

# Becker's Theories of Marriage and the Shrinking Role of Demand and Supply Models <sup>1</sup>

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## ABSTRACT

*This paper argues that Gary Becker has been a leader in the economics of marriage not only as a pioneer but also as a leader who influenced the work of other economists who entered this field over at least two decades. A comprehensive survey of economic research on marriage is presented for the years 1970-1993. A distinction is drawn between earlier entrants and later entrants, the dividing line being 1980, coinciding with the publication of Becker's seminal *Treatise on the Family*. In his first article on marriage in the *JPE* in 1973, Becker gave more prominence to Demand & Supply [D&S] models than he later did in the *Treatise*. It appears that a similar movement away from D&S models is observed among later entrants. This is but one indication of Becker's leadership in the economics of marriage in the period 1980-1993. Other indications are also discussed.*

January 17, 2006

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<sup>1</sup> This paper has benefited from comments by Patricia Apps, Gary Becker, Mario Blejer, Carmel Chiswick, Scott Drewianka, Valerio Filoso, Sarah Hamersma, Lawrence Kenny, Bertrand Lemennicier, Ronald Mincy, Catherine Sofer, Yoram Weiss, Robert Willis, and Howard Yourow.

## I. Introduction

If academics generate intellectual products, then fields of inquiry are intellectual industries. Some industries have a Bill Gates, who not only pioneers the industry but also continues to exert considerable influence over its production for a prolonged period of time. Other industries develop without much leadership from a single individual or firm, or if one producer dominates, leadership does not last very long.

How influential are pioneers in research fields in economics? This paper examines the degree of leadership that Gary Becker has exercised over the economics of marriage, a research field he pioneered in the 1970s. It is argued here that his influence over this field of inquiry was considerable, at least until 1993, the year this study ends.

When he broke new ground in the study of marriage, at Columbia in the late 1960s, Becker faced little competition. He had already acquired considerable stature in more conventional areas of economics, including labor economics and consumer economics, and by the time the theory of marriage was first published, in 1973, he had moved to Chicago and become one of the mastheads of the Chicago School of economics. In those early years, competition from other economic theorists was very limited, as few considered marriage part of the scope of economics. In the 1960s and 1970s Becker was one of the few theorists engaging in what is now called ‘freakonomics’ (a term coined recently by Steve Levitt and Stephen Dubner 2005).

Becker’s standing in the economics profession grew in the 1970s and 1980s. Even though he did not win the Nobel prize until 1992--towards the end of the period under study here--Becker’s growing influence in the U.S. and abroad during the period under study was being recognized in other ways, including *Business Week*’s invitation to become a regular columnist in 1985. In becoming a spokesman for the Chicago School of economics, Becker followed in the footsteps of his mentor, Milton Friedman, who had earned the Nobel prize in 1976 and reached a broad audience via *Newsweek* columns and his popular books, *Capitalism and Freedom* and *Free to Choose*.<sup>2</sup> Becker’s rising fame did not stop other economists from trying to gain more influence over the economics of marriage, as documented in section III.

This paper offers indications of the extent of Becker’s intellectual leadership in economics of marriage by comparing the contents of other economists’ writings on this topic with Becker’s own publications on the economics of marriage. The analysis focuses on Becker’s two major works on the economics of marriage: a set of two articles published in the *Journal of Political Economy (JPE)* in 1973-74, and selected chapters in his 1981 book *Treatise on the Family*.<sup>3</sup> Within the relatively short period 1973-1981, Becker made substantial changes to the presentation of his theory of marriage. Changes in Becker’s perspective on marriage appear to have led to changes in other economists’ writings on marriage. This paper reports on much of the economic literature on marriage published in the period 1973-1980 and in the twelve years after the publication of Becker’s *Treatise*.

In Section II, I review Becker’s theory of marriage (BTM). It is shown that Demand and Supply (D&S) models played a more prominent role in the *JPE* articles than

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<sup>2</sup> Friedman encouraged Becker to accept *Business Week*’s invitation (see Becker and Guity Nashat Becker 1997).

<sup>3</sup> A second edition of the *Treatise* was published in 1992. It is not very different from the first edition.

in the *Treatise*. Section III examines the evolution of models of marriage by other economists. A distinction is made between the publications of earlier entrants into the field of economics of marriage, i.e. researchers who entered in the 1970s, before Becker published his *Treatise*, and the publications of later entrants who entered the field in the 1980s and early 1990s. Until the *Treatise* was published, D&S models predominated not only in Becker's writings, but also in other economists' writings on the topic. After the *Treatise* appeared in 1981, optimal sorting and bargaining models of marriage became popular relative to D&S models of marriage. It is argued that the growth of both optimal sorting and bargaining models indicates Becker's persistent influence on economic analyses of marriage during the period under study. The paper concludes with tentative comparisons between the extent of Becker's influence on a number of different fields of novel research of interest to economists as well as non-economists.

## II. Becker's D&S models of marriage: 1973 to 1981

Except for a relatively inconsequential note by Martin Bronfenbrenner (1971) that used D&S analysis, Becker pioneered the economic analysis of marriage. Becker's theory of marriage (BTM) first appeared in two articles entitled 'A Theory of Marriage', originally published in the *Journal of Political Economy (JPE)* in 1973-74, and then in a book, the *Treatise on the Family*, originally published in 1981. In Becker's *Treatise on the Family* published in 1981 marriage market models appear principally in chapters 3 (Polygamy and Monogamy in Marriage Markets) and 4 (Assortative Mating in Marriage Markets). The sections on marriage were reproduced without any changes in the second edition of the *Treatise*, published in 1992.

Both the 1973 and the 1981 versions of BTM contain two types of marriage market models: D&S models and optimal sorting models.<sup>4</sup> With Robert T. Michael and Elizabeth Landes, Becker also co-authored an article on the economics of divorce that appeared in the *JPE* in 1977, but the bulk of the discussion below regards the 1973 *JPE* articles and the 1981 *Treatise*.

