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CHANGES DURING THE 1990's IN THE LOCATION OF SWEDISH POWER COUPLES: CONSEQUENCES AND EXPLANATIONS

by

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Changes during the 1990's in the location of Swedish Power Couples: consequences and explanations

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Abstract

Between 1990 and 1998 there was an increase by 4 percentage points of couples where both individuals were college educated, so-called power couples, in Swedish cities. During the same period, the shares of non-college educated couples and college educated singles increased by only 1 percentage point, respectively. The study argues that the observed trends are explained neither by the co-location hypothesis nor the marriage market hypothesis. Instead it seems that the differential household trends in city location coincide with differential trends in the city earnings premium. The city earnings premium has increased during the 1990´s particularly for college educated men and women in couples.

Keywords: City earnings premiums, power couples, location
JEL classification: J11,J31, R23

1. Introduction

Cross-sectional analyses of data from the US covering the period 1970-1990 show that college educated couples - power couples - are increasingly likely to be located in large metropolitan areas (Costa and Kahn 2000). A possible reason is that these areas provide job opportunities for both spouses, solving the so-called co-location problem.[1] However, analyses of panel data covering also the 1990s show that college educated couples are no more likely to migrate to large metropolitan areas than couples in which only one spouse has a college education or college educated singles (Compton and Pollak 2004). It is argued that these results are more consistent with the hypothesis that urban areas serve as marriage markets.[2]

Although power couples may face a co-location problem and although cities may serve as marriage markets, it also seems reasonable to expect that changes in location patterns coincide with changes in the geographical structure of the returns to schooling. This would be the case if the returns to schooling vary by household type and place of residence. The US studies did not address these issues directly. Instead, Costa and Kahn (2000) analyze the returns to city size. They find that such returns increase for most educational categories between 1970 and 1990, and females with a graduate

[1] The results might as well be due to college educated singles meeting and marrying in the city. Therefore, cross-section data do not allow proper testing of the co-location hypothesis.

[2] College educated singles can move to the city to avoid future co-location problems, i.e. an increase of singles in cities is consistent with the co-location hypothesis as well.

degree experience the strongest increase. But they do not present separate results for single men (women) and cohabiting men (women). Therefore, their results are not that informative regarding the choice of location of different types of households.

In this paper we examine trends in the location patterns among couples and singles in Sweden, and analyze the city earnings premium for men and women in different households with different educational backgrounds. We also propose a novel way of assessing the co-location hypothesis from a simple test of linear restrictions. We use a large panel database containing linked employer-individual-household data, covering the period 1990-1998. We distinguish between power couples, low power couples, part power couples in which only the husband is college educated and part power couples where only the wife is college educated. We also distinguish between singles with different educational background and women and men.

There are several motives for analyzing the location choice of different types of households characterized in terms of college education, and the city earnings premium. First, the geographical distributions of human capital and its returns have strong implications for geographical differences in tax policies at the local and regional level. In Sweden taxes are collected at the national, regional and local (municipality) levels. Thus, the larger the stock of human capital in a municipality, the lower may the local tax rate have to be in order to finance a given amount of services provided by the

municipality. In addition, the regional supply of human capital may also affect firms' choice of location. Secondly, economic growth might be affected by local human capital spillovers (Lucas, 1988). The general idea being that new innovations and adoption of new technologies depend on non-market interactions between individuals. The average local stock of human capital may hence raise the marginal product of all local workers. Furthermore, Jacobs (1969) suggests that such interactions are facilitated by the density of economic activity. Thus, dense metropolitan areas may experience higher economic growth than rural areas.[3] Finally, empirical results show that recent technical changes in most developed economies have been biased, favoring skilled and educated workers (e.g. Katz & Murphy, 1992, Berman et al. 1994, Berman et al. 1998, and Mellander, 1999). Thus, the regional distribution of human capital has probably become even more important to the geographical distribution of economic activity in the last twenty years.

In Sweden, there are well established systems of public transportations both within and between cities. In combination with relatively low private costs of commuting the system of public transportation might reduce the gains of moving to a city. Moreover, since the 1970s higher education policy has emphasized the spatial decentralization of college education. The system of higher education is financed and regulated by the government,

[3] Rauch (1993) reports results in support of these ideas. However, the results vary widely between empirical models (e.g. Moretti 2004a, 2004b; Acemoglu & Angrist 2000; Ciccone & Peri 2004; Isacsson 2005).

which might guarantee a high basic quality level at all colleges.[4] As a consequence, firms might locate in many different parts of the country, creating regional job and marriage markets. Therefore, the trend of city migration might not be as strong in Sweden as in the US.

The results show that there has been an increase of college educated couples in the Swedish cities. But probability models suggest that power couples are underrepresented in the city. The city earnings premium has increased during the 1990's, and most for college educated cohabiting men and women. The level of the earnings premium is larger for college educated men than non-college educated men, but of the same magnitude for college educated women and non-college educated women. Further, college educated women and men are not more likely to find a partner in the city than outside the city. The results are neither in accordance with the hypothesis that college educated couples move to solve a co-location problem, nor the hypothesis that the city primarily serves as a marriage market for college educated singles. Instead the economic returns to living in a city have changed in a more beneficial way for college educated couples than for other couples.

