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Sex and the City

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Abstract

Throughout the industrialized world, young women outnumber young men in urban areas. This paper proposes that such a pattern may be linked to higher male incomes in urban areas. The argument is that urban areas offer skilled workers better labor markets. Assuming that there are more skilled males than females, this alone would predict a surplus of males. However, the presence of males with high incomes may attract not only skilled females but also unskilled females. Thus, a surplus of women in urban areas may result from a combination of better labor and marriage markets. Swedish municipality data support the results.

Keywords: Sex ratio; marriage migration
JEL classification: *J*6; *J*16; *R*23

I. Introduction

Throughout the Western world, rural areas are short of young women (see Table 1). Urban areas are not only home to relatively more females, they also offer better labor markets for skilled workers. However, since women are on average less skilled than men, job location alone cannot account for the surplus of women. This paper argues that a combination of marriage and labor market factors may explain the observed pattern.

It is well established that, in partner choice, men value traits that are associated with female fecundity, such as youth; for evidence, see e.g. Wright (1994) and Buss (1994).[1] Female fecundity is not only attractive but also scarce; see Trivers (1972). Hence young women tend to have a choice of partners. If women value financial security when evaluating a partner, richer men would face better partner availability; again, see Wright (1994) and Buss (1994). These observations suggest that young women would match with rich men. If such men are in urban areas, this could account for the surplus of women.

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[1] Fecundity is synonymous with fertility, but in this context the former is often used to indicate capacity to bear children and the latter the actual number borne.

Table 1. *Ratio of men to women aged 25–34, 1985–1994, latest available year*

Country	Rural	Urban	Rural–Urban
Europe			
Andorra	1.38	1.21	0.17
Armenia	1.10	0.84	0.26
Austria	1.10	1.03	0.07
Belarus	1.20	0.94	0.26
Bulgaria	1.16	0.97	0.19
Croatia	1.17	0.92	0.25
Estonia	1.11	0.97	0.14
Finland	1.10	1.02	0.08
France	1.02	0.98	0.04
Georgia	1.05	0.86	0.19
Hungary	1.09	0.99	0.10
Ireland	1.09	0.95	0.14
Latvia	1.11	0.97	0.14
Lithuania	1.17	0.97	0.20
Moldova	0.96	0.91	0.05
Netherlands	1.05	1.05	0.00
Norway	1.14	1.03	0.11
Poland	1.15	0.96	0.19
Portugal	1.01	0.94	0.07
Romania	1.30	0.90	0.40
Russia	1.10	0.99	0.11
Slovenia	1.09	0.79	0.30
Sweden	1.06	1.06	0.00
Switzerland	1.08	1.08	0.00
Ukraine	1.08	0.95	0.13
North and Central America			
Belize	1.18	0.97	0.21
Canada	1.00	0.99	0.01
Costa Rica	0.97	0.92	0.05
Cuba	1.12	0.99	0.13
Greenland	1.35	1.11	0.24
Guatemala	1.08	0.92	0.16
Haiti	1.01	0.80	0.21
Honduras	1.00	0.83	0.17
Nicaragua	1.11	0.91	0.20
Panama	1.24	0.89	0.35
US	1.01	1.00	0.01
South America			
Argentina	1.18	0.95	0.23
Bolivia	1.02	0.90	0.12
Brazil	1.10	0.92	0.18
Chile	1.33	0.96	0.37
Colombia	1.14	0.87	0.27
Ecuador	1.11	0.97	0.14
Falklands	1.05	0.96	0.09
Paraguay	1.13	0.91	0.22
Peru	1.11	0.99	0.12
Uruguay	1.48	0.91	0.57
Venezuela	1.21	1.00	0.21

Source: United Nations, *Demographic Yearbook 1994*: Table 7.

By symmetry, it might be argued that if young women congregate in urban areas, men would also be attracted by better marriage market opportunities in urban areas, which should balance the sex ratio. However, this is not necessarily true. If the marriage market is asymmetric—so that for men, marriage follows from good job-market opportunities, but for women, marriage and wage work constitute two alternative sources of income—high paying jobs in a locality may imply that it can support more women than men, since women draw income from both jobs and men.

This paper is in the vein of a small economics literature on family and location choice. Mincer (1978) and Costa and Kahn (2000) analyzed couples' location choice where matching was taken as given. These papers assume that couples co-reside, and thus cannot account for variation in the sex ratio. Another related paper is Konrad, Künemund, Lommerud and Robledo (2002), which studied the location choice of siblings, given birth order. While the surplus of young women in cities has been noted in the popular press, this is the first economics paper that, to the best of my knowledge, analyzes the phenomenon systematically.

The remainder of the paper is organized as follows. Section II considers whether it is reasonable to assume that, in the Western world, men pay women (as partners in general and wives in particular). Section III provides a rudimentary model and Section IV reports evidence from Swedish municipality data. Section V concludes.