Economic models are meant to resolve three basic economic problems: allocation of factors of production, production, and distribution. D&S models and optimal sorting models of marriage have a number of points in common: they consider individuals as rational optimizers and make an analogy between marriages and firms.<sup>5</sup> Both types of model address the basic economic problem of *allocation*: in this case the allocation (or sorting) of men and women into matches. Both types of model also recognize that markets play a role in facilitating this sorting into matches. Optimal sorting models are more general than D&S models in the sense that they focus on the *sorting result*, namely the very best allocation of men and women into matches, and tend to be vague about the *sorting process*.<sup>6</sup> D&S models of marriage are more specific about this process, in that

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<sup>4</sup> In Grossbard-Shechtman (2003) I called these two versions of BTM the marriage market model and the matching model, but these are inappropriate terms: D&S models deal with matching, and matching models are about the sorting of men and women participating in the same marriage markets. See Catherine Sofer and Michel Sollogoub (1992) and Michael Brien and Michelle Seran (2003) for other classifications of Becker's marriage models.

<sup>5</sup> In that sense, BTM has to be understood in the context of the New Home Economics pioneered by Becker and Jacob Mincer while both were at Columbia (see Grossbard-Shechtman 2001a).

<sup>6</sup> Some sorting models are closer to D&S models than others. Matching models in the tradition of David Gale and Lloyd Shapley's (1962) 'stable marriage problem' are further from D&S models than Tjalling

they emphasize the essential role of a price mechanism. This mechanism also lies at the basis of search models of marriage. In these search models that complement D&S models, a price mechanism (or quasi-price mechanism) helps obtain a *sorting result* between a person on the demand side and a person on the supply side. Becker is also one of the major contributors to search theories of marriage (in Becker, Landes and Michael 1977 and in the *Treatise*), and the first to apply Mortensen's search models to marriage was Michael Keeley, a student of Becker, in Keeley (1974).

Optimal sorting models and D&S models also differ in the degree to which they help resolve the other two basic economic problems of *production and distribution*. Optimal sorting models don't deal with distribution. Therefore, if optimal sorting models are used to explain allocation, other models such as bargaining models are needed to resolve distribution problems.<sup>7</sup> One reason that bargaining models of marriage have flourished since the 1980s is that complements to optimal sorting models were increasingly needed as the use of optimal sorting models expanded.

A major advantage of D&S models based on the operation of a price mechanism and competition lies in these models' capacity to simultaneously and parcimoniously resolve problems of allocation, production, and distribution. A disadvantage of D&S models is their lack of generality: the models need stronger assumptions than most alternative models of optimal sorting and bargaining, including the assumption that a price mechanism operates and assumptions guaranteeing some degree of competition (such as homogeneity, ease of entry and exit, and large number of participants).

While D&S models of marriage markets play an important role in explaining sorting into marriages in both versions of BTM, the first version of the theory is quite different from the second version, published 8 years later. This section compares the *JPE* articles and the two main chapters on marriage in the *Treatise* in terms of the centrality of D&S models. While there is much in common between the theory of marriage that Becker published in the 1970s in the *JPE* and in 1981 in the *Treatise*, there are also fundamental differences in the prominence of D&S models in the two versions of the theory.

***What the two versions of D&S models of marriage in BTM have in common.***

In both versions of BTM graphic presentations of D&S models of marriage play a prominent role. In emphasizing D&S models of marriage, Becker follows the Chicago tradition of preference for the price mechanism over the command mechanism of organization. Prices in Becker's D&S models of marriage are mostly implicit prices, although he recognizes that some societies also have explicit prices for brides or grooms. From the perspective of distribution, prices are closely related to incomes. Becker typically phrases his discussions of implicit prices in terms of shares of the gain from marriage received by men or women, or as the equilibrium income [from marriage] that men and women obtain. Within the framework of D&S models, it follows that any discussion of distribution of gains or income recognizes that prices play a role in the allocation of resources inside the unit of production, in this case a married household.

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Koopmans and Martin Beckmann's (1957) which they called 'assignment problems'. I owe this point to Valerio Filoso.

<sup>7</sup> I am using the term 'bargaining model' to categorize all models that deal with the distribution of goods and resources inside a marriage. This includes models about agency in marriage such as Weiss and Willis (1985) and collective models such as Chiappori (1988).

The same basic competitive D&S model of marriage appears both in the *JPE* article and the *Treatise* (see Figure 1 in Becker 1973 and Figure 3.1 in Becker 1981). It assumes that identical men and identical women are in the market for one another. As a couple, a man and a woman can produce a vector of goods  $Z_{mf}$  (with homogeneity of men and women this gain was assumed to be the same for all couples) that exceeds the sum of the  $Z_f$  a woman could produce alone and the  $Z_m$  that a man could produce alone. The market then determines how the total gain from marriage  $Z_{mf} - Z_m - Z_f$  is subdivided between husband and wife. Graphically, this is presented as a market for wives, with the supply being a horizontal line equal to  $Z_f$  for every woman in the market. The supply becomes vertical and rises when the market runs out of women. The demand by men is established as a horizontal line equal to  $Z_{mf} - Z_m$ , the maximum that men are willing to pay women to marry them (i.e. women get the entire gain from marriage). The demand becomes vertical and falls when the market runs out of men. It follows from this market analysis that if the number of men exceeds the number of women, i.e. the sex ratio exceeds one, the entire gain from marriage goes to women. If the number of women exceeds the number of men, the entire gain from marriage goes to men. If the number of men and women are the same, the market does not determine the division of the gains from marriage. Bargaining leads to the establishment of a lower limit for women's market compensation at  $Z_f$  (with the entire gain going to men), and an upper limit at  $Z_{mf} - Z_m$  (with the entire gain going to women). As has been recognized by Becker, this model does not determine how gains from marriage would be distributed between husbands and wives, an indeterminacy that opens a door to bargaining theories of marriage, in which men and women use command mechanisms to determine the division of marital output.<sup>8</sup>

***Where the two versions of D&S models of marriage in BTM differ.***

The two versions of BTM differ in the extent to which they cover D&S models and optimal sorting models. More specifically, the following differences are noteworthy.