The rest of this paper is organized as follows. Section 2 presents empirical models and section 3 outlines the data and presents changes in location patterns of couples and singles. Section 4 and 5 report results of the empirical models. Section 6 concludes the paper.

[4] See Lindahl & Regnér (2005) for a discussion about college education in Sweden.

2. The empirical framework

We analyze changes in the geographical distribution of college and non-college educated households using a binomial geographical distribution defined over "city" and "non-city". As a starting point we estimate the probability that a cohabiting man (woman) lives in a city as a function of his (her) educational attainment and the educational attainment of his (her) partner in 1990, 1993 and 1998. Corresponding models are estimated for single men and women. The analyses are based on the following model

$$P(BC_{it}=1)=\alpha_{0t}+\alpha_{1t}ME_{it}+\alpha_{2t}FE_{it} \qquad (1)$$

where the dependent variable is the probability that individual i (i = 1, 2,…, N) lives in a big city in year t (t=1, 2, …, T); ME_{it} is a dummy variable that is equal to one if the man in the couple is college educated; and FE_{it} is a dummy variable that is equal to one if the woman is college educated.

The parameters of model 1 are over-identified. We only need three types of households to identify the three parameters. Thus, we can test the co-location hypothesis by estimating model 1 from the location choice of low power couples which gives us an estimate of α_{0t}, and the two types of mixed couples which gives estimates of α_{1t} and α_{2t}. The sum of these parameters can also be estimated from the observed location choice of power couples. If there are any specific benefits to power couples of locating in a big city, such as a solution to a potential co-location problem, we should observe a higher

probability that power couples are located in a big city than what we would predict from an estimate of model 1. We test this formally by estimating the following model

$$P(BC_{it}=1)=\alpha_{0t}+\alpha_{1t}ME_{it}+\alpha_{2t}FE_{it}+\alpha_{3t}PC_{it} \qquad (2)$$

where PC_{it} is dummy variable that equals one if the individual lives in a power couple. If α_{3t} is significantly larger than zero we reject the null hypothesis that there are no specific benefits to power couples of locating in a big city. Regardless of the outcome of the test, it should be noted that the basic purpose of model 2 is to investigate changes in the parameters between different points in time.

Model 2 is estimated as a standard logit model. We also add a set of control variables when estimating the model. The purpose is to investigate the potential role of demographic changes among the different types of households. For example, women are older at the birth of the first child in 1990's than in the 1980's. Thus, since fertility decisions and age, in general, may be important to the choice of location we control for age and the number of children between 0 and 6 years of age in the household.

Beside the impact of children and age, there are two other potential explanations to changes in location patterns. First, it is possible that the city earnings premium has changed. In addition, it may have changed in a different way for different types of individuals. Secondly, the value of city

amenities may have increased, including the marriage market property of cities discussed by Compton and Pollock (2004). In the following we consider the importance of cities to the formation of couples, in general. Models related to each one of these two issues are outlined in the following.

2.1 The City Earnings Premium

We analyze the benefits of living in a city by estimating the city earnings premium in different years, by gender and household types. These estimates will show whether the premium has changed over time and if the premium is similar for different groups. This might in turn provide insights to the observed differences in location patterns. Previous US studies did not estimate city earnings premium by couple type and gender.

We estimate the earnings differences between individuals living in cities and those living outside cities, using the following cross-sectional relationship

$$y_{it} = \beta_{0t} + \beta_{1t} BC_{it} + \beta_{2t} S_{it} + \beta_{3t} Age_{it} + \beta_{4t} Age_{it}^2 + \varepsilon_{it}, \qquad (3)$$

where y_{it} is the natural logarithm of individual *i's* (i = 1, 2,…, N) earnings in year t (t = 1, 2, ..., T); BC_{it} is a dummy variable that is equal to one if the individual works in a metropolitan area, S_i denotes individual i's years of schooling, and Age_i denotes the individual's age.

Equation 3 is estimated separately for six types of males and six types of females. The six male types are: college educated men living with a college educated woman, college educated men living with a non-college educated woman, non-college educated men living with a college educated woman, non-college educated men living with a non-college educated woman, single college educated men and single non-college educated men. The six female types are correspondingly defined. The basic purpose of equation 3 is to investigate how the metropolitan earnings premium (β_{1t}) vary over time for each member of the different types of households.

If couples move to the city to improve the career of both spouses, we should observe relatively high city earnings premiums for cohabiting college educated women.

2.2 Couple formation

To test the hypothesis that cities are important to college and non-college educated individuals in finding a partner we estimate the following model for individuals (i = 1,2, …, N) that are single in time period t.

$$P(C_{it+1}=1)=\alpha_{0t}+\alpha_{1t}Male_{it}+\alpha_{2t}MC_{it}+\alpha_{3t}FC_{it}+\alpha_{4t}MP_{it}+\alpha_{5t}FP_{it} \\ +\alpha_{6t}City_{it}*MP_{it}+\alpha_{7t}City_{it}*FP_{it}+\alpha_{8t}FA_{it}+\alpha_{9t}MA_{it}+\varepsilon_{it} \quad (4)$$

where C_{it+1} is an indicator variable of individual i's cohabiting status the observation period after t. It equals one if the individual is cohabiting in $t+1$

and is zero otherwise. *Male* is a dummy variable that equals one if the individual is male, *MC* is a dummy variable that equals one if the individual is male and lives in a city, *FC* is a dummy variable that equals one if the individual is female and lives in a city, *MP* is a dummy variable that equals one if the individual is male and college educated, *FP* is a dummy variable that equals one if the individual is female and college educated, *MA* is the age of a male individual, *FA* is the age of a female individual and ε_{it} is the error of the model assumed to be logistically distributed.