II. Why Men Pay Women

While it takes a man and a woman to produce a child, and sex ratios roughly balance, Trivers (1972) argued that women's greater parental investment makes them bottlenecks in reproduction. The female parental investment is greater than that of the male (in the vast majority of species), starting with the (by definition) greater energy invested in the female sex cell and, among humans, further amplified by a nine-month gestation period. Moreover, women are fecund for fewer years than males. Although a woman cannot reproduce in splendid isolation, beyond the first male, the contribution of additional partners to the number of offspring a woman can bear is negligible. In contrast, a man's ability to father children is strongly linked to his ability to attract partners, an observation first made by Bateman (1948).[2] Hence, the reproductive rewards to additional partners are much greater for males than females. As a consequence, male-to-male competition for partners tends to be greater than female-to-female

[2] In his study of the fruit fly, Bateman found that female reproductive success was unrelated to an ability to attract partners, while male reproductive success was an almost linear function of the same ability.

partner competition. This in turn provides the conditions for a partner market in which males contribute resources in exchange for mating opportunities.

Humans not only mate, they also marry. As argued by Edlund (2001), marriage may induce even greater male-to-female transfers. The underlying rationale may be summarized by the Roman dictum *Mater semper certa est, pater est, quem nuptiae demonstrant*. In other words, in the absence of marriage, there is only one known parent—the mother. She is the default custodian of her children and, unless married, she is also the sole custodian. If the mother is married, fatherhood accrues to her husband. Moreover, a married mother shares custody with her husband.[3] Since marriage establishes paternity and gives men custodial rights (some of which are at the expense of the mother's rights), men could be expected to pay for marriage. In fact, marriage may be viewed as a contract through which men transfer resources to women in exchange for parental rights. This observation was used by Edlund and Korn (2002) to explain why prostitutes are well paid (they cannot marry), and by Edlund and Pande (2002) to understand why the decline in marriage over the last three decades may have made women poorer relative to men and thus more left-leaning politically.[4]

While men may pay for mating opportunities and marriage, this does not necessarily imply that they pay women. In societies which practice bride price, the payment is not to the bride but to her father; see Goody (1973). Typically, bride price payments reflect that the right to decide marriage is vested in a bride's male relative, not the bride. However, in Europe since the Middle Ages, and in many other countries with Western-inspired family law since the 1950s, only the intending spouses need to consent for the marriage to be valid; see Goody (1983) and Goode (1970).[5] If women decide whom to partner with or marry, it stands to reason that they would be the beneficiaries of male-to-male competition for partners.[6] In Europe, large up-front payments have been rare.[7] Instead, the payment seems to have taken the form of higher transfers during

[3] The establishment of paternity when a mother is unmarried does not automatically vest the father with parental rights. That is, an unmarried mother may acknowledge the father of her children but retain mother-only custody.

[4] The decline in marriage, in turn, may be understood by the following argument, inspired by Akerlof, Yellen and Katz (1996). Assume that a fraction of men are *not* interested in parenthood. Instead, they marry for sex. If sex becomes widely available outside marriage, these men would not marry and marriage would decline.

[5] The right to consent to marriage is part of the Universal Declaration of Human Rights, 1948. In Imperial China, for example, the right to contract marriage rested solely with the fathers of the intending spouses; see Cheung (1972).

[6] In the Bible, Jacob can only marry Rachel after having worked seven (plus seven) years for her father (*Genesis 29*). Arguably, in today's society of individual consent, Jacob would have worked seven years for Rachel, not her dad.

[7] This is potentially linked to the fact that the bride is the recipient rather than her father. Payment in installments eases credit constraints, a more attractive option to a bride than to her father, given the fact that he is older.

marriage and there is ample evidence that, historically, women in Europe have enjoyed higher status than women in Asia. For instance, men and women have shared quarters and often taken meals together, which can be contrasted with the Asian practice of *purdah*. Moreover, on the death of her husband, the widow inherited, a practice that contrasts with custom in Africa and Asia, where she did not inherit and may even have been considered part of the estate.[8]

Arguably, many societies mandate monogamy, thereby adding institutional constraints on a man's ability to father children (in-wedlock). While monogamy reduces the gender differences in reproductive capacity, it does not eliminate them. First, not all partnering is between people who are married to each other. Second, monogamy is rarely strict. Remarriage is typically allowed on divorce or death of a spouse.[9] A widower or divorcé can remarry and have children if his new wife is young, while the widow or divorcée beyond a certain age cannot bear children irrespective of her partner's age. If ability to reproduce contributes to attractiveness, gender differential fecundity will make women scarce on the partner market—even under monogamy—as long as there is some repartnering. This asymmetry was exploited by Siow (1998) in his analysis of the implications of differential fecundity for labor market behavior. Lastly, monogamy may raise the rewards associated with marriage to a high-income husband since he can only take one wife. Thus, while the number of men and women who are married at any given point in time will balance under monogamy, this does not mean that the sex ratio in a locality has to approach unity, since unmarried women may be attracted by the potential to marry well (and be the sole wife).

III. An Example

A simple example may illustrate how the location of skilled jobs in urban areas can result in more female than male rural-to-urban migration despite the fact that women are less skilled than men. The argument is that urban areas offer skilled workers of either gender better paying jobs, which implies that urban areas offer women not only better labor market opportunities but also better marriage market opportunities since high earning men are located there. Hence, unskilled women may also want to locate in urban areas, in the hope of landing a good husband. The migration of unskilled women to urban areas and the resulting surplus of women is similar to the migration and wait

[8] Muslim family law provides a notable exception.
[9] Note that the now defunct Indian upper-caste practice of *suttee*—widow burning—prevented women, not men, from remarriage.

unemployment generated by a minimum wage modeled by Harris and Todaro (1970) and Mincer (1976).

