The Oxford Handbook of
WOMEN AND THE ECONOMY
THE OXFORD HANDBOOK OF

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WOMEN AND THE ECONOMY

Edited by

SUSAN L. AVERETT
LAURA M. ARGYS
and
SAUL D. HOFFMAN

OXFORD UNIVERSITY PRESS
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About the Editors

Susan L. Averett is the Charles A. Dana Professor of Economics at Lafayette College. She has published widely on topics at the intersection of health and demographic/labor economics. With co-author Saul D. Hoffman, she is the author of Women and the Economy: Family, Work, and Pay (3rd edition, 2016), an economics textbook on women’s family and work issues, published by Palgrave Macmillan. She served on the board of the American Economic Association’s Committee on the Status of Women in the Economics Profession and is a Research Fellow at the Institute for Labor Research in Bonn, Germany.

Laura M. Argys is Professor of Economics and Associate Dean for Research and Creative Activities at the University of Colorado, Denver. She is well known for her research on the impact of health, education, and welfare policies on the economic well-being of families and children. Her work has been funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development and the American Education Finance Association, and she is currently a Research Fellow at the Institute for Labor Research in Bonn, Germany.

Saul D. Hoffman is Professor Emeritus of Economics at the University of Delaware and Visiting Professor of Economics at the University of Colorado, Denver. He has published widely in topics in labor economics and economic demography. He is the author of By the Numbers: The Public Costs of Teen Childbearing and co-editor of Kids Having Kids (2nd Edition), to which he also contributed several chapters. With co-author Susan Averett, he is the author of Women and the Economy: Family, Work, and Pay (3rd edition, 2016), an economics textbook on women’s family and work issues, published by Palgrave Macmillan.
Contributors

Alicia Adserà, Princeton University
Francisca M. Antman, University of Colorado, Boulder
S Anukriti, Boston College
Laura M. Argys, University of Colorado, Denver, and IZA
Susan L. Averett, Lafayette College and IZA
Martha J. Bailey, University of Michigan
Francine D. Blau, Cornell University
Kasey S. Buckles, University of Notre Dame
Deborah A. Cobb-Clark, University of Sydney
William J. Collins, Vanderbilt University
Rachel Connelly, Bowdoin College
Patricia Cortes, Boston University
Shatanjaya Dasgupta, Beloit College
Catherine C. Eckel, Texas A&M University
Ana Ferrer, University of Waterloo
Jason M. Fletcher, University of Wisconsin, Madison
Nancy Folbre, University of Massachusetts, Amherst
Donna Ginther, University of Kansas
Paola Giuliano, University of California, Los Angeles
Shoshana Grossbard, San Diego State University and IZA
Melanie Guldi, University of Central Florida
Rachel Heath, University of Washington
Saul D. Hoffman, University of Delaware and University of Colorado, Denver
Joyce P. Jacobsen, Wesleyan University
Seema Jayachandran, Northwestern University
Guy Johnson, RMIT University
Shulamit Kahn, Boston University
Takao Kato, Colgate University
Jean Kimmel, Western Michigan University
Naomi Kodama, Hitotsubashi University
Astrid Kunze, NHH Norwegian School of Economics
Evelyn L. Lehrer, University of Illinois, Chicago
Jason M. Lindo, Texas A&M University
Leonard M. Lopoo, Syracuse University