.239</i>	-0.113 <i>0.061</i>
In workplaces with more than 30 employees				0.039 <i>0.049</i>	2.409 <i>0.173</i>	-0.183 <i>0.053</i>
Workplace information missing						
Because of unemployment	-0.110 <i>0.037</i>		-0.242 <i>0.033</i>	-0.233 <i>0.033</i>		-0.251 <i>0.034</i>
Because of school attendance	-0.107 <i>0.031</i>		-0.098 <i>0.031</i>	-0.090 <i>0.031</i>		-0.107 <i>0.031</i>
Because workplace information is missing	-0.100 <i>0.032</i>		-0.085 <i>0.032</i>	-0.090 <i>0.032</i>		-0.094 <i>0.032</i>
Number of individuals				14,082		

Notes: Asymptotic standard errors in italics. Other regressors include level of education, occupation, children, income, and age.

fewer than five employees, with 5–30 employees, and with more than 30 employees. For both models, I estimate a single risk as well as a competing risks version.

The results presented in Table 1 show that the fraction of coworkers of the opposite sex does not affect the instantaneous probability of finding a partner. This suggests that for single people, workplaces do not constitute the most important marriage market segment, and that they are using other arenas to find partners. In addition, individuals with missing workplace information are less likely to find a partner. This probably reflects that individuals in this group on average have worse characteristics than individuals with workplace information.⁶ Despite the fact that I do take level of education, income, and age effects into account, I still find that this group have a harder job finding a spouse.

I now turn to the last columns for Model 1, where a distinction is made between leaving the single state to form a partnership with a partner who is also a colleague as opposed to a person who is not a colleague. I find that the fraction of coworkers of

6. A comparison of individuals with workplace information to those without show that the latter group on average have lower levels of education, lower income, and are younger.

the opposite sex has a strongly positive effect on the transition into partnerships with a coworker and a small negative effect on the transition into partnerships with a person who is not a colleague. That is, even though the overall transition rate into partnership is not significantly affected by the workplace sex mix, the results suggest that the workplace serves as a local marriage market, and that the gender mix at work matters for partnership formation. In terms of the literature on sex ratios in the local marriage market, it is reassuring that the probability of finding a partner at work increases with the relative supply of potential partners in the workplace. In fact, in Model 2, I find that the transition rate into a partnership with a coworker is increasing with workplace size.

Looking at firm-size effect instead of workplace size gave the same qualitative results. The same were the case if I allowed left-censored observations to be included in the analysis.

VI. Analysis of partnership dissolution

Having established that workplace sex ratios are not paramount to partnership formation for singles, the next step is to analyze how it affects the duration of relationships. Based on the previous findings by Åberg (2003) and McKinnish (2004, 2007), I expect workplace sex ratio to have a positive effect on dissolutions, since the workplace presumably constitutes a more important marriage market segment for individuals who are already in a relationship. Again, I also estimate a model where I address workplace size effects. Descriptive statistics for the whole set of included explanatory variables are presented in Appendix Table A1.

The results presented in Table 2 show that the risk of divorce increases with the fraction of coworkers of the opposite sex at both spouses' workplace. The effect on the dissolution risk from working in a workplace with no coworkers of the opposite sex compared to a workplace where all coworkers are of the same sex as the individual in question is that the divorce risk is increased by 41 percent (36 percent) for the female (male) workplace. These findings are in accordance with Åberg (2003) who also finds significant effects for both males and females. For smaller workplaces, the fraction of coworkers is not important for dissolution. However, when the workplace reaches a certain size workplace sex ratios are associated with high dissolution risk. Interestingly, the effect is not increasing in workplace size beyond around five employees.

Again, I find that individuals with missing workplace information are less likely to succeed in the marriage market. For these individuals, the dissolution risk is higher than for individuals with workplace information. As mentioned previously, this group has less favorable characteristics in terms of education and income.

Couples who, at the start of their relationship, share the same workplace are less likely to break up. This result, together with the finding that individuals are more likely to find a partner at work if the sex ratio works in their favour, suggests that individuals tend to become choosier when arrival rates increase. An alternative interpretation of this finding is that workplace interactions increase the information set of the potential partner and enables individuals to make more informed and hence better choices in the marriage market.