Consider a population with M men and F women, where for simplicity $M = F$. There are two skill types, unskilled or skilled, denoted L and H. There are M_L, F_L unskilled men and women, respectively; and M_H, F_H skilled men and women, respectively. I assume that there are at least as many skilled men as women, $M_H \geq F_H$. Skilled workers have higher potential labor market productivity than unskilled. Jobs also come in two types, skilled and unskilled. Skilled jobs pay w_H, and unskilled jobs w_L, where $w_H > w_L$.

There are two locations: Urban and Rural, denoted U and R, respectively. Labor demand is perfectly elastic. Skilled jobs are only available in Urban. Unskilled jobs can be obtained in both locations. Either type of worker can hold an unskilled job, while only skilled workers can hold a skilled job.

Urban has an initial population of m^U men and f^U women, and Rural an initial population of m^R men and f^R women. For simplicity, let initial sex ratios balance in both locations, and let there be no difference in the initial proportion of skilled workers in Urban and Rural.

People migrate if they can achieve a strictly higher expected payoff from moving.[10] Location matters because I assume that both the labor and the marriage markets are local, i.e., an individual can only marry someone who is in the same location, and cannot hold a job outside that location. Let M_j^i denote the number of men in location $i = U, R$ of type $j = L, H$ *after* migration has taken place, and similarly for women, F_j^i denotes the number of women in location i of type j.

In the marriage market, women are assumed identical, and men pay for marriage. I assume that marriage is a normal good for men. A man's valuation of marriage, z, is a function of his income, where $z(w_H) > z(w_L) > 0$. To further simplify the analysis I assume: (i) monogamy; (ii) men in unskilled jobs pay their valuation of marriage, i.e., $z_L = z(y_L)$; and (iii) men in skilled jobs may pay less than their full valuation, but more than men in unskilled jobs, i.e., $z_H \in (z(w_L), z(w_H)]$.[11]

I assume (random) matching on the Urban and Rural marriage markets as follows. The short side of the market always marries. High wage men marry before low wage men. If there are more high wage men than women in location i, then high wage men marry with probability $\min\{1, F^i/M_H^i\}$, where F^i is the number of women in location i of either type, and low

[10] Risk neutrality and a small relocation cost could justify this.

[11] One way of justifying $z_H > z_L$ is that if $z_H \leq z_L$, there would be no reason for a surplus of women in Urban and, in fact, there would be a deficit of women. If $z_H = z_L$, some high wage men would not marry, which would be both inefficient and *ex post* involuntary since high wage men value marriage at more than z_L. Only a price $z_H > z_L$ ensures marriage with certainty.

wage men do not marry. If there are more women than high wage men, then low wage men marry with probability $\min\{1, (F^i - M_H^i)/M_L^i\}$.

In equilibrium, no one can achieve a higher expected payoff from a different location decision, given the others' location decision.

Let p_j^i denote the probability that a man in location i with wage j marries. Furthermore, let ρ^i denote the female probability of marriage in location i, and ρ_j^i, the probability of marrying a man with wage j in location i.

If a skilled man locates in Urban, his payoff is

$$\pi_H^U = p_H^U(z(w_H) - z_H) + w_H. \tag{1}$$

If he locates in Rural, his payoff is

$$\pi_H^R = w_L, \tag{2}$$

since there are no skilled jobs in Rural. Clearly, even if a skilled man would not marry, he would like to locate in Urban.

The unskilled man's payoff is independent of location choice, since he would hold an unskilled job in either location and he is indifferent between marriage and bachelorhood. Hence, $\pi_L^U = \pi_L^R = w_L$.

The skilled woman's payoff from locating in Urban is

$$\Pi_H^U = \rho^U z_L + \rho_H^U(z_H - z_L) + w_H. \tag{3}$$

Her payoff from locating in Rural is

$$\Pi_H^R = \rho^R z_L + w_L, \tag{4}$$

since there are neither high wage men nor high wage jobs there.

The unskilled woman's payoff from locating in Urban is

$$\Pi_L^U = \rho^U z_L + \rho_H^U(z_H - z_L) + w_L. \tag{5}$$

Her payoff if in Rural, Π_L^R, is the same as the skilled woman's, given by equation (4).

We are interested in the post-migration sex ratio, M^U/F^U. Starting with Urban men, $M^U = m_L^U + m_H^U + m_H^R$, since no Urban-born men, or Rural unskilled men, can gain by migrating, while Rural skilled men gain by moving to Urban. As for women, Rural skilled women will migrate to Urban. However, this does not suffice to establish a surplus of women in Urban, since there are at least as many skilled men as skilled women. Hence, the interesting group is unskilled women. Since they face the same labor market in either location, it must be the marriage market that determines their choice. Clearly, if there were fewer or equally many women as men in Urban, unskilled women would do better in Urban since they marry with probability one, and with some positive probability they marry a man with high wage. Hence, payoffs to unskilled women in Urban and Rural cannot

equalize unless the probability of marriage is less than one in Urban, i.e., there is a surplus of women in Urban.