If cities increase the likelihood of finding a partner for men and women then α_{2t} and α_{3t} should be positive. If college education is important in finding a partner α_{4t} and α_{5t} should be positive. If cities increase the likelihood of finding a partner particularly for college educated men and women then α_{6t} and α_{7t} should be positive.

3. The data

The data is derived from administrative records kept by Statistics Sweden (SCB). We collected information for a sample of individuals and the population of all establishments in Sweden. The sample of individuals was taken from the stock of all employed individuals in 1998. The sampling unit was the establishment and the sample was stratified with respect to the size-distribution of establishments, with larger sample-weights on large establishments so as to achieve a representative sample of the population.

The resulting sample covers nearly 10 percent of all employed individuals in 1998.

Information on individuals was collected at four different years: 1998, 1993, and 1990. For each of these years we know whether the individual is single or cohabiting.[5] If the individual was found to be cohabiting we collected information on the partner as well. We have detailed geographical information on the location of the place of residence, gross annual earnings, educational attainment, age, sex, civil status (married or not married), number of children between 0 and 6 years of age, employment status (employed or not employed), car ownership (0, 1, 2 or more cars) and a unique identification number for his/her primary establishment in 1998, 1993, and 1990, respectively. The information on the establishments includes, *inter alia,* detailed geographic information on the location of the establishment.

Information on the individuals' gross annual earnings is collected from tax records. The information on educational attainment is collected from administrative records on completed degrees within the regular educational system. Schools and colleges are required to report individual educational attainments to Statistics Sweden. In this study we use information on the individual's highest attained educational level among seven distinct levels. We classify individuals as "college educated" if they have attained one of the

[5] Cohabiting include married couples and cohabiting couples. Marital status is identified through tax registers.

two highest levels according to this classification; i.e. university of at least 3 years or a research education (a PhD for example). The information on educational attainment was also used to construct years of schooling by imputing the average years of schooling estimated on a sample of individuals that contain both information on educational level and information on years of schooling. The Swedish Level of Living Survey in 1991 (the SLLS) was used to this end (see Eriksson & Åberg, 1987, and Fritzell & Lundberg, 1994).[6] It contains both register information on the highest attained educational level and a self-report on years of schooling. This information is used to estimate a model regressing self-reported years of schooling on the register information on highest attained educational level. The model is used to impute years of schooling in the sample of individuals used for the analyses presented below.

To facilitate the discussion of our results in relation to previous US studies we use corresponding terminology and distinguish throughout between: *power couples (PC)* – both man and woman in the couple have college degrees, *mixed couple male power (MCM)* – only the man has a college degree, *mixed couple female power (MCF)* – only the woman has a college degree and *low power couples (LPC)* – neither man nor woman has a college degree. Singles are divided into four groups, college educated men

[6] We should adjust standard errors when we link information between different samples. Since previous work suggests that such adjustments have negligible effect on the standard errors (Isacsson, 2004), we chose not to adjust the standard errors.

(*PSM*), college educated women (*PSF*), men who have at most a high school degree (*LSM*) and women who have at most a high school degree (*LSF*).

We impose some restrictions on the data. We only include households where both the sampled individual and the potential partner are employed and between 25-64 years of age. In addition, we require non-missing information on educational attainment and municipality of residence. When we use the longitudinal structure of the data we also impose the restriction that the conditions for inclusion in the sample are fulfilled in both *t* and *t+1*.

Table 3.1 presents mean sample characteristics of men and women in different types households. College couples are to a larger extent than non-college couples located in the city, and power couples are more likely than other college couples to live in the city. Between 1990 and 1998 the proportion of power couples in the city increased more than the proportions of other types of couples. The pattern is similar to that reported for college educated couples in the US (Costa & Kahn, 2000).

<TABLE 3.1 ABOUT HERE>

College educated men and women have higher earnings than non-college educated men and women. Men and women in power couples have higher earnings than college educated men and women in mixed couples. Standard deviations of earnings increase over time within all groups, indicating a widening of the earnings distribution in the 1990s. Moreover, during the

1990s earnings have increased significantly more for college educated couples than low power couples.

Table 3.2 reports mean sample characteristics of single men and women with different educational background. There is a larger share of male power singles than power females in the city, and a larger share of low power females than lower power males. The proportions of college-educated singles have not increased as much as the proportions of college educated couples. Earnings of college educated singles are higher than earnings of non-college educated singles, and earnings have increased more for the college educated.

<TABLE 3.2 ABOUT HERE>

To add information about the trends in city location Table 3.3 reports the data in 1990 and 1998 by household type and age groups. Age groups are defined according to the age of the sampled individual. There are some interesting differences in location patterns within age groups and between couples. There is a large increase over time of power couples and mixed couples where the man is college educated in the age-groups 30-34, 35-39 and 40-44. Among mixed couples where only the woman has a college degree there have been changes mainly in the age groups 35-39 and 40-44. Among low power couples the largest positive changes are in the age groups 30-34

and 35-39. There is a slight decrease of low power couples in the age groups 25-29 and 45-49.