Table 2
Results from Dissolution Model

	Model 1	Model 2
Fraction of coworkers of opposite sex, men	0.354 <i>0.068</i>	
Fraction of coworkers of opposite sex, women	0.348 <i>0.064</i>	
In workplaces with fewer than five employees, men		0.021 <i>0.213</i>
In workplaces with fewer than five employees, women		0.156 <i>0.185</i>
In workplaces with 5–30 employees, men		0.324 <i>0.089</i>
In workplaces with 5–30 employees, women		0.324 <i>0.085</i>
In workplaces with more than 30 employees, men		0.351 <i>0.072</i>
In workplaces with more than 30 employees, women		0.338 <i>0.066</i>
Workplace information missing		
Because of unemployment, men	0.276 <i>0.066</i>	0.266 <i>0.066</i>
Because of unemployment, women	0.207 <i>0.056</i>	0.193 <i>0.055</i>
Because of school attendance, men	0.381 <i>0.043</i>	0.370 <i>0.043</i>
Because of school attendance, women	0.216 <i>0.042</i>	0.206 <i>0.042</i>
Because workplace information is missing, men	0.094 <i>0.039</i>	0.084 <i>0.039</i>
Because workplace information is missing, women	0.130 <i>0.050</i>	0.123 <i>0.050</i>
Number of couples		13,585

Notes: Asymptotic standard errors in italics. Other regressors include level of education, occupation, children, income, and age.

The results indicate that workplace sex ratios are important for partnership dissolution, but not necessarily that it matters in terms of finding a new partner for individuals already in partnerships. To investigate this issue I estimate a competing risks version of the model where I focus on partnerships that end because the individual followed find a new partner. The results from this exercise are in accordance with

the results presented in Table 2. In addition, if I condition on availability of workplace information for both individuals in the new relationship I find that 18 percent of the couples are colleagues. This implies that the fraction of individuals who leave a partnership to form a new relationship with a coworker is twice the size of the fraction of single individuals who form a partnership with a colleague. Hence, the workplace indeed seems to constitute a more important marriage market segment for individuals in partnerships than for single people.

In sum, the results presented above suggest that workplace sex ratio matters for partnership dissolution.⁷ This is consistent with related studies on workplace composition (Åberg 2003; and McKinnish 2004, 2007) and also with studies that consider more widely defined local marriage markets (like South and Lloyd 1995). The result is also consistent with a standard search model interpretation in the sense that an increase in the arrival rate of alternative offers (typically) leads to higher exit rates out of the current state. On the other hand, the finding could also be driven by action taken by individuals who find themselves in a less successful relationship and in order to find a new partner, look for employment in firms that, besides employment, supply a variety of potential marriage partners. In order to isolate this possibility of reverse causality from the effect of sex ratio on dissolution risk, it would be preferable to have an exogenous shock to workplace sex ratio to help identify the main hypothesis of this paper. Angrist (2002) uses variation in immigrant flows to study the effect of immigrants' marriage markets in the United States. A similar natural experiment setting is unfortunately not available in the data set used in this analysis. Ideally, if the data set had information on unannounced workplace merges that suddenly changed the workplace composition, this could be exploited to obtain a cleaner measure of the effect of workplace sex ratio on dissolution risk. As an approximation, I analyzed the dissolution pattern of couples who experience a change in workplace sex ratio while working at the same workplace for three consecutive years. I compare couples where the partners worked in the same workplace for three consecutive years without experiencing substantial changes in workplace sex ratio to those who did experience either an increase or decrease in the sex ratio. The reference category consists of those who do not have workplace information or who find a new job within three years of employment. Clearly, this is a very rough approach since I have no idea whether the changes that happen are expected. In addition, I condition on relationships that last at least three years to identify the effect of changing sex ratio. Anyway, the results⁸ show no effect of these changes if they occur at the male's workplace and that both large increases and decreases in sex ratio at the female's workplace are associated with an increased risk of dissolution compared to couples for whom the sex ratio stays pretty much constant over the three preceding years. Taking at face value the fact that a drop in the sex ratio at the female's workplace correlates positively with dissolution risks does not support our main hypothesis. On the other hand, it is obvious that this correlation can be generated from other mechanisms than changes in the number of possible marriage partners. In fact, I compare workplaces that experience rather large changes in composition to

7. I also estimated the models using firm level data. The results from this exercise are in accordance with results presented in Table 2.