- *Different use of explicit language steeped in price theory.* In the *JPE* article of 1973 the role of prices in the model is clearly stated, as in the following passage: "Each marriage can be considered a two-person firm with either member being the 'entrepreneur' who 'hires' the other at the salary  $m_{ij}$  or  $f_{ij}$  and receives residual 'profits' (...). Another interpretation of the optimal sorting is that only it enables each 'entrepreneur' to maximize 'profits' for given 'salaries' of mates...With all other sortings, some 'entrepreneurs' could do better by 'hiring' different mates than those assigned to them."

Here is another example of the role of prices in the 1973 article: "...the 'shadow' price of an hour of  $t_f$  [female household production time] to a single M [male]—the price he would be willing to pay for  $t_f$ —would exceed  $w_f$  [the female wage], and the 'shadow' price of an hour of  $t_m$  [male household production time] to a single F [female]—the price she would be willing to pay for  $t_m$ —would exceed  $w_m$  [the male wage]. Both gain from marriage because M then, in effect, can buy an hour of  $t_f$  at  $w_f$  and F can buy an hour of  $t_m$  at  $w_m$ , lower prices they then would be willing to pay. Of course this is also why

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<sup>8</sup> Oral communication some time in the period 1974-1976.

married households use positive amounts of  $t_f$  and  $t_m$ .” These sentences clearly emphasize the role of price in a demand for labor. This is about demand as the willingness to pay for an hour of a spouse’s household production time. In other words, Becker writes that the implicit wage of a woman in marital production may exceed the opportunity cost of her time as measured by her wage in the labor force.

- *Different graphs of D&S of mates.* In addition to this basic D&S model of marriage common to both venues, the two publications contain more graphical D&S models of marriage markets, but different models appear in the 1973 and 1981 versions of BTM. In 1973 there is a market for men of type  $i$  and women of type  $i$  which assumes that people can substitute between different types of spouses (Figure 2), and in 1981 there are more markets with polygyny (Figures 3.2 and 3.3). Becker’s omission of the second marriage market model in the *Treatise* is very interesting and worth further investigation.

The second graphic D&S model presented in Becker’s 1973 *JPE* article models choice between mates of different types, in contrast to the first model that assumed homogeneous men and homogeneous women. This model is therefore most relevant to complex societies like ours. In this model, supply and demand takes account of possible substitution between mates belonging to a continuum of different types. Becker shows that in these circumstances the equilibrium division of output in marriage can fall anywhere between the best division from a male point of view and the best division from a female point of view (Figure 2). This graph does not appear in the *Treatise*. This is a fact that has puzzled me for years.

One of the advantages of studying the thoughts of a living economist is that one can ask him questions. In a 2004 email exchange between us, this is what Becker had to say about the disappearance of the D&S model with heterogeneous men and women from the 1981 version of BTM: “My *Treatise* was considered by me to be a complement to my previous work, not a substitute. So I did not go over everything in the earlier papers that I considered to be valid and sometimes even important.” (Becker, 2004) In that same exchange, Becker was very clear that he had not changed his mind about the validity and applicability of the D&S model that appeared as Figure 2 in his *JPE* article on marriage: “I never abandoned my view that imputations to men and women are determined by a competitive marriage market - what you call the supply demand framework.”

- *Different Order of Presentation and Subsection Titles.* In the 1973 *JPE* article graphical D&S models are presented regardless of cultural context. In contrast, in the *Treatise*, such models appear only in the chapter on polygamy.

Readers who learned BTM only from the *Treatise*, and are not particularly interested in polygamy, may very well have skipped the chapter on polygamy, or just skimmed it. They would have paid attention mostly to the chapter on assortative mating and invested more in learning Becker’s formally presented optimal sorting models than his graphical D&S models presented in the previous chapter on polygamy.

In contrast, it is in a section entitled ‘division of output between mates’ that the first *JPE* article presents analyses of D&S in marriage markets.<sup>9</sup> The reader who studies the *JPE* articles on marriage finds it difficult to escape the conclusion that D&S models of marriage markets are of primary importance in influencing the way that marital output is divided between husbands and wives in any society, regardless of whether it is polygamous or monogamous. In contrast, the *Treatise* does not include a section entitled ‘The division of output between mates’ containing an explicit D&S graph applied to the distribution problem. The conclusion that Becker’s theory of marriage explains the distribution of marital output between husband and wife was easy to reach from Becker’s *JPE* articles on marriage, but the reader whose first exposure to Becker’s theory of marriage consists of reading the *Treatise* is unlikely to conclude that competitive D&S models can explain the relative access of men and women to goods consumed in marriage. From reading the *Treatise*’s discussion of the division of marital output in monogamous societies, and not the 1973 *JPE* article, an economist familiar with more conventional applications of D&S analysis is less likely to gain a clear understanding of how D&S affects distribution of goods produced in marriage. The *Treatise* contains a section called ‘Equilibrium income, investments, and sex ratio’, but not all readers may realize that equilibrium incomes correspond to a division of output between husband and wife. Furthermore, this discussion is found in the chapter on polygamy, not in the chapter on assortative mating in monogamous countries. Statements found in the *Treatise*, such as “The bumping of lower-quality men out of their marriages through competitive reductions in the incomes of higher-quality men continues until the incomes of the lowest-quality men are reduced to their single levels”, indicate that supply and demand of brides and grooms influences distribution of marital output, but the connection is not as obvious as it would be to a careful reader of the 1973 *JPE* article.