<TABLE 3.3 ABOUT HERE>

As among couples, there seems to be relatively larger increases in the share of college educated singles in the age groups 30-44. But they do not, in general, seem as large as among the couples. The changes among the low power singles are, in general, quite small.

4. Empirical findings

4.1 City location

Table 4.1 presents estimates from logit models of the probability of couples living in the city in 1990, 1993 and 1998. All of the results show that there is an increase in the probability of living in the city if the man in the couple is college educated relative to the reference category of low power couples. There is also a boost to the probability of living in the city if the woman is college educated relative to low power couples. However, the estimate of the parameter related to power couples indicates that there is no additional boost to the probability of power couples living in a city. The estimate is actually significantly negative in all three years, suggesting that power couples are underrepresented in cities. In other words, there are no specific

and additional benefits to power couples of locating in a city relative to other types of college educated couples, which suggest that the co-location hypothesis is rejected.

We also see that the parameter related to male college education increases strongly between 1990 and 1998 suggesting that male college education has a stronger effect in the late 1990's on the probability that a couple is located in a city than in the early 1990's. The results also imply that children increase the probability of living in the city and that children raise the probability for city location more in 1998 than in 1990. This suggests that couples where the man is college educated (this include both power couples and mixed couples where the man is college educated and the woman is not) and couples with children are more likely to live in a city in 1998 than in 1990. Finally, we see that the age of the man decreases the probability of city location and the age of the women increases the probability. These results are the same in 1990 as well as in 1993 and 1998.

<TABLE 4.1 ABOUT HERE>

At the bottom of Table 4.1 we report predicted probabilities on city location using the estimated model for 1998. From this model and average values for individual ages and number of children in 1990 and 1998, respectively, we find that the predicted probabilities in 1990 are more or less the same as those found in 1998. We conclude that the changes between 1990 and 1998

reported in sections 3 and 4 are not a result of changes in the demographic composition of the data. The changes are more likely due to changes in economic and non-economic benefits of living in a city.

The results for singles are reported in table 4.2. They show that college educated singles are more likely of living in the city than non-college educated singles. Furthermore, the estimated coefficient of power males increases over time, suggesting that such single males are more likely to live in a city in 1998 than in 1990. There is no similar increase in the probability of city location for power females.

<TABLE 4.2 ABOUT HERE>

Age has a significantly negative effect on the probability to live in the city. The estimated effects of children on city location are statistically insignificant. This is likely due to the fact that few singles have children.

At the bottom of the table we report predicted probabilities on city location from the model in 1998 using average values for male, age and number of children in 1990 and 1998, respectively. As for couples, the estimated probabilities are quite similar in these two years. We conclude that demographic changes among singles are not responsible for the lack of changes in singles' city location.

4.2 City Earnings Premiums

Table 4.3 reports city earnings premium in 1990, 1993 and 1998 for men and women in different couples. In 1990 the earnings premium varied between 0.147 for men in *MCF* to 0.092 for men in *PC*. In 1990, the city earnings premium is somewhat larger among non-college educated men than among college educated men. However, by 1998 the picture is reversed: men in *PC*s and in *MCM*s experience a larger city earnings premium than non-college educated men in *MCF*s and *LPC*s. The city earnings premium increases among the former group whereas it remains more or less constant among the latter group.

<TABLE 4.3 ABOUT HERE>

There is a similar pattern in the city earnings premium among cohabiting women. In 1990 the city earnings premium is lower among college-educated women than non-college educated women. In fact, there is no statistically significant premium at all among women in *MCF* in 1990. The city earnings premium increases strongly for college-educated women whereas it remains more or less constant among non-college-educated women. Nevertheless and in contrast to males, non-college educated women have a higher return to city location in 1998 than college educated women.

There is also a large variation in the city earnings premium between men and women within couples. The results suggest that men benefit more

of living in a city than women, and that the level of the benefits varies between couples. The difference in the earnings premium is largest within power couples, both in 1990 and 1998. The results in Table 4.3 suggest, at a more general level, that the returns to education have increased in cities during the 1990's whereas they have remained more constant outside cities.[7]

Table 4.4 reports the estimated city earnings premium for singles. There are differences between men who are singles and men in couples. First, the city earnings premium is lower for singles. Second, the premium does not increase as much for male power singles between 1990 and 1998. It actually decreases between 1990 and 1993. Further, low power single men have a relatively low earnings premium, resulting in larger differences in city returns between power and low power single males than between the corresponding groups of men in couples.

<TABLE 4.4 ABOUT HERE>

There are smaller differences between single women and cohabiting women than among the same male groups. The earnings premiums for female

[7] This conclusion was strengthen from results obtained in a model similar to a conventional Mincer-equation (Mincer, 1974) where we interacted years of schooling with the city indicator. These results, which we do not report, show that the returns to schooling was somewhat higher (lower) for men (women) in cities in 1990. By 1998 the returns to schooling in cities had increased significantly both for men and women.

power singles are only slightly below the premium for women in *PC* and *MCF*. In addition, the premiums for low power single females are similar to those for women in *LPC* and *MCM* although they are somewhat lower among the singles.

Another interesting finding is that in 1998 the gender difference in the city earnings premium between college educated singles is smaller than between college-educated individuals in couples. The corresponding gender difference tends to be smaller and of the opposite sign among non-college educated individuals in couples and large and of opposite sign among non-college educated singles.