8. The results are not presented in the paper, but are available upon request.

workplaces that do not. The mere fact that these changes take place may generate tensions that spill over into the personal life. Anyway, the procedure used does not guarantee a clear-cut identification result and the findings also suggest that this is not the case.

As suggested by McKinnish (2007), it also could be the case, that individuals who work in industry-occupation cells with a high fraction of colleagues of the opposite sex for some reason are more (or less) likely to divorce. To the extent that a correlation exists between workplace sex ratios and observable individual characteristics that affect dissolution risk this should be captured by the inclusion of the other explanatory variables in the dissolution hazard model. McKinnish (2007) addresses the possibility of correlation between sex ratios and unobserved personal characteristics that might affect dissolution both in terms of a fixed effects analysis and by IV techniques. As discussed previously, neither of these elaborations change the main results in her analysis. This suggests that even if endogeneity is an issue, the direction of the bias it causes is not unambiguously determined. In the light of McKinnish (2007) and supported by the lack of confidence in being able to find a good instrument for workplace sex ratios in the available data set, I base the main conclusion of this paper on the results presented in Table 1 and Table 2.

VII. Concluding remarks

This paper analyzes the association between sex ratios at the workplace and marriage market behavior. There is ample evidence that romantic encounters at the workplace do happen. Several studies also document that the sex ratio in the local marriage market matters for partnership formation and dissolution. The paper distinguishes between the effect of workplace sex ratios for partnership formation for single individuals and for partnership dissolution for married or cohabiting individuals. For the latter group, the workplace might constitute a more important marriage market segment due to higher search costs in other segments. Hence, it is speculated that workplace sex ratios are more important for partnership dissolution than for partnership formation among singles. The results of this paper show that this is indeed the case.

A major challenge for future work in this area is to find exogenous variation in workplace sex ratios in order to get a cleaner picture of the causal effect of workplace sex ratios and partnership formation and dissolution.

Appendix 1*Descriptive statistics*

	Partnership Formation		Dissolutions	
	Mean	Standard Deviation	Mean	Standard Deviation
Fraction of coworkers of opposite sex	0.203	0.248		
Female's workplace			0.249	0.267
Male's workplace			0.207	0.241
Workplace information missing				
Because of unemployment	0.093			
Because of school attendance	0.136			
Because workplace identification is missing	0.323			
Female				
Because of unemployment			0.113	
Because of school attendance			0.180	
Because workplace identification is missing			0.077	
Male				
Because of unemployment			0.067	
Because of school attendance			0.130	
Because workplace identification is missing			0.167	
White Collar	0.319			
Female			0.418	
Male			0.341	
Blue Collar	0.108			
Female			0.031	
Male			0.210	
Children (0/1)	0.222			
First (at last year of relationship)			0.480	
Second (at last year of relationship)			0.260	
Third (at last year of relationship)			0.050	
Age (in years)	24.850	5.978		
Female			23.605	4.816
Male			25.882	5.328
Female more than four years older			0.051	
Male more than four years older			0.256	
Vocational education (for males in diss. model)	0.407		0.501	
Short cycle further education (do)	0.039		0.049	
Medium cycle further education (do)	0.035		0.065	

Appendix 1 (continued)

	Partnership Formation		Dissolutions	
	Mean	Standard Deviation	Mean	Standard Deviation
Long further education (do)	0.026		0.079	
Income (in 100.000 DKK)	0.766	0.565		
Income female			0.584	0.362
Income male			0.882	0.539
Couple has same level of education			0.463	
Same workplace at time of partnership start			0.061	
Married			0.098	
Relationship number			1.371	
Number of persons		14,082		13,585

Note: All numbers are for first year of observation in the relevant state.

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