- *Disappearance of some D&S terms familiar to labor economists.* In the first *JPE* article, the section on the marriage market and sorting of mates includes statements that appear directly imported from labor economics, as the ones on salaries and opportunity cost cited in the previous section. Even though the *Treatise* reproduces many other paragraphs from the same section of the *JPE* article in which the D&S jargon appeared (including numerical examples of optimal sorting), this jargon does not appear in the *Treatise*’s chapters on marriage markets. It is therefore to be expected that readers of the *JPE* articles familiar with traditional D&S analysis would be more likely to understand that BTM deals with intra-marriage distribution than readers getting their only exposure to Becker’s theory of marriage from the *Treatise*.

I conclude that in the first *JPE* article Becker gave more prominence to D&S models of marriage markets than he did in chapters 3 and 4 of the 1981 version of the

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<sup>9</sup> Other subsections in this article are entitled: ‘the gain from marriage’, and ‘the marriage market and sorting of mates’. The second *JPE* article (1974) includes a section entitled ‘love, caring, and marriage,’ a short section on polygamy (2 ½ pages, in contrast to an entire chapter in the *Treatise*), a section on assortative mating and natural selection, and a section on life-cycle marital patterns that includes an economic analysis of search in marriage markets.

*Treatise*. Parallely to the reduced emphasis on D&S models, a comparison between the 1973 and 1981 versions of BTM indicates increased prominence of optimal sorting models. In the *Treatise*, Becker expands optimal sorting models and integrates elements of D&S analysis into an optimal sorting model that he calls an equilibrium sorting model. Here is an example of a statement consistent with D&S analysis found in a section on sorting (in the chapter on assortative mating): “This analysis shows that the equilibrium income and mate assigned to any person by the optimal sorting depends not only on his traits but also on the traits of everyone else in the marriage market.” (Becker 1981, p. 80)

The *Treatise* offers a few more economic analyses of marriage. The chapter on altruism in the family (chapter 8 in Becker 1981) contains a few examples of negotiations between husband and wife assuming an altruistic decision-maker; the chapter on families in nonhuman species (chapter 9 in Becker 1981) presents some analogies between mating among humans and among other species; chapter 10 deals with divorce; and chapter 11 offers some explanations for changes in family characteristics in a number of industrialized countries in the period between 1950 and 1978. In this chapter Becker writes that the growth of U.S. women’s earning power is the major cause of the following changes: lower fertility, growth in lone motherhood, higher divorce rates, higher labor force participation of married women, and higher school enrollment rates for women.<sup>10</sup>

The importance of D&S models in Becker’s opus on marriage is also apparent from the economic analysis of divorce that he co-authored with Robert T. Michael and Elizabeth Landes and that appeared in 1977. This article tested a number of predictions derived from Becker’s D&S models of marriage and from related search models, such as the prediction that individuals with rare characteristics may be less attractive relative to people with more generally desired characteristics. In a market equilibrium their gain from marriage may be lower and therefore they may be more likely to divorce.<sup>11</sup> This article also develops the idea that individuals invest in human capital related to productivity in marriage. The concept of marriage-specific investments is presented, by which the authors mean ‘an investment that raises the output produced in a particular marriage,’ reinforcing the tie between Becker’s economics of marriage and Becker’s theoretical work on human capital (see Becker 1964).<sup>12</sup> Earlier work by economists in the New Home Economics had also analyzed wives’ investments in their husband’s human capital, and vice-versa, husbands’ investments in their wife’s human capital (Lee Benham 1974 and Michael Grossman 1976).

Next, I examine the contributions of other economists to the economic analysis of marriage in the two periods: 1970-1979 and 1980-1993. This survey is then analyzed with an eye on establishing the extent of Becker’s leadership in this field.

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<sup>10</sup> This conclusion has brought Becker the ire of a number of female economists, including Barbara Bergmann (1995) and Frances Woolley (1996).

<sup>11</sup> Other predictions derived and tested in Becker, Landes and Michael (1977) follow from search theory: information is imperfect prior to marriage and divorces are most likely to occur in the first year of marriage (rather than in any later year) due to the fast accumulation of new information about the spouse right after the marriage. Moreover, Becker, Landes and Michael predict and confirm that shotgun marriages, i.e. marriages that occur after the bride gets pregnant, are more likely to end in divorce.

<sup>12</sup> Becker also played a pioneering role in the development of the economic analysis of human capital, other influential pioneers being Jacob Mincer and T.W. Schultz.

### III. Other Economists' Marriage Models: 1970-1993

One sees quite a contrast between the economic models of marriage that were developed by economists entering the field in the 1970s (earlier entrants) and those developed by economists who entered the field after 1980 (later entrants). Earlier entrants contributed primarily D&S models of marriage and later entrants contributed primarily bargaining and optimal sorting models.

*The 1970s.* Before the *Treatise* was published, most entrants into the field of economics of marriage were with Becker either at Columbia or at Chicago. One of the most influential earlier entrants into the economic analysis of marriage markets is Judge Richard Posner, who was fully employed by the law school at the University of Chicago and thus a colleague of Becker's when BTM was first published (see Posner 1980). Posner's *Sex and Reason* is a major contribution to D&S models of marriage. Not surprisingly, Posner uses primarily D&S models of marriage. For example, in *Sex and Reason* Posner (1992) offers D&S models of sexual behavior—including homosexuality and prostitution.

Earlier entrants included many students of Becker's, first at Columbia and then at Chicago. Before he left Columbia for Chicago in 1969, Becker inspired Fredericka Pickford-Santos to write a dissertation on the economics of marriage. Pickford-Santos' theoretical framework is one of bilateral trade. The first students at Chicago who wrote dissertations on the economics of marriage under Becker's supervision are Alan Freiden and Michael Keeley, who both published D&S analyses of marriage markets in 1974.

Keeley built on Becker's assumption that marriage markets establish implicit prices for brides, using this assumption as a stepping stone for the adoption of more labor market analysis tools. Keeley (1974) adapts search theory traditionally combined with D&S analysis of labor markets to the analysis of marriage markets, leading him to derive testable predictions regarding the determinants of age at marriage (see also Keeley 1979).