In all, the trends in the city earnings premium among couples seem to be consistent with the trends in city location among couples. However, the relatively large increase in the premium for females in *MCF* does not seem to generate a similar shift in city location for those couples. This may reflect that male returns to city location are more important than female returns when couples decide where to locate. Moreover, the city earnings premium is lower for singles than couples, and it has increased more over time for couples. These results are also consistent with the fact that the shift in city location is larger among couples than among singles.

4.3 Couple formation

The results in the previous section indicate that economic motives might not be the main factor behind the city choice of college educated singles. Instead

it is possible that college educated singles choose to locate in the city because it increases the likelihood of finding a partner. This could in turn generate an increase in the share of college-educated couples in cities over time, to the extent that newly formed couples tend to remain in the city. We investigate this by comparing the formation of couples in the city and outside the city during the 1990s.

Table 4.5 presents estimates of the probability of having a partner in 1993 conditional on being single in 1990, and the probability of having a partner in 1998 conditional on being single in 1993. The estimates in column one show that college educated women and men are more likely of having a partner in 1993 than non-college educated women and men. We also see that men in the city who are single in 1990 are more likely to find a partner but the reverse is true for single women in cities. The probability of finding a partner decreases with the age of the individual and the negative impact of age is stronger for women than men.

<TABLE 4.5 ABOUT HERE>

There are some changes in the model when it is estimated on individuals who were singles in 1993 and had a partner in 1998. First, women in the city are as likely to find a partner as women outside the city – the estimated effect for female in city is now statistically insignificant. Secondly, men in cities appear to be even more successful in finding a partner than men

outside cities. Furthermore, college educated males appear to be more likely to find a partner than college-educated females. Finally, the age effects appear to be somewhat stronger.

The estimated models suggest that men in cities and college-educated men are more likely to find a partner. However, the model also suggests that there is no statistically significant college-specific boost to the male probability of finding a partner in the city. This means that college-educated men as well as non-college educated men would increase their probability of finding a partner if they moved to a city. Furthermore, the estimated parameters of the models do not indicate any statistically significant college-specific boost to the female probability of finding a partner in the city. These results suggest that power singles in the city are no more likely of finding a partner than power singles outside the city.

5. Consequences of change of marital status

Section 4.2 showed that the city earnings premium had increased most among cohabiting college educated men and women compared to college educated single men and women. Consequently, one might expect that these differential trends in the city earnings premiums are due to factors related to the family. One way to investigate this hypothesis is to analyze the effects of changes of marital status among individuals in the city. If the city earnings premium is related to family formation, we would expect to observe earnings differences between those who were cohabitants in 1990, 1993 and

1998 and those who were singles over the same period of time. We would also expect to observe an earnings effect of changes in marital status.

Table 5.1 reports estimated earnings differences between individuals in the city who have been cohabiting in every year (couple 1990,1993, 1998) or changed marital status in some year, and individuals who are single in every year. We report separate results for women and men. Looking first at the results for women, we see that earnings in 1990 are significantly lower for women who have been cohabiting in every year compared to singles. But earnings are significantly larger for those who are singles in 1990 and married in later years. In 1993 and 1998 there are significant negative estimates for two groups, women who are cohabiting in every year and singles who cohabit in 1993 and 1998. In 1998, earnings are significantly lower also for singles in 1990 and 1993 who cohabit in 1998. None of the other estimates are statistically significant in 1998.[8]

<TABLE 5.1 ABOUT HERE>

The results for men are quite different from those for women. Looking on the first three types of civil status all estimates are positive and significantly so in all years except 1990 for singles who cohabit in 1998.

[8] The negative earnings impact of children is lower for women in the city, and the negative effect decreases faster in the city than outside city. There are no significant earnings effects of children for men neither in the city nor outside the city.

Moreover, the earnings differences increase markedly over time. Earnings are also significantly larger for cohabiting men in 1990 and 1993 who are singles in 1998. Although, earnings do not grow as much as for the other groups. In all these results suggest that cohabiting women earn less than singles, and single women earn less when they start to cohabit. For men the results are the opposite, they earn significantly more when they cohabit.[9]

Table 5.2 presents the same types of estimates for women and men who live outside the city. The pattern in the results for women and men outside the city are similar to those for women and men in the city. Earnings of cohabiting women are significantly lower than earnings of single women, while the earnings of cohabiting men is larger then they are for single men. However, the earnings differentials are larger for cohabiting women outside the city than for women in the city, while they are much lower for cohabiting men outside city than they are for cohabiting men in the city.

<TABLE 5.2 ABOUT HERE>

6. Conclusion

This paper has documented an increase of power couples as well as mixed couples in the Swedish cities. But our statistical analysis suggested that there was no specific power-couple boost to the probability of living in a city.

[9] The results are reinforced when we analyze only college graduates.

Instead, the prediction from city-location probabilities of mixed couples (couples where only one of the individuals is college educated) was that power couples are underrepresented in cities. Thus, we conclude that the "co-location hypothesis" advanced by Costa & Kahn (2000) is rejected on the Swedish data.

The paper has also documented substantial increases in the city earnings premium during the 1990's. The increase is largest among college educated cohabiting men and women. The relatively large increase in the city earnings premium experienced by college educated women living with a non-college educated man is not accompanied by a similar increase in the probability for such households of locating in a city. This could reflect that male returns to city location are more important than the female returns to city location when a household chooses where to live.