Formally, from equations (4) and (5), Urban is more attractive than Rural, as long as

$$\frac{\rho^R - \rho^U}{\rho^U_H} < \frac{z_H - z_L}{z_L}. \tag{6}$$

Clearly, the RHS of condition (6) is positive. The LHS can be rewritten as

$$\frac{\min\{A,1\} - \min\{B,1\}}{\min\{C,1\}} \equiv \phi(\delta), \tag{7}$$

where

$$A = \frac{m^R_L}{f^R_L - \delta}, \quad B = \frac{m^R_H + m^U_H + m^U_L}{f^R_H + f^U_H + f^U_L + \delta}, \quad C = \frac{m^R_H + m^U_H}{f^R_H + f^U_H + f^U_L + \delta},$$

and $\delta \in [0, f^R_L]$ is the number of Rural unskilled women who migrate to Urban. Let δ^* denote the equilibrium δ, and $\bar{\delta}$ the number of unskilled women who have to migrate to Urban in order for sex ratios to balance. Migration to Urban is attractive until condition (6) no longer holds, hence

$$\delta^* = \left\{ \delta : \frac{\rho^R - \rho^U}{\rho^U_H} = \frac{z_H - z_L}{z_L} \right\}.$$

Note that $\phi'(\delta) > 0$ and that $\phi(\bar{\delta}) = 0$. Hence, $\delta^* > \bar{\delta}$.

This establishes the result: there is a unique equilibrium in which Urban has a surplus of women and Rural a surplus of men. Immediate implications are that:

(i) Employment in Urban is both skilled and unskilled.
(ii) Unskilled employment in Urban is relatively more female than unskilled employment in Rural.
(iii) Urban singles are female and rural singles are male.
(iv) Single females have higher income than single males.

Point (ii) suggests a supply explanation as to why, in cities, unskilled service jobs tend to be female. For instance, the prevalence of women in clerical jobs may be a result of, not an explanation for, a surplus of females in cities. While secretarial jobs are primarily held by women today, there is nothing inherently female about such jobs. In fact, until 1930, the clerical profession in the US employed more males than females; see Goldin (1990). A similar argument can be made for waiters and waitresses.

Point (iii) follows trivially from monogamy. Point (iv) holds because some of the single females are skilled, while single males are all unskilled.

Extensions

So far I have assumed that women are identical as partners, that all women want to marry, and that matching is random. These assumptions were made for convenience rather than realism. I now discuss how relaxing these assumptions would modify the results.

If skilled men had a preference for skilled women as partners, then the expected payoff to unskilled women locating in Urban would be reduced. Still, as long as there are more skilled men than women, unskilled women would face a better marriage market in Urban than Rural. Consequently, more women than men would find Urban advantageous.

Another possibility is that a high own income would reduce a woman's interest in marriage. Assume for simplicity that skilled women do not marry at all. This would raise the number of women Urban could support, since more unskilled women could find skilled husbands.

Above, I assumed that all women work, that wages are fixed and that there is no unemployment. Two possible objections are that: (i) married women drop out of the labor force; and (ii) an inflow of workers would depress wages in Urban. Neither observation, however, would change the qualitative results. If women reduce their labor supply when married, this would leave room for more women to move to Urban to work. Hence, the sex ratio could decline even further if the model accounted for this explicitly. Allowing labor demand to be less than perfectly elastic would mute the results, since the out-migration of Rural unskilled women would depress wages in Urban and raise them in Rural (maintaining the assumption that $w_H > w_L$, skilled workers' decisions are not affected).

IV. Empirical Illustration

This section reports the empirical relationship between incomes and sex ratios using Swedish municipality-level data for the 25–44 age group in 1998. The data are from the statistical databases provided by Statistics Sweden. The ages 25–44 were chosen because they cover the prime years of family formation for women and I conjecture that it is women in this age group who are scarce. The same age group was chosen for men, primarily because the number of men in the same age group forms a natural benchmark against which to compare the number of women.

The unit of observation is the municipality. In 1998 there were 289 municipalities. Descriptive statistics are provided in Table 2. The income data are grouped by 10-year age groups, 25–34 and 35–44, thereby allowing me to estimate—for each group separately—a regression equation of the form

$$ratio = \alpha \ln(male\_income) + controls + \epsilon,$$

Table 2. *Descriptive statistics*

Variable	Mean	Std. dev.	Min.	Max.
ratio25–34	1.06	0.06	0.88	1.38
ratio35–44	1.04	0.05	0.92	1.20
male_income25–34	189.74	16.68	148.20	278.80
male_income35–44	218.64	36.61	170.30	566.60
female_income25–34	136.85	8.71	116.90	175.10
female_income35–44	155.99	12.63	133.20	231.00
population25–34	2,116.10	5,209.51	135	71,662
population35–44	1,996.92	3,955.65	121	53,051
fraction never-married25–34	0.58	0.06	0.41	0.77
fraction never-married35–44	0.27	0.05	0.16	0.43
suburb	0.12	0.33	0	1
industrial	0.17	0.37	0	1
rural	0.24	0.43	0	1
military	0.03	0.18	0	1
central	0.01	0.10	0	1

where *ratio* is the ratio of men to women, and *male_income* is the average annual male income. The hypothesis is that $\alpha < 0$, i.e., municipalities with higher male income have more women (per men). Controls include female income, population size and dummies for type of municipality according to the classification of the Swedish Association of Local Authorities. A complete list of variables is in the Appendix.

The rationale for including female income in the regression is that women presumably also migrate to a location where their own labor market prospects are good. However, this measure reflects not only wages (which I do not have), but also hours worked which, for women, are particularly problematic since labor supply is likely to be negatively correlated with both male income and the marriage rate. This may be one reason why female income varies much less than male income (Table 2).