I also entered the field as a student of Becker's at Chicago, adopted Becker's concept of a marriage as a particular type of small non-profit firm similar to other non-profit firms producing goods of a non-commercial nature, and have developed D&S models that analyze marriage markets. Following Becker's D&S models, I assumed that marriage markets establish implicit prices for brides in an economic analysis of polygamy (Grossbard 1976). Another student at Chicago during this period who wrote articles that adopt Becker's D&S models is Ivy Papps (1980).

Becker's D&S models of marriage have also been applied to the study of dating, extra-marital affairs, and marriage brokers. One of the first to adapt models to such questions is French economist Bertrand Lemennicier (1980, 1982, 1988), who came to the field in 1976 after he had read the 1973 *JPE* articles.

The 1970s also saw a few articles in the New Home Economics tradition that modeled in-marriage human capital investments by one spouse in another. One of the first to develop the concept that wives invest in their husbands' earnings capacity is Lee Benham (1974), a graduate of Stanford University. Becker, Landes and Michael (1977) also applied concepts of human capital to the economic analysis of marriage. Michael Grossman (1976), a student of Becker's at Columbia in the 1960s, developed the concept that spouses invest in each other's health-producing human capital. As was pointed out in

other writings by the founders of the New Home Economics, Becker and Mincer, D&S models and models of investment in human capital are complementary: to better understand why people invest in human capital (theirs or others') it helps to think in terms of demand and supply.

Gerald Scully (1979) was inspired by Becker's optimal sorting model of marriage.

***The 1980s and early 1990s.*** In contrast to the domination of D&S models of marriage markets in the research of economists who were first exposed to Becker's ideas on marriage in the 1960s and 1970s (prior to the publication of the *Treatise*), the models of marriage that experienced the most growth in the 1980s were bargaining and optimal sorting models contributed by researchers newly entering the field of economics of marriage in the 1980s. Bargaining models assume that the problems of allocation and production have been solved, and focus on how a couple will divide the gains of marriage between themselves. Bargaining models recognize that the forces of D&S operate in marriage markets, and have influence on power struggles between wife and husband, but bargaining models are more about command than about matches based on price. Market factors are in the background, as they affect bargaining power (market conditions affect threat points, using the language of some bargaining theories).

Bargaining theorists often dissociate themselves from Becker's unitary model (i.e. a model that conceives of a household as having a central decision-making mechanism affecting all of the household's consumption).<sup>13</sup> It is interesting that bargaining theorists of marriage typically prefer to ignore the fact that Becker's D&S models of marriage clearly address problems of distribution within marriages.<sup>14</sup> One of the most influential later entrants was Marjorie McElroy, who co-authored one of the first bargaining theories of marriage with Mary Jane Horney more than ten years after starting her career at Duke University in 1970. Another influential bargaining theory of marriage was co-authored by Marilyn Manser and Murray Brown, the latter a well-published professor at the State University of New York at Buffalo. Other bargaining models were contributed by Frances Woolley (1988), based on her Ph.D dissertation at the London School of Economics, and Paul Carlin (1985).

A prominent later entrant is Robert Pollak. A professor at the University of Pennsylvania, Pollak already had acquired a reputation as a specialist on consumption theory. Before dealing with Becker's theory of marriage, Pollak had published critiques of Becker's theory of allocation of time, altruist model of family decision-making, and theory of fertility. Pollak first promoted bargaining theories as editor of the *International Economic Review* in which he published the first two influential bargaining articles in 1980-81 (by Manser and Brown, and by Horney and McElroy). Later, after he had moved to the University of Washington in Seattle, his colleague Shelly Lundberg and he published their own bargaining model of marriage in the *JPE* (Lundberg and Pollak 1993). Pollak's dedication to criticizing Becker's theories of the family may be related to

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<sup>13</sup> Until Becker's theory of marriage, most models contributed by the *New Home Economics*, starting with Becker's 1960 article on the economics of fertility and Jacob Mincer's (1962) article on married women's labor force participation, assumed unitary decision-making in the household.

<sup>14</sup> When I called Becker's attention to this apparent oversight of the bargaining theorists of marriage, in January 1993, he agreed with me.

his self-description as a feminist economist (see Pollak 2003). As discussed below, a number of influential later entrants have been associated with feminist economics.

The focus towards two-person models was not limited to models that assume a bargaining process between spouses. In 1981 Patricia Apps published a Walrasian trade model of the household as a two-person economy in which the members engage in perfectly competitive trade and the member specializing in domestic production produces domestic goods in exchange for a wage income from the partner specializing in commercial work (also see Apps 1982).

In the same year, Pierre-Andre Chiappori (1988, 1992) and Apps and Ray Rees (1988) published generalizations of previous two-person models in which the intra-household exchange equilibrium was not limited to that of a bargaining model. They each obtained a household equilibrium that is Pareto efficient and in which the sharing of gains from marriage is an application of the second theorem of welfare economics. Apps and Rees (1988) include a generalization of Apps' trade model that assumes household production. There is no household production in Chiappori's early models. Chiappori called his model a collective model.<sup>15</sup>

Models of marriage that were published by later entrants associated with Becker or Chicago are also two-person models. This holds for Elizabeth Peters, a student at Chicago who entered the field with a model of the effects of no-fault divorce laws on men and women. Even though Peters assumes an implicit price established in marriage markets, an assumption that follows from D&S analysis of marriage (Peters 1986), her models are mostly household bargaining models.<sup>16</sup> Other models of marriage that focus on the conflicting goals of husband and wife are models of child custody and child support by Yoram Weiss and Robert Willis (1985, 1993), two economists with prior connections to Becker.<sup>17</sup>