The level of the city earnings premium in 1998 was larger for college educated men than non-college educated men, and largest for college educated cohabiting men. There was no major difference in the level of the city earnings premium for college educated women compared with non-college educated women. Actually, the city earnings premium was largest for cohabiting non-college educated women. These results suggest that college educated women do not benefit more than non-college educated women of locating in the city. This result also rejects the co-location hypothesis.

College educated women and men are not more likely to find a partner in the city than outside the city. This suggests that the increase in the share of college educated couples in cities does not primarily appear to be a result from an increased propensity of such couples forming in cities. The result does not support the marriage market hypothesis.

In all, the results in this study are neither in accordance with the hypothesis that college educated couples move to solve a co-location problem, nor the hypothesis that the city primarily serves as a marriage market for college educated singles. Instead it seems that the economic returns to living in a city have changed in a more beneficial way for college educated couples than for other couples.

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TABLE 3.1 Descriptive statistics, couples

	Power couples	**Mixed couples male power**	**Mixed couples female power**	**Low power couples**
City 1998	0.563	0.495	0.401	0.293
City 1993	0.532	0.470	0.392	0.290
City 1990	0.521	0.460	0.386	0.282
MALES				
Earnings 1998	404.12	388.01	276.77	244.33
	(272.79)	(227.64)	(160.58)	(108.78)
Earnings 1993	347.25	336.28	241.66	214.99
	(204.92)	(173.55)	(128.09)	(95.49)
Earnings 1990	345.48	336.38	252.82	227.45
	(152.87)	(147.30)	(115.92)	(85.42)
Age 1998	45.97	46.15	45.08	45.18
	(8.97)	(8.55)	(9.33)	(9.67)
Age 1993	44.42	43.94	44.41	43.41
	(8.02)	(7.81)	(8.19)	(8.89)
Age 1990	42.73	41.97	42.80	41.82
	(7.55)	(7.64)	(7.81)	(8.48)
FEMALES				
Earnings 1998	254.56	182.67	223.27	164.17
	(118.08)	(78.09)	(90.27)	(62.99)
Earnings 1993	221.62	154.56	200.03	141.10
	(93.66)	(59.61)	(70.30)	(50.87)
Earnings 1990	223.07	156.03	205.76	144.96
	(91.58)	(59.38)	(71.31)	(51.56)
Age 1998	43.95	43.95	42.92	42.82
	(8.75)	(8.62)	(8.97)	(9.50)
Age 1993	42.48	41.78	42.17	40.99
	(7.70)	(7.91)	(7.62)	(8.73)
Age 1990	40.81	39.84	40.55	39.33
	(7.16)	(7.61)	(7.15)	(8.29)
# Observations 1998	12 963	12 200	10 501	101 997
# Observations 1993	10 033	10 173	7 455	85 590
# Observations 1990	8 821	9 705	6 798	85 247

Notes: standard deviations in parentheses. City includes Malmoe, Gothenburg and Stockholm. Earnings are in thousands of 1998 SEK.

TABLE 3.2 Descriptive statistics, singles

	Male power	**Female power**	**Male low power**	**Female low power**
City 1998	0.631	0.586	0.359	0.439
City 1993	0.604	0.571	0.350	0.436
City 1990	0.613	0.587	0.353	0.439
Earnings 1998	312.08	242.94	216.37	178.49
	(173.81)	(109.20)	(99.91)	(69.66)
Earnings 1993	276.86	221.50	193.02	160.20
	(180.64)	(87.19)	(73.61)	(53.29)
Earnings 1990	272.11	226.77	201.98	171.05
	(122.12)	(85.49)	(71.51)	(52.19)
Age, 1998	39.88	40.64	39.18	41.70
	(10.45)	(11.22)	(10.83)	(11.19)
Age, 1993	38.80	40.31	37.64	39.50
	(9.07)	(9.57)	(9.78)	(10.06)
Age, 1990	36.32	37.97	35.94	37.62
	(8.37)	(8.90)	(8.95)	(9.19)
# Observations 1998	6 980	7 963	44 914	35 992
# Observations 1993	4 400	4 711	29 141	24 668
# Observations 1990	4 370	4 251	28 341	22 201

Notes: standard deviations in parentheses. City includes Malmoe, Gothenburg and Stockholm. Earnings are in thousands of 1998 SEK.

TABLE 3.3 Percentage living in the city by household type

Age	Power couple		Mixed couple male power		Mixed couple female power		Low power couples	
	1990	1998	1990	1998	1990	1998	1990	1998
25 – 64	0.521	0.563	0.460	0.495	0.386	0.401	0.282	0.293
25 – 29	0.546	0.532	0.499	0.500	0.427	0.368	0.295	0.293
30 – 34	0.570	0.631	0.488	0.570	0.424	0.432	0.285	0.315
35 – 39	0.536	0.629	0.454	0.561	0.406	0.456	0.274	0.312
40 – 44	0.493	0.607	0.429	0.504	0.372	0.423	0.284	0.289
45 – 49	0.520	0.505	0.472	0.462	0.366	0.374	0.282	0.277
50 – 54	0.500	0.529	0.455	0.447	0.353	0.377	0.273	0.288
55 – 64	0.480	0.500	0.466	0.466	0.399	0.359	0.284	0.281