The number of women in the municipality, *population*, is a measure of municipality size. It is included to control for the possibility that women have a taste for amenities provided in more populous areas, such as the theater or museums.[12]

Arguably, a competing hypothesis is that variation in sex ratios across municipalities is driven by industry structure. Hence, I include dummies for predominantly *rural* or *industrial* municipalities. Traditionally, both agriculture and industry have employed more males than females. A similar argument motivates my inclusion of a dummy indicating whether the municipality hosts a *military* base with training of recruits, and whether

[12] Using the total population, males and females, yields similar results.

the municipality is the *central* municipality in a metropolitan area (i.e., Stockholm, Göteborg or Malmö).[13] The reason for including a dummy variable indicating that the municipality is a *suburb* is that suburbs are part of an integrated labor (and marriage) market.

Results

The hypothesis that low sex ratios (males to females) are associated with high male income is borne out by the data. Figure 1 plots the municipality sex ratio against male average income for ages 25–34 and 35–44, respectively, revealing a strong negative correlation.

Turning to the regression analysis, Table 3 reports the results for ages 25–34 and Table 4 for ages 35–44. These are two sets of specifications for each age group, the first without female income (columns 1–5) and the second with female income (columns 6–10). Within each set, municipality dummies are entered sequentially.

Across the regression specifications, male income enters with the hypothesized sign—higher male income is associated with a lower sex ratio, that is, more

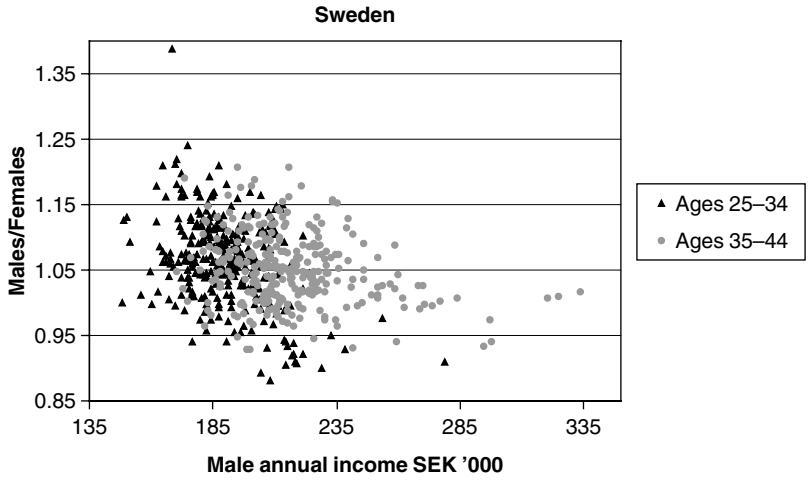

Fig. 1. Municipality sex ratio by male average annual income, Sweden
Note: For legibility, Danderyd and Täby municipalities for ages 35–44 are omitted (566.6, 0.984) and (400.8, 1.008).

[13] The reason for including military bases but not hospitals (which employ more women than men), is that the former are typically located in small municipalities where their presence could have a significant impact on the sex ratio, while this is less true of hospitals.

Table 3. *Dependent variable: municipality sex ratio, men to women, aged 25–34 (OLS)*

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln(male_income25–34)	−0.099**	−0.110**	−0.096**	−0.099**	−0.101**	−0.194***	−0.216***	−0.204***	−0.206***	−0.210***
	[0.046]	[0.047]	[0.047]	[0.046]	[0.045]	[0.056]	[0.058]	[0.057]	[0.058]	[0.058]
ln(female_income25–34)						0.274***	0.283***	0.279***	0.276***	0.280***
						[0.074]	[0.074]	[0.074]	[0.074]	[0.074]
ln(population25–34)	−0.010***	−0.010***	−0.008*	−0.008**	−0.007	−0.011***	−0.010***	−0.008*	−0.009**	−0.007
	[0.003]	[0.004]	[0.004]	[0.004]	[0.005]	[0.003]	[0.004]	[0.004]	[0.004]	[0.005]
suburb	−0.097***	−0.095***	−0.095***	−0.092***	−0.093***	−0.110***	−0.107***	−0.106***	−0.104***	−0.105***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]
industrial		0.006	0.010	0.012	0.012		0.011	0.014	0.015	0.016
		[0.009]	[0.010]	[0.010]	[0.010]		[0.009]	[0.010]	[0.010]	[0.010]
rural			0.011	0.010	0.011			0.008	0.007	0.009
			[0.010]	[0.010]	[0.011]			[0.010]	[0.010]	[0.010]
military				0.035**	0.034**				0.033**	0.031**
				[0.015]	[0.015]				[0.014]	[0.014]
central					−0.034*					−0.042**
					[0.020]					[0.021]
N	289	289	289	289	289	289	289	289	289	289
Adj. R^2	0.35	0.35	0.35	0.36	0.36	0.39	0.39	0.39	0.39	0.39

Note: Robust standard errors in brackets. *Significant at 10%; **significant at 5%; ***significant at 1%.

Table 4. *Dependent variable: municipality sex ratio, men to women, aged 35–44 (OLS)*

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln(male_income35–44)	−0.037	−0.065**	−0.045*	−0.045*	−0.041	−0.108***	−0.158***	−0.135***	−0.135***	−0.129***
	[0.029]	[0.028]	[0.027]	[0.027]	[0.027]	[0.035]	[0.034]	[0.034]	[0.034]	[0.034]
ln(female_income35–44)						0.201***	0.252***	0.237***	0.238***	0.230***
						[0.058]	[0.057]	[0.057]	[0.057]	[0.057]
ln(population35–44)	−0.013***	−0.008**	−0.004	−0.004	−0.007	−0.014***	−0.010**	−0.006	−0.006	−0.008*
	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]
suburb	−0.023**	−0.011	−0.012	−0.012	−0.010	−0.032***	−0.020**	−0.020**	−0.020**	−0.019*
	[0.011]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]	[0.010]
industrial		0.038***	0.048***	0.048***	0.047***		0.043***	0.051***	0.051***	0.050***
		[0.008]	[0.009]	[0.009]	[0.009]		[0.008]	[0.009]	[0.009]	[0.009]
rural			0.023**	0.023**	0.021**			0.019**	0.020**	0.018*
			[0.009]	[0.009]	[0.010]			[0.009]	[0.009]	[0.009]
military				0.000	0.003				−0.003	−0.001
				[0.019]	[0.019]				[0.018]	[0.017]
central					0.060***					0.052***
					[0.014]					[0.015]
N	289	289	289	289	289	289	289	289	289	289
Adj. R^2	0.11	0.17	0.19	0.19	0.2	0.14	0.22	0.23	0.23	0.23

Note: Robust standard errors in brackets. *Significant at 10%; **significant at 5%; ***significant at 1%.

women—and is significant in all but two of the specifications (Table 4). Inclusion of female income improves the fit and strengthens the statistical significance of the coefficient on male income. The coefficient on female income is positive, a result I will return to below. Suburbs and large municipalities are associated with a lower sex ratio, and the effect is statistically significant for both age groups. In contrast, industry structure seems to be a less important determinant of the sex ratio. The coefficients on *industrial* and *rural* are positive, but only statistically significant for the older age group. Municipalities with military bases that train recruits have more young males; the coefficient on the *military* dummy is positive and significant in the younger age group but is close to zero and not significant in the older age group. This may be because the military employs mainly males. Another possibility is that the camps were intentionally located in economically depressed/rural areas.[14] Whether a municipality is also the central municipality in a metropolitan area has different effects on the two age groups. Among the younger age group, the coefficient on *central* is negative, i.e., associated with more women, and among the older age group, the sign is reversed.

To summarize, I find the relationship between male income and the sex ratio to be stronger in the younger than in the older age group, both in terms of magnitude of the estimated coefficient and statistical significance. Suburban municipalities have more women (lower sex ratios), and this is particularly true for the younger age group. In contrast, the dummies measuring industry structure (*industrial, rural, central*) are more important determinants of the sex ratio in the older age group, with the exception of *military*.

Female Income

The results in Tables 3 and 4 reveal a positive relationship between female incomes and the sex ratio. It seems implausible that women are drawn to counties with low female income. A more likely explanation is that when male incomes are low, women work more. First, married women may work more because they live in poorer households. Second, when male incomes are low, women are less likely to be married in the first place, and thus rely more heavily on their own earned income. To investigate this empirically, I computed the fraction of females never married in the two age groups. As hypothesized, female income and the female never-married rate are positively correlated (0.14 and 0.09 for ages 25–34 and 35–44, respectively). Moreover, the female never-married rate is negatively correlated with the

[14] Recruits do not contribute to the sex ratio since they typically remain registered at their residence prior to enlisting.

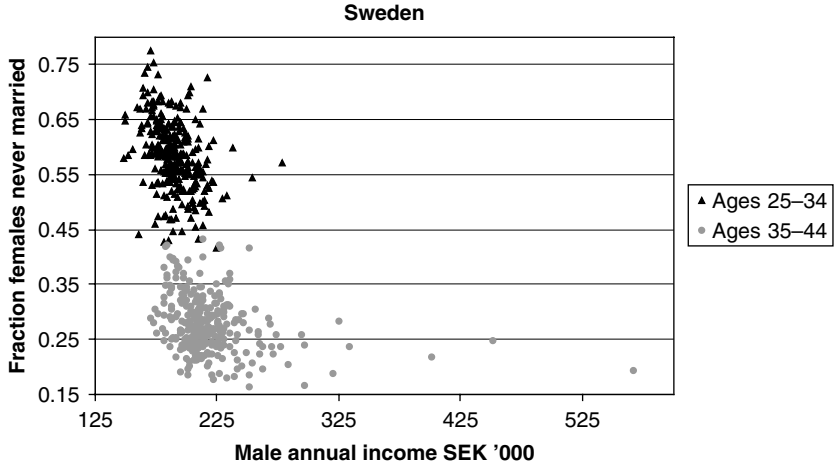

Fig. 2. Fraction females never married by male average annual income

sex ratio, i.e., municipalities with a surplus of men also have more unmarried women. This suggests that it is not the availability of men that keeps female marriage rates down; rather, the limiting factor seems to be low average income of the available men. Figures 2–3 plot the female never-married rate against the sex ratio and male income for the two age groups. High female never-married rates are associated with low male income and a surplus of males. The pattern is particularly pronounced for the younger age group.