Like Pollak, Theodore Bergstrom is a later entrant who came to the economics of marriage with a well-established reputation as a mathematical economist and a history of questioning basic assumptions underlying traditional models of D&S of private goods. By the time he entered the economics of marriage in 1989, Bergstrom had a long record of publications in major economics journals, public goods and taxation among his specialties. Also like Pollak, Bergstrom was an early critic of Becker's model of altruism in family decision-making. Unlike Pollak, however, Bergstrom's contributions to the modeling of marriage are in the area of sorting/allocation models. He has contributed marriage and courtship models that don't rely on traditional D&S analysis. With David Lam, his colleague at the University of Michigan, Bergstrom authored a number of articles based on optimal sorting in marriage (Bergstrom and Lam 1989a and 1989b). This group produced more optimal sorting models: Lam (1988) and Bergstrom and Mark Bagnoli (1993). A later entrant adopting optimal sorting models is Alessandro Cigno (1991), who dismisses competitive D&S models as unrealistic in their assumption that homogeneity of participants in marriage markets is comparable to the assumption of homogeneity in labor

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<sup>15</sup> For more on the differences between the intra-household exchange models of Apps and Rees and Chiappori, see Apps and Rees (1997) and Chiappori (1997).

<sup>16</sup> Her principal thesis advisor was Robert Michael.

<sup>17</sup> Willis had become a close associate of Becker's after he had come to Columbia for a post-doctoral fellowship in the 1970s and in 1985 was a professor at Chicago.

markets (Cigno 1991, p. 62). Another optimal sorting model was contributed by Allen Schirm (1987), a student of Pollak's when he was at the University of Pennsylvania.

These new models pulled the economics of marriage in different directions. What these and other later entrants have in common is that they helped move the economic modeling of marriage away from traditional D&S models. Nevertheless, during this period many earlier entrants continued to publish D&S models of marriage. Lemennicier went on to publish a marriage market analysis of marital infidelity (which he called marital mobility, Lemennicier 1982) and an analysis of personal ads in French newspapers (Lemennicier 1988). I published models analyzing married women's labor force participation decisions: Grossbard-Shechtman (1984, 1993) presented a marriage market analysis leading to the derivation of sex ratio effects on labor supply, and Grossbard-Shechtman and Shoshana Neuman (1988) presented a marriage market analysis that leads to the derivation of compensating differentials in marriage. There were also D&S models of choice between formal marriage and cohabitation (Grossbard-Shechtman 1982) and of religious intermarriage (Grossbard-Shechtman 1983). Also in the D&S tradition is Yehoshua Liebermann's (1983) analysis of dowry among Jews. Liebermann had also been a student at Chicago in the 1970s.

Furthermore, during this period a number of scholars followed Lee Benham (1974) and Becker, Landes and Michael (1977) in applying concepts of human capital to the economic analysis of marriage. These include Lawrence Kenny (1983), Grossbard-Shechtman (1986), Grossbard-Shechtman and Shoshana Neuman (1986, 1991), Carmel Chiswick and Evelyn Lehrer (1990), and Lehrer and Chiswick (1993). All these contributions were made by at least one author who had studied with Becker (Kenny and Chiswick).

#### **IV. Why were D&S models of marriage replaced?**

A major difference between the earlier and later entrants is that most entrants in the 1970s were principally using D&S models, in which implicit prices play a central role, whereas most later entrants were principally using bargaining and optimal sorting models, in which (implicit) prices play a limited role.<sup>18</sup> To the extent that they used D&S concepts, later entrants relegated D&S models of marriage to a secondary role: as support for bargaining or optimal sorting models. What accounts for this paradigm shift in the economics of marriage after 1980?

- A first explanation is that Becker's leadership position in the field and the marginalization of D&S models of marriage in Becker's *Treatise* encouraged other scholars also to marginalize D&S models of marriage and to disregard Becker's models that made it into the *JPE* articles but not into the *Treatise*.

By the time the *Treatise* was published in 1981, Becker had clearly achieved extraordinary prominence in the field, and whatever ideas he decided to exclude from the *Treatise* had less impact on other economists than the ideas he included. Becker seems to

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<sup>18</sup> One of the earliest bargaining models of marriage was authored by a post-doc whom Becker invited to the department of economics at Chicago in the mid-1970s, Louis Wilde. Wilde, who later took a job at Cal Tech, presented a Nash equilibrium model of marriage in Becker's workshop in 1975-76.

have pushed D&S to a minor position in the *Treatise* for reasons independent of the evolution of the economics profession and the evolution of the economics department at Chicago in particular. Readers who did not know Becker perceived the *Treatise* as Becker's last word on marriage and family and a replacement for the earlier *JPE* articles. The title "Treatise" added to this perception. Economists rarely call their books treatises.<sup>19</sup> The other famous *Treatise* in economics is that by John Maynard Keynes.

Many economists understood the title *A Treatise on the Family* to imply disregard for work that Becker had previously published about the family. Some drew parallels between the Keynesian revolution in macro-economics and the Beckerian revolution in studies of the family. Scholars entering the economics of marriage in the 1980s may not have paid much attention to the additional D&S model and the labor economics jargon found in the 1973 *JPE* article, but avoided in the *Treatise*.<sup>20</sup>

In fact, Becker did not call this book a *Treatise* in order to signal its role as a vehicle for his ultimate message on the economics of marriage and the family. What led Becker to name his book a *Treatise* was his ambition to attract the interest of sociologists who would have avoided a book entitled 'Economics of...' or any similar title. In the late 1970s, when Becker was working on the *Treatise* and Becker's work was being published exclusively in economics venues, sociologists had not yet taken an interest in Becker's ideas about the family. This even holds for his sociology colleagues at Chicago (see Grossbard-Shechtman 1981).

At the time the *Treatise* was being prepared there was some antagonism to Becker's entry into subject matter traditionally in the domain of sociologists (see, for instance, Remi Clignet and Joyce Sween 1977). Given that the family has traditionally been a topic studied by sociologists, Becker wanted the *Treatise* to make his theory of marriage more appealing to sociologists.<sup>21</sup> It is this desire to appeal to non-economists that led Becker to choose the title '*Treatise*'.<sup>22</sup>

This motivation to reach out to sociologists also led Becker to avoid statements likely to alienate readers reluctant to apply traditional D&S analysis to marriage problems. Anticipating the discomfort that potential readers trained in sociology would experience with some of the D&S jargon used in the *JPE* article, Becker eliminated it in the *Treatise*.