SINGLES

Age	Male power		Female power		Male low power		Female low power	
	1990	1998	1990	1998	1990	1998	1990	1998
25 – 64	0.613	0.631	0.587	0.586	0.353	0.359	0.439	0.439
25 – 29	0.616	0.678	0.623	0.600	0.373	0.379	0.471	0.490
30 – 34	0.678	0.690	0.626	0.676	0.371	0.386	0.460	0.489
35 – 39	0.641	0.679	0.602	0.633	0.334	0.379	0.421	0.457
40 – 44	0.544	0.640	0.560	0.607	0.323	0.341	0.421	0.405
45 – 49	0.569	0.561	0.525	0.535	0.355	0.323	0.421	0.398
50 – 54	0.556	0.546	0.552	0.527	0.314	0.329	0.397	0.418
55 – 64	0.539	0.542	0.555	0.525	0.321	0328	0.440	0.395

TABLE 4.1 Logit estimates of the probability of living in City 1990, 1993 and 1998 - couples

	1990	**1993**	**1998**
Intercept	-0.850	-0.748	-0.723
	(0.048)	(0.047)	(0.040)
MP	0.765	0.775	0.867
	(0.022)	(0.021)	(0.020)
FP	0.469	0.457	0.475
	(0.026)	(0.025)	(0.021)
PC	-0.226	-0.213	-0.210
	(0.040)	(0.038)	(0.033)
Male Age	-0.012	-0.012	-0.009
	(0.002)	(0.002)	(0.002)
Female Age	0.011	0.009	0.005
	(0.002)	(0.002)	(0.002)
# Children	0.023	0.050	0.095
	(0.011)	(0.011)	(0.010)
-2 Log Likelihood	133821.45	139347.45	169888.04
#Observations	108676	112029	136052

Predicted probabilities from the model fitted on 1998-data using observed characteristics in 1990 and 1998, respectively

	1990	**1998**
Power couples	0.568	0.563
Mixed couple male power	0.503	0.495
Mixed couple female power	0.404	0.401
Low power	0.297	0.293

TABLE 4.2 Logit estimates of the probability of living in City 1990, 1993 and 1998 - singles

	1990	**1993**	**1998**
Intercept	0.173	0.190	0.337
	(0.054)	(0.050)	(0.039)
MP	1.067	1.052	1.129
	(0.034)	(0.033)	(0.027)
FP	0.599	0.553	0.581
	(0.034)	(0.032)	(0.025)
Male	-0.434	-0.482	-0.477
	(0.073)	(0.068)	(0.052)
Age	-0.011	-0.011	-0.014
	(0.001)	(0.001)	(0.001)
Male*Age	0.002	0.003	0.003
	(0.002)	(0.002)	(0.001)
#Children	-0.022	0.010	-0.045
	(0.039)	(0.036)	(0.030)
Male*(#Children)	-0.260	-0.003	-0.016
	(0.128)	(0.108)	(0.087)
-2 Log Likelihood	78742.593	83723.584	127564.13
#Observations	**59163**	**62920**	**95849**

Predicted probabilities from the model fitted on 1998-data using observed characteristics in 1990 and 1998, respectively

	1990	**1998**
Power male	0.641	0.632
Power female	0.596	0.587
Low power male	0.367	0.358
Low power female	0.453	0.439

TABLE 4.3 City earnings premiums by gender and type of couples

	Power couples		**Mixed couples male power**		**Mixed couples female power**		**Low power couples**	
	Men	**Wom**	**Men**	**Wom**	**Men**	**Wom**	**Men**	**Wom**
1998	0.175	0.100	0.173	0.122	0.143	0.098	0.107	0.126
	(0.009)	(0.008)	(0.010)	(0.009)	(0.011)	(0.008)	(0.004)	(0.003)
1993	0.115	0.071	0.118	0.117	0.113	0.032	0.104	0.123
	(0.009)	(0.008)	(0.009)	(0.009)	(0.012)	(0.009)	(0.003)	(0.003)
1990	0.092	0.044	0.108	0.102	0.147	0.010	0.108	0.122
	(0.009)	(0.009)	(0.009)	(0.009)	(0.012)	(0.010)	(0.003)	(0.003)
Sample size, 1998	12824		12104		10400		100724	
Sample size, 1993	9988		10124		7420		84497	
Sample size, 1990	8798		9649		6761		83468	

Notes: White's standard errors in parentheses. Regressions also include an intercept, control variables for years of schooling, age, age-squared, and the number of children of age 0-6 years in the household.

TABLE 4.4 City earnings premiums by gender and type of single

	SINGLES			
	Male power	Female power	Low power males	Low power females
1998	0.121 (0.014)	0.087 (0.010)	0.029 (0.005)	0.106 (0.005)
1993	0.054 (0.014)	0.032 (0.012)	0.056 (0.006)	0.100 (0.005)
1990	0.082 (0.015)	0.040 (0.014)	0.012 (0.006)	0.066 (0.006)
Sample Size, 1998	7 171	8 591	58 220	46 236
Sample Size, 1993	4 447	4 815	38 357	32 187
Sample Size, 1990	4 481	4 466	46 251	36 177

Notes: White's standard errors in parentheses. Regressions also include an intercept, control variables for years of schooling, age, age-squared, and the number of children of age 0-6 years in the household.