To investigate whether the positive correlation between female income and the sex ratio can be explained by unmarried women's working more,

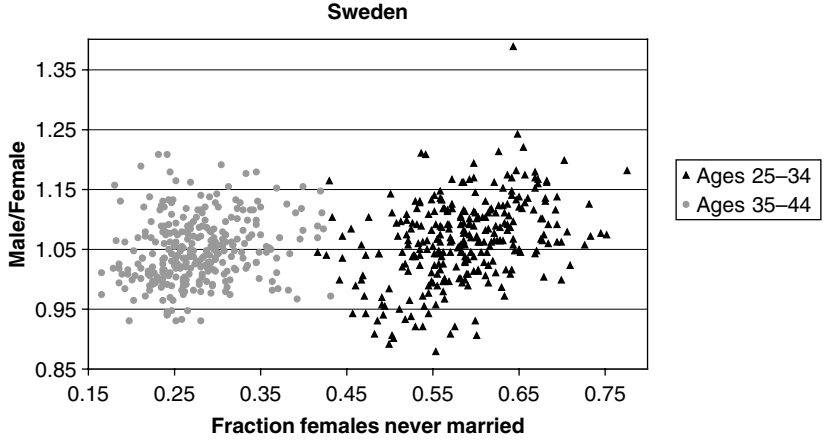

Fig. 3. Sex ratio by fraction females never married

I included the female never-married rate in the regressions. Table 5 reports the results, columns 1–5 for ages 25–34 and columns 5–10 for ages 35–44. The results are mixed; inclusion of the female never-married rate renders female income insignificant for the younger, but not the older age group. Throughout, the main result remains, but is estimated with less precision. This is unsurprising given that male income and the female never-married rate are negatively correlated in the data (in line with the hypothesis of the paper that high male income facilitates marriage).

Stockholm

Whereas the distinction between income and wages is less important for males, the possible endogeneity of male income (or wages) to the sex ratio remains. Male incomes may be low in some municipalities simply because there are relatively many males—lending an entirely different interpretation of the negative correlation found between male income and the sex ratio.

As a robustness check, I therefore restricted attention to the 26 municipalities in Stockholm county. These municipalities are all within commuting distance and constitute a common labor market. Thus wages and incomes should not be endogenous to the sex ratio. It is reassuring that these municipalities exhibit the same negative relationship between sex ratios and male income as the country as a whole (Figure 4). Moreover, since access to cultural and other amenities is presumably similar across municipalities in Stockholm county, this also suggests that gender differences in tastes for such amenities are not behind the pattern found here.

V. Conclusion

Young women outnumber young men in urban areas throughout the Western world. Assuming that cities offer better labor markets for skilled workers, urban areas should attract skilled workers of both sexes. However, this explanation alone would predict a counterfactual surplus of men in urban areas. This paper has argued that the key to this puzzle may lie in asymmetries in the marriage market. In particular, men pay women for marriage. Thus, urban areas may offer women not only a better job market, but also a better marriage market, i.e., men with higher incomes. Swedish municipality-level data for the ages 25–34 and 35–44 are consistent with the second explanation. High male incomes are associated with more women for both age groups, but more so for the younger age group, consistent with the hypothesis that younger women are particularly prized.

While men out-earn women at all ages, judging by the sex ratios, young women aged 25–44 live in richer municipalities. Whether this means that

Table 5. *Dependent variable: municipality sex ratio, men to women, aged 25–34 and 35–44 (OLS)*

	Ages 25–34					Ages 35–44				
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln(male_income)	−0.101	−0.123*	−0.121*	−0.122*	−0.127**	−0.068	−0.126***	−0.111**	−0.112**	−0.104**
	[0.064]	[0.065]	[0.064]	[0.064]	[0.064]	[0.045]	[0.044]	[0.043]	[0.043]	[0.043]
ln(female_income)	0.131	0.139	0.140	0.135	0.141	0.134*	0.198**	0.197**	0.197***	0.187**
	[0.087]	[0.087]	[0.088]	[0.088]	[0.088]	[0.080]	[0.079]	[0.076]	[0.076]	[0.076]
ln(fraction never-married)	0.114***	0.116***	0.114***	0.116***	0.113***	0.030	0.024	0.018	0.018	0.019
	[0.039]	[0.039]	[0.040]	[0.040]	[0.040]	[0.024]	[0.023]	[0.023]	[0.023]	[0.023]
ln(population)	−0.013***	−0.012***	−0.011**	−0.012***	−0.010**	−0.015***	−0.011***	−0.006	−0.006	−0.009*
	[0.003]	[0.004]	[0.004]	[0.004]	[0.005]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]
suburb	−0.096***	−0.092***	−0.092***	−0.089***	−0.091***	−0.028**	−0.017*	−0.018*	−0.018*	−0.017
	[0.013]	[0.013]	[0.013]	[0.013]	[0.013]	[0.011]	[0.010]	[0.010]	[0.010]	[0.011]
industrial		0.012	0.013	0.014	0.015		0.043***	0.051***	0.050***	0.049***
		[0.009]	[0.010]	[0.010]	[0.010]		[0.008]	[0.009]	[0.009]	[0.009]
rural			0.003	0.002	0.003			0.019*	0.019*	0.017*
			[0.010]	[0.010]	[0.011]			[0.009]	[0.010]	[0.010]
military				0.034**	0.033**				−0.002	0.000
				[0.014]	[0.014]				[0.018]	[0.018]
central					−0.037*					0.052***
					[0.020]					[0.015]
N	289	289	289	289	289	289	289	289	289	289
Adj. R^2	0.4	0.4	0.4	0.41	0.41	0.14	0.22	0.23	0.23	0.23

Note: Robust standard errors in brackets. *Significant at 10%; **significant at 5%; ***significant at 1%.

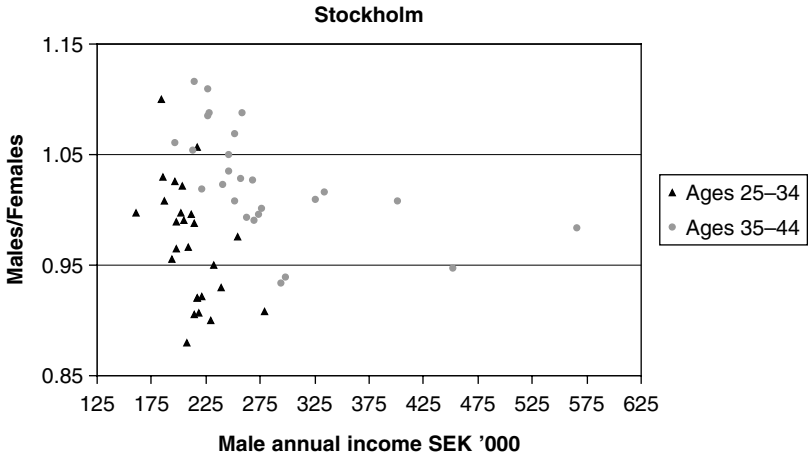

Fig. 4. Municipality sex ratio by male average annual income, Stockholm

women also enjoy higher consumption than men in that age group remains unclear, but the findings are suggestive of the importance of partnering and marriage in equalizing male and female consumption.

A surplus of women in cities may be a geographic manifestation of the general phenomenon of hypergyny, that is, women's marrying "up". So-called "mail-order brides" provide graphic examples, but as this paper indicates, internal migration may be governed by similar forces; see, for instance, Fan and Huang (1998) regarding marriage migration in China. In fact, recent studies in molecular anthropology suggest that women have been more mobile geographically than men for a long time, and that this mobility may be linked to marriage; see e.g. Oota, Settheetham-Ishida, Tiwawech, Ishida and Stoneking (2001).

Appendix

The demographic and income variables are from Statistics Sweden and pertain to 1998. A brief description of the variables is as follows:

ratio25–34 Ratio of males to females aged 25–34.
ratio35–44 Ratio of males to females aged 35–44.
male_income25–34 Average income males aged 25–34, SEK '000.
male_income35–44 Average income males aged 35–44, SEK '000.
female_income25–34 Average income females aged 25–34, SEK '000.
female_income35–44 Average income females aged 35–44, SEK '000.
population25–34 Number of females aged 25–34.
population35–44 Number of females aged 35–44.

Fraction never-married25–34 Fraction women never married aged 25–34.
Fraction never-married35–44 Fraction women never married aged 35–44.

The following classifications are from the Swedish Association of Local Authorities (*Svenska Kommunförbundet*). The municipalities are listed, by dummy, for which the dummy takes on the value 1. The Swedish term is in brackets.

suburb [*förortskommun*] Upplands-Väsby, Vallentuna, Österåker, Värmdö, Järfälla, Ekerö, Huddinge, Botkyrka, Salem, Haninge, Tyresö, Upplands-Bro, Nykvarn, Täby, Danderyd, Sollentuna, Södertälje, Nacka, Sundbyberg, Solna, Lidingö, Vaxholm, Norrtälje, Sigtuna, Ale, Håbo, Härryda, Kävlinge, Kungälv, Kungsbacka, Lerum, Lomma, Mölndal, Öckerö, Partille, Staffanstorp, Svedala, Vellinge.

industrial [*industrikommuner*] Älvkarleby, Arboga, Åstorp, Bengtsfors Bjuv, Boxholm, Bromölla, Degerfors, Eda, Emmaboda, Fagersta Filipstad, Finspång, Gislaved, Gnosjö, Götene, Grums, Gullspång, Hällefors, Hallstahammar, Hofors, Hultsfred, Hylte, Karlskoga Kungsör, Laxå, Lessebo, Lilla Edet, Ljungby, Markaryd, Mönsterås Munkfors, Norberg, Nybro, Olofström, Osby, Östra Göinge, Perstorp Sandviken, Smedjebacken, Storfors, Surahammar, Tibro, Tidaholm, Tranemo, Uppvidinge, Vaggeryd, Värnamo, Vetlanda, Vingåker.

rural [*landsbygdskommuner*] Aneby, Årjäng, Båstad, Bollebygd, Borgholm, Dals-Ed, Essunga, Färgelanda, Gotland, Grästorp, Heby, Herrljunga, Högsby, Hörby, Kinda, Laholm, Lekeberg, Mellerud, Mörbylånga, Nordanstig, Nordmaling, Ockelbo, Ödeshog, Ovanåker, Oxelösund, Robertsfors, Sala, Simrishamn, Sjöbo, Sunne, Svalöv, Svenljunga, Tanum, Tierp Tingsryd, Tomelilla, Töreboda, Torsås, Valdemarsvik, Vara, Ydre.

central Stockholm, Göteborg, Malmö.

The dummy "military" indicates whether the municipality had a military base with training of recruits in 1998.

military Boden, Eksjö, Halmstad, Karlskrona, Strängnäs, Gotland, Sollefteå, Kiruna, Hässleholm, Arvidsjaur.

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