- A second explanation for the decreased importance of D&S models after 1980 is that in contrast to the mostly inexperienced students entering the economics of marriage in the 1970s, many of the later entrants were scholars with a well-established reputation in more traditional economics and an inclination for controversial fields of study. This applies to Pollak and Bergstrom.

Both Bergstrom and Pollak are prominent economists with an anti-Beckerian intellectual history and a proclivity for unusual causes. Whereas Pollak has been active in feminist

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<sup>19</sup> This feedback was contributed by Sarah Hamersma from the University of Florida.

<sup>20</sup> I thank Scott Drewianka and Lawrence Kenny for pointing this out.

<sup>21</sup> Prior to the publication of the *Treatise*, very few sociologists had heard of Becker's theories on marriage and family.

<sup>22</sup> Personal communication from Gary Becker, 1975 or 1976.

causes (he is one of the few men to have served on the board of the Committee for the Status of Women in the Economics Profession (CSWEP)), in recent years Bergstrom has actively tried to foster competition in journal publishing.

Pollak and Bergstrom have been particularly influential in the economics of marriage. An indicator of their influence is that they have published review articles on the economics of marriage: Lundberg and Pollak (1996) on bargaining in marriage, and Bergstrom (1996) mostly on sorting in marriage. The former appeared in the *Journal of Economic Perspectives*, and the latter in the *Journal of Economic Literature*, two primary outlets for review articles in economics.

Both Pollak and Bergstrom have used game theoretical models. It is in the late 1970s that game theories started to become more popular among economists, implying a loss of popularity for the particular game that is at the core of traditional D&S analysis: the competitive market model. Theorists were looking for ways to apply new game theories. Marriage seemed to offer good opportunities to apply such theories.

While bargaining theorists of marriage like to see themselves in opposition to BTM, Becker has recognized the value of bargaining theories of marriage. He has invited to Chicago at least three scholars who have applied bargaining theories to marriage: Wilde, McElroy, and Chiappori. McElroy entered the field of marriage after visiting Chicago, upon Becker's invitation, in 1977-78. During that time, she had the opportunity to absorb some lessons about D&S models. In Becker's (2004) words: "When Marjorie gave a talk to the applications workshop on her paper on marriage bargaining prior to its publication, I jumped on her for not including market forces." Nevertheless, D&S analysis plays a limited role in her bargaining model of marriage. Pollak was invited to present his ideas about Becker's theories of the family at a conference honoring Becker at Chicago.

- A third explanation is that the shift from D&S models to bargaining models may have been partially motivated by feminist ideals regarding fairness in marriage.

The major focus of bargaining theories is intra-marriage distribution. This topic tends to be of great interest to women. Many of the bargaining analysts are women. Of the four authors of two influential early articles on bargaining in marriage three are women (McElroy, Manser, and Horney). At least one of the later entrants, Frances Woolley, published a critique of Becker's *Treatise* in *Feminist Economics* (Woolley 1996) and later served as president of the International Association for Feminist Economics that publishes *Feminist Economics*. Robert Pollak, a critic of Becker's economic models of the family, calls himself a feminist economist who builds neoclassical models that include considerations that Becker omitted, in contrast to other feminist economists who have rejected Becker's neoclassical models without providing alternatives (see Pollak 2003).

However, it is not clear that more women entered the field in the 1980s than in the 1970s. It is noteworthy that throughout the entire period studied here one observes a large concentration of women among all junior economists entering the study of marriage, relative to the number of women in economics in general. In the 1970s, a relatively high proportion of Becker's students writing on marriage were women (although in more

recent decades, most of Becker's students writing on marriage have been men).<sup>23</sup> It is possible that throughout the entire period women were attracted to the analysis of marriage out of concern for fairness in marriage. However, one does not need bargaining models to study the degree of fairness in marriage; the same idealistic concerns about fairness in marriage can be studied via D&S models.

Feminist economists' antagonism toward Becker's work on the family started before the *Treatise* was published. Feminist economists were among the first critics of BTM (see Marianne Ferber and Bonnie Birnbaum 1977). This antagonism (evident from Barbara Bergmann's (1995) article published in the first issue of *Feminist Economics*) may have dissuaded some potential new entrants from studying the economics of marriage with Becker, thereby cutting some of the supply of potential entrants in the field via Chicago.

- A fourth explanation is that earlier entrants were mostly Columbia and Chicago people who naturally felt attracted to D&S models. Of the two types of marriage models that Becker's Chicago students were exposed to in the 1970s, the D&S and the optimal sorting models, these students were probably more comfortable with D&S models also taught in many of their classes (including price theory classes by Milton Friedman and Gary Becker and a course on industrial organization taught by George Stigler.) In contrast, few of the later entrants were Chicago people. This holds for Bergstrom, Bourguignon, Brown, Chiappori, Lehrer, Lundberg, Neuman, and Pollak.

The lesser role of Chicago scholars helps explain the reduced importance of D&S models, given that traditionally the Chicago School of economics promoted D&S models. The small number of entrants from Chicago after the first decade of economics of marriage could be related to other changes in the economics department at the University of Chicago. It is possible that Friedman's retirement from teaching in the mid 1970s reduced the interest of Chicago students in pursuing D&S models of any kind, including marriage market models.<sup>24</sup>

## **V. About Becker's Persistent Leadership in Economics of Marriage**

In his first article on the economics of marriage published in 1973, Becker featured primarily D&S models. Likewise, most other economists entering the field in the 1970s—principally students and colleagues of Becker--produced D&S models. Becker's leadership in economics of marriage in the 1970s was obvious. Becker's leadership in economics of marriage continued in the 1980s and early 1990s, even though he essentially stopped publishing in this field after the *Treatise on the Family* appeared in 1981. One indication of Becker's continued influence can be seen in the supply of sorting

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<sup>23</sup> Even in the 1960s, when Becker was at Columbia, he and Mincer attracted a disproportionately high percentage of female dissertation writers (see Fuchs 1994). It should be remembered that in the 1960s and 1970s a very low proportion of all Ph.D. students in economics were women.