TABLE 4.5 Logit estimates of the probability of finding a partner between 1993 and 1998, and between 1990 and 1993 conditional on being single in 1993 and 1990, respectively.

	1990-1993	**1993-1998**
Intercept	2.5745 (0.1009)	3.4873 (0.0816)
Male	-1.5111 (0.1303)	-1.7991 (0.1062)
Female in City	-0.1237 (0.0457)	-0.0340 (0.0376)
Male in City	0.0982 (0.0394)	0.1461 (0.0338)
Male Power	0.4725 (0.0718)	0.5464 (0.0661)
Female Power	0.4497 (0.0773)	0.3810 (0.0690)
Male Power in City	-0.0179 (0.0941)	0.0891 (0.0849)
Female Power in City	-0.00508 (0.1029)	0.1371 (0.0905)
Female Age	-0.1278 (0.00299)	-0.1414 (0.0024)
Male Age	-0.0840 (0.00242)	-0.0925 (0.0020)
-2 Log Likelihood	37625.686	49678.866
#Observations	50451	60466

Table 5.1 The relationship between changes in marital status on earnings for women and men in the city 1990, 1993 and 1998

WOMEN	**1990**	**1993**	**1998**
Couple 1990, 1993, 1998	-0.126	-0.106	-0.056
	(0.005)	(0.006)	(0.006)
Single 1990, couple 1993 and 1998	0.066	-0.041	-0.080
	(0.012)	(0.012)	(0.013)
Single 1990 and 1993, couple 1998	0.040	0.058	-0.100
	(0.012)	(0.012)	(0.013)
Couple 1990, single 1993 and 1998	-0.335	-0.151	0.024
	(0.152)	(0.152)	(0.163)
Couple 1990 and 1993, single 1998	-0.095	-0.058	0.011
	(0.011)	(0.011)	(0.012)
Single 1990, couple 1993, single 1998	0.083	-0.048	0.008
	(0.030)	(0.031)	(0.033)
Couple 1990, single 1993, couple 1998	-0.505	-0.262	-0.225
	(0.373)	(0.373)	(0.399)
#Observations	22 870	22 870	22 870
MEN			
Couple 1990, 1993, 1998	0.120	0.131	0.161
	(0.006)	(0.006)	(0.007)
Single 1990, couple 1993 and 1998	0.073	0.098	0.148
	(0.012)	(0.012)	(0.014)
Single 1990 and 1993, couple 1998	0.015	0.058	0.101
	(0.011)	(0.012)	(0.014)
Couple 1990, single 1993 and 1998	0.169	0.121	0.170
	(0.155)	(0.164)	(0.188)
Couple 1990 and 1993, single 1998	0.086	0.096	0.106
	(0.012)	(0.012)	(0.015)
Single 1990, couple 1993, single 1998	0.043	0.005	-0.064
	(0.029)	(0.020)	(0.035)
Couple 1990, single 1993, couple 1998	0.205	0.099	0.061
	(0.269)	(0.284)	(0.326)
#Observations	22 835	22 835	22 835

Notes: White's standard errors in parentheses. Regressions also include and intercept, years of education, age and age-squared. The reference category is individuals who are singles in every year.

Table 5.2 The relationship between changes in marital status on earnings for women and men outside city 1990, 1993 and 1998

WOMEN	**1990**	**1993**	**1998**
Couple 1990, 1993, 1998	-0.147 (0.004)	-0.125 (0.005)	-0.086 (0.005)
Single 1990, couple 1993 and 1998	0.036 (0.011)	-0.085 (0.011)	-0.110 (0.012)
Single 1990 and 1993, couple 1998	0.035 (0.012)	0.045 (0.012)	-0.115 (0.013)
Couple 1990, single 1993 and 1998	-0.151 (0.106)	0.023 (0.110)	0.055 (0.119)
Couple 1990 and 1993, single 1998	-0.128 (0.009)	-0.091 (0.009)	-0,024 (0.010)
Single 1990, couple 1993, single 1998	0.007 (0.028)	-0.073 (0.029)	-0.037 (0.031)
Couple 1990, single 1993, couple 1998	0,054 (0.352)	-0.147 (0.363)	-0.029 (0.396)
#Observations	38 395	38 395	38 395
MEN			
Couple 1990, 1993, 1998	0.090 (0.004)	0.091 (0.005)	0.114 (0.005)
Single 1990, couple 1993 and 1998	0.037 (0.009)	0.059 (0.010)	0.072 (0.012)
Single 1990 and 1993, couple 1998	0.035 (0.010)	0.053 (0.011)	0.064 (0.013)
Couple 1990, single 1993 and 1998	-0.008 (0.127)	0.206 (0.143)	0.154 (0.168)
Couple 1990 and 1993, single 1998	0.080 (0.009)	0.078 (0.010)	0.081 (0.011)
Single 1990, couple 1993, single 1998	0.091 (0.024)	0.005 (0.027)	0.056 (0.032)
Couple 1990, single 1993, couple 1998	0.163 (0.180)	0.293 (0.202)	0.012 (0.238)
#Observations	43 439	43 439	43 439

Notes: White's standard errors in parentheses. Regressions also include and intercept, years of education, age and age-squared. The reference category is individuals who are singles in every year.