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Abstract

The institutions of family and marriage may seem beyond the remit of economics, involving complexities which the discipline could only ever assume away. There is, however, a significant body of research, which applies the adaptable economists' toolbox to these areas of life, often yielding a significant degree of insight. Gary Becker's seminal *Treatise on the Family*, one of the first studies to subject decisions about sex, marriage, childbearing and childrearing to economic analysis, employed concepts such as the maximisation of family, or household, utility functions to explain family collective choice, with later authors using game theoretic models to offer a different perspective on the intra-household distribution of goods. However, the well-documented phenomenon of urban areas having higher divorce rates than rural regions is not addressed by existing family economics literature, despite the importance of such trends to social policy planners. We develop a new model that provides a theoretical basis for the difference in rural and urban divorce rates, drawing on insights from labour economics and social psychology that have not previously been applied to family economics.

Empirical Observations

There is a tradition of empirical studies showing a correlation between urbanisation and divorce.[2] The most recent United Nations Demographic Yearbook shows divorces by urban/rural residence for 33 countries in 4 continents. The crude divorce rate by urban/rural residence (the number of divorces per 1,000 mid-year population by year) has been calculated for 26 countries in 2008, using the relevant reference population, either urban or rural. In every single case, the urban divorce rate was higher than its rural counterpart. On average, the divorce rate in urban areas is 1.16 per 1,000 greater than in rural areas. In the Republic of Korea, the difference was as low as 0.05 while in Moldova, with the greatest disparity, the rate of divorce in urban areas is 6.40 per 1000 greater than in rural areas.[3] Similarly, the 2001 Census

[1] We would like to thank Dimitra Petropoulou and Michael Boyle for their comments and suggestions.
[2] See Calhoun (1945); Burgess, Locke and Thomes (1963); Schultz (1984) and Jalovaara (2001).
[3] Data collected from http://unstats.un.org/unsd/demographic/products/dyb/dyb2008.htm

of England and Wales demonstrated that the percentage of people aged 16 or over who are divorced is 8.34% in urban areas compared to 7.25% in rural areas. More specifically, the percentage of divorcees increases as settlement size increases, with a rise in the divorce rate when moving from a hamlet or isolated dwelling to a village, onto a town or fringe, and reaching the highest level in an urban area.[4] A century previously, a special report from the 1909 Census in the US demonstrated that urban counties in the north central region of the U.S. had consistently higher divorce rates than the less urbanised counties.[5]

Proposed explanations for the rural-urban divorce differential have tended to come from sociological papers, focusing on lifestyle and norms (e.g. Shelton, 1987) or social integration and mobility (e.g. Woodrow *et al*, 1978). Only one paper, as far as we knew, proposes an explicitly economic model (Gautier *et al*, 2009, discussed below), and it does not engage with search theory insights. We believe that a crucial effect is being ignored, namely the greater opportunity that urban areas provide for residents to meet new people.

The Model

We propose a simple 'Partner Search' model to account for the matching of suitable spouses, using the framework of search models developed in the field of labour economics. The simplest search models in labour theory posit homogeneous workers who are unable to access the entire range of job vacancies in the labour market due to informational imperfections or search costs[6]. Consequently, different employers may pay different wages for identically productive workers and over time, employees move to better-paid jobs. A later development from search theory is 'matching' models that incorporate heterogeneity of employers or employees. In these models there are frictions in search and recruitment that impede the 'matching' of appropriate jobseekers to vacancies. Both sides will incur costs in order to find more suitable workers or higher-paying jobs[7].

Initial attempts to apply search theory to the family were based on the costs and benefits involved in the search for a suitable spouse (and did not explicitly address divorce). One such model, detailed in Hutchens (1979), views a marriage offer as an "expected stream of real income or commodities" with commodities including, for example, the quality of meals, the quality and quantity of children, recreation and companionship.[8] The individual incurs costs associated with gathering information about such offers, through activities such as "dating, visits to a singles bar, and attendance at dances." The marriage decision

[4] Data collected from http://www.statistics.gov.uk/statbase/ssdataset.asp?vlnk=8917&More=Y
[5] See Schultz (1984)
[6] See McCall (1970) and Mortensen (1970) for the pioneering search theory models
[7] For example, Blanchard and Diamond (1994) and Mumford and Smith (1999) where firms have ranked preferences for employed over unemployed jobseekers, and for both over economically inactive candidates.
[8] See Hutchens (1979) and Becker (1973).

is thus based on the maximisation of net benefits from search. While there is clearly merit in taking into account the costs of search and the expected utility from marriage, it is also arguable that this approach is somewhat dated. The internet and increased female participation in the workplace have reduced the importance of the activities which Hutchens lists as costs to gathering information; furthermore, married persons are not normally engaging in a search for a new partner. As opposed to these earlier applications of search theory to the marriage market, we focus on the rate of meeting as a key variable, and we assume that individuals marry based on personality. We also incorporate the real-world fact that married people will meet new people over time even without any 'search effort', and one of these may happen to suit them more than their current partner.

Our model considers a single time period: during this period an individual meets a subset of the entire population, and if they find someone with personality traits or characteristics that are sufficiently well-suited, then they marry. If a married person meets someone more suited to them than their current partner then they divorce and immediately, and costlessly, remarry the more suitable match. Our model is therefore showing one period only. The proportion of single people in the population is set exogenously, and the model provides a snapshot of marriage activity rather than attempting to account for changes over time.

In forming a search model for the marriage market, we alter a key feature of the Job Search models. Even those that allow for worker heterogeneity in terms of *productive characteristics* describe workers *tastes* as identical. That is, all workers have identical preferences over job offers. For example, all workers prefer job A to job B if the former pays a higher wage to the latter and the roles are otherwise identical. However, in the field of personal relations, individuals do not have identical preferences over potential spouses. It may be that Venus prefers husband A over husband B, but Serena prefers husband B over husband A. In order to specify a measure of marital suitability for any given pair of individuals, we have drawn from the literature on positive assortative matching in social psychology, meaning the empirically observed tendency for "like to marry like" (Botwin et al., 1997). Partners tend to be similar in a range of characteristics, including personality traits, and empirical evidence indicates that this occurs through selection rather than convergence over time (Humbad, 2010). Popular theories such as the Myers-Briggs indicator and the Five Factor model both suggest a variety of personality traits. Botwin et al. (1997) use the Five Factor model, in which human personality is fully described with reference to five key traits, and find positive correlations between one's own personality and the desired personality of a partner for each of the five factors, suggesting that individuals prefer partners with similar personality characteristics to themselves. The Myer-Briggs model is similar, but it describes personality as a vector of four different traits: it measures the degree to which an individual relies on sensing over intuition, thinking over feeling, judgment over perception and is more extraverted over introverted.

Our model employs a vector of k personality traits as a measure of marital suitability – this is general enough to be mapped to a number of the established personality-matching theories. Each individual's personality traits are assigned a numerical score between 0 and 0.9. The smaller the difference in scores between two individuals, the more suitable they are as a match. We can compile a 'suitability score' defined as the sum of the absolute difference between each partner's score over the four personality traits. If we take one male and one female, and assign the male's personality score to the variables $m_1, \ldots, m_k$, and the female's personality score to $f_1, \ldots, f_k$ then the couple's suitability score is:

The lower the score the more suitable the couple: a score of 0 implies identical personality traits and a completely dissimilar couple would have the maximum score of k multiplied by the range of possible values for a trait.

As such, we can derive the probability of marriage in a single time period given λ, the number of new people an individual meets per period. Our behavioural assumption in the model is that an unmarried individual will marry the first 'suitable' person that they meet in a given time period, (a potential spouse is 'suitable' if the resulting couple suitability score is no greater than a 'reservation suitability', r). The interpretation of r is that, in modern societies, most people are not so desperate to marry that they will accept someone entirely unsuitable – hence if an individual fails to meet someone that surpasses their reservation suitability then they will choose to remain single. We have made a simplifying assumption that marriages will occur spontaneously once a suitable partner is found. This removes the complexity that arises if individuals have a 'menu' of potential partners – for example where Venus proposes to her most suitable match, husband A, but husband A has also received an offer from Martina, who is a better match for him. This can lead to a cascade of rejections, and the possibility that an unmarried individual will find a suitable partner, but have their marriage offer rejected and remain single at the end of the period. In our model there are no rejected marriage offers, and any bachelor who finds a partner meeting the reservation suitability will marry instantaneously. This is not a grave over-simplification: in real life, most people do not entertain multiple marriage offers simultaneously, nor are they able to return to an earlier partner if they are unsuccessful in their proposal to a more preferred individual.