<sup>24</sup> Friedman's graduate course in microeconomics, which he tellingly called a course on price theory, also served as a stage from which Friedman enthusiastically defended the price mechanism and attacked the command principle of organization. A number of students in my class, including myself, were deeply affected by Friedman's enthusiasm.

models that followed Becker's increased coverage of these models. Even though the increase in the popularity of bargaining models did not follow Becker's example, it can also be interpreted as indirect evidence of Becker's influence. Optimal sorting and bargaining models are complements: the first deal with allocation and production, the second with distribution. After the traditional models of D&S that dominated Becker's early work on marriage were replaced by sorting models, models that don't deal much with distribution, it was necessary to bring in other models that dealt with distribution. This was not necessary with D&S models that simultaneously address problems of allocation, distribution, and production.

Some of the motivation behind new models of marriage in the 1980s and early 1990s came from discontent with Becker's theories and possibly from a view that Becker's theory of marriage was inconsistent with feminist ideals. Developers and users of bargaining models of marriage often dissociate themselves from Becker's theories of the family. These authors dissociate themselves from earlier models of Becker, but not from the original models that Becker pioneered in order to analyze marriage: D&S models of marriage that address the problem of distribution in a manner similar to that of bargaining models.

None of the challengers to Becker's leadership in this field seems to have dominated the economics of marriage by the end of the period covered here: 1993. In the last twelve years since then there have been many more entrants into the field, and most of the later entrants described here are still active. The field has experienced a considerable expansion beyond the scope of this article. A quick look at the economics of marriage today does not reveal any new leaders of Becker's stature. More than thirty years after the publication of Becker's first article on the economics of marriage, and twenty-five years after Becker stopped producing in this field, it is my impression that Becker remains the primary leader in economics of marriage. Relatively strong continuing sales of the *Treatise* are consistent with this impression, and so is the large number of citations of that book in current articles on marriage. Is the extent of this leadership unusual?

Becker pioneered the economics of marriage in the same sense that he has pioneered a number of other new applications of economics. Becker's pioneering leadership role was recognized by the prestigious Nobel Prize Committee (1992) and by Victor Fuchs (1994) in the widely read *Journal of Economic Perspectives*. In particular, Becker can also be considered a pioneer in law and economics and in health economics.

A first glance at such 'intra-Becker' comparison reveals a contrast between the enormous growth of these other applications of economics relative to the more limited growth in economics of marriage during the period under study here. The American Law and Economics Association had over 400 members in the mid 1990s (Fuchs 1994).<sup>25</sup> Health economics had become an influential field of economic research, with its own National Bureau of Economic Research (NBER) program and hundreds of economists active in this field. In contrast, no NBER program or professional organization was founded for economics of marriage, not by 1993 and not by 2005.

It is my impression that Becker is more likely to be cited in an article on marriage (by an economist or a sociologist) than in an article on health or law, an impression shared by Becker (Becker 2005). The institutional differences between economics of

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<sup>25</sup> William Landes and Richard Posner also pioneered the field of law and economics.

marriage and other new applications of economics pioneered by Becker are correlated with the presence of many other prominent economists in these other fields and the establishment of study programs in these other fields in economics departments, law schools, schools of public health, and schools of public policy. Economics of marriage is a smaller field, and Becker has fewer competitors for the mantle of leadership (see Grossbard-Shechtman 2001a).

Much of the current research on family is performed by sociologists who may find the newer writings in economics of the family more difficult to access than Becker's *Treatise*. Becker's efforts at reaching out to sociologists of marriage were hugely successful: Becker has achieved undeniable prominence among quantitative sociologists and demographers studying marriage. That the study of marriage is primarily a field dominated by sociologists helps explain Becker's enormous prominence in quantitative research on marriage, whether generated by sociologists or economists. Few articles on marriage by sociologists or demographers are currently published without a reference to Becker. One of the reasons that Becker is among the most cited economists in the world is that his citations also come from social scientists outside economics (not only those who write on marriage), and sociologists tend to cite more than economists (see Grossbard-Shechtman 2001b).

When the University of Chicago awarded Becker the Phoenix Award in the social sciences in 2002, Milton Friedman gave a talk during which he called Becker the greatest social scientist of the century. Friedman also had this to say about my comparison between Keynes' *General Theory* and Becker's *Treatise on the Family*: "As to the comparison with Keynes' *General Theory*, the two books are comparable in terms of the kind of influence they had on the particular field of analysis. Both are very largely theoretical and yet concerned with very practical problems, yet there is an enormous difference between them. Keynes is concerned with the economy as a whole, the very broadest subjects of analysis, while Gary is concerned with some of the narrowest subjects of analysis: of what happens on the level of the family, of the married couple; so they are very different in their scope." (Friedman 2004).

## **VI. Concluding Remarks**

What has been uncovered here is that in the area of economics of marriage Becker has been a leader in two senses: he pioneered the field and he has exerted a considerable influence on the work of other economists who entered this field in the period surrounding the publication of his pioneering analyses of marriage (1970-1993).

D&S models of marriage have the following advantages over other theories: (1) simplicity, (2) simultaneous resolution of allocation, production, and distribution problems, and (3) bridges with labor economics, a more established field of inquiry. Becker's first *JPE* model of marriage was principally an application of D&S analysis to marriage. Some of that analysis was not included in the *Treatise* and tends to be forgotten. I hope that by clarifying that Becker stands by his earlier D&S models of marriage, this article will generate renewed interest in D&S models of marriage.

It is hoped that future research will help us gain a better understanding of the determinants of intellectual leadership in general and of Becker's leadership in particular, both in economics and in other social sciences.

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