To find the probability of an unmarried individual finding a suitable partner, we define $F()$ as the distribution of suitability scores between the individual and the rest of the population. The probability in one time period of meeting an individual that meets the reservation utility is:

(1)

That is, one minus the probability of all λ new acquaintances being unsuitable. 1-F(r) is the probability that any given new acquaintance is unsuitable. It is raised to the power λ to give the probability of all new acquaintances in that time period being unsuitable.

A married individual will only remarry if they meet someone more suited to them than their current spouse. Each existing couple has a suitability score of Ξ, which is distributed amongst the population of married couples according to the probability distribution D(Ξ) with upper boundary $\Xi \leq r$. So, the probability of remarriage is a weighted average of remarriage probabilities for each suitability score:

(2)

F(), as mentioned above, is the cumulative distribution of suitability scores between some individual X and the rest of the population. The formula calculates one minus the probability that all λ new acquaintances have a weakly lower suitability than the individual's current partner for each Ξ, and weights it by the density of suitability score Ξ in the population of married couples.

The overall marriage rate per time period as a proportion of the population can be found by weighting equations (1) and (2) by u, the fraction of unmarried individuals in the population:

(3)

The remarriage rate in the overall population is just an expression of the probability of remarriage times the proportion of married persons in the population:

(4)

An Application of the Model

To show how the model works, we will apply it to a population where personality is measured on a vector of four traits[9], each of which is measured on a scale of 0.0 to 0.9 accepting values at one decimal place. Personality types are uniformly and independently distributed. An individual of personality type (0.4, 0.2, 0.6, 0.9) would find partner A, with personality type (0.5, 0.2, 0.5, 0.8) more suitable than partner B, with type (0.9, 0.9, 0.1, 0.1). In the above example, the individual has a score of 0.3 (0.1 + 0.0 + 0.1 + 0.1) with partner A and a score of 2.5 with partner B.

The model predicts that changing the rate of meeting new acquaintances will positively affect the marriage and remarriage rates. An obvious application of this is to compare rural and urban communities, as the opportunity to meet new people is generally much greater in urban areas.

As an example of this using fictional data, let us compare rural Cookham with urban Central City. In both communities r=0.4, u=0.2, D(Ξ) is uniformly distributed between 0 and r. Because we have supposed that personality scores are evenly distributed, it follows that each of the 10^4 personality trait permutations are equally likely. The greater opportunities to meet new people in urban areas is modelled by setting λ=10 for Cookham, whereas for Central City λ=20.

We have calculated the resulting probabilities of a single person with personality traits (0.0, 0.0, 0.0, 0.0) marrying or remarrying. F(Ξ) is therefore calculated by finding the number of combinations that sum to Ξ or less. This can be taken as a baseline for the marriage probabilities – a person with middle-value personality traits has a greater probability of meeting a suitable partner because they have available to them potential spouses with both higher and lower personality scores. The results of computing these parameters for the model are P^S values of 0.068 for Cookham and 0.131 for Central City, and P^M of 0.011 and 0.022 respectively. The remarriage rate in Cookham is 0.0089, whereas in Central City it is 0.0175. The overall marriage rates are 0.022 and 0.044 respectively. I.e. marriage and remarriage rates are twice as high in Central City as they are in Cookham.

Limitations

Firstly, the above model only provides a static representation of the marriage market, and assumes an exogenously given u and D(Ξ). But each marriage that occurs will change the distribution of D(Ξ), and we would expect that over time matches would improve as individuals find partners that are more suited

[9] Setting k=4 follows the Myers-Briggs indicator, a leading model of personality traits.

to them. Therefore, a dynamic equilibrium model would determine D(Ξ) endogenously. The proportion of unmarried adults would also be endogenous, determined by the marriage rate of singles and the rate of 'entry' into the unmarried sector by divorcés, widows and minors reaching adulthood. However, the effect of a higher λ will still be to increase the remarriage rate by making better matches available faster.

Secondly, the model assumes perfect information such that individuals accurately adjudicate the personality traits of potential partners. In reality, imperfect information would increase the rate of divorce, as individuals mistakenly marry unsuitable partners and easily find (or at least think they find) better suited alternatives. Alternatively, risk-averse agents in an imperfect information world may remain with their spouse despite an offer from an apparently better-suited partner for fear that the new partner will turn out worse than the old one.

A more robust model would need to incorporate certain variables that our model has assumed away. For example, in actuality marriage and divorce do not occur instantaneously and costlessly. Incorporating costs into the model would reduce the predicted rate of marriage and remarriage. Furthermore, our model has assumed that r is uniform across the population. However, it may be that r will vary between individuals according to age, situation, tastes and so forth. Our model would predict that urban dwellers marry at a younger age than rural dwellers (as the marriage probability is higher at any one time), a result that does not accord with empirical findings (Woodrow *et al*, 1987). It may be that young urban dwellers have a higher r because of lifestyle preferences or the expectation that they will be able to find a highly suited partner in the future. Incorporating heterogeneous r into the model allows for a tighter explanation of differences in rural-urban marriage patterns.

Conclusions

Our model's predictions are in line with the empirical data that consistently show divorce rates to be higher in urban areas. This outcome relies on the assumption that urban dwellers meet more new people per year than rural dwellers do.

This paper has suggested a possible causal mechanism for the evident correlation between urbanisation and divorce. However, cross-country empirical studies are required for this mechanism to be tested. Other mechanisms may be at play: for example, it could be that more stable couples move to the countryside to buy larger properties and raise children, leaving unstable couples in urban areas. Gautier et al (2005) using Danish data, directly focus on the effect on divorce of the rural/urban distinction and find this sorting effect to be more significant than the potential causal effect of the size of the marriage market in cities. However, it is difficult to extrapolate from this study when interpreting data from the

2001 UK Census as the meaning of divorce, and even conceptions of what is rural or urban, vary significantly between different countries, different cultures and different legal frameworks. Adopting the Danish instrumental variable approach to the British case would require more data collection and analysis than this paper could feasibly include, but would clearly be a necessary step towards resolving this unanswered question.

References

Becker, G. S. (1973), 'A Theory of Marriage: Part I' *The Journal of Political Economy* 81(4), 813-846

Blanchard, O. and P. Diamond (1994), 'Ranking, Unemployment Duration and Wages', *Review of Economic Studies* 61, 417-434.

Botwin, M., D.M. Buss and T.K. Shackelford (1997), 'Personality and mate preferences: five factors in mate selection and marital satisfaction,' *Journal of Personality* 65, 107-136.

Burgess, E., Locke, H. J. and Thomes, M. M. (1963), *The Family from Institution to Companionship*, American Books, New York.

Calhoun, A. W. (1945), *A Social History of the American Family*, Vol. 3, Barnes & Noble, New York.

Gautier, P. A., et al. (2009), 'Sin City? Why is the Divorce Rate Higher in Urban Areas?', *Scandinavian Journal of Economics* 111(3), 439–456

Humbad, M. N., et al. (2010), 'Is spousal similarity for personality a matter of convergence or selection?', *Personality and Individual Differences* 49(7), 827-830.

Hutchens, Robert M. (1979), 'Welfare, Remarriage, and Marital Search', *The American Economic Review* 69(3), 369-379

Jalovaara, M. (2001), 'Socio-economic Status and Divorce in First Marriages in Finland 1991–93', *Population Studies* 55(2), 119–133.

McCall, J. (1970), 'Economics of information and job search', *The Quarterly Journal of Economics* 84(1), 113-126.

Mortensen, D. (1970), 'Job search, the Duration of Unemployment, and the Phillips Curve', *The American Economic Review* 60(5), 505-517.

Mortensen, D. (2003), *Wage Dispersion: Why are similar workers paid differently?*, MIT Press, Cambridge MA.

Mumford, K. and P.N. Smith (1999), 'The hiring function reconsidered: On closing the circle', *Oxford Bulletin of Economics and Statistics* 61, 343-364

Schultz, M. (1984), 'Divorce in Early America: Origins and Patterns in Three North-central States', *Sociological Quarterly* 25 (Autumn), 511–526.

Shelton, B. A. (1987), 'Variations in Divorce Rates by Community Size: A Test of the Social Integration Explanation', *Journal of Marriage and Family* 49 (4), 827-832.

Woodrow, K., D. W. Hastings and E. J. Tu (1978), 'Rural–urban patterns of marriage, divorce, and mortality', *Rural Sociology*, 43(1), 70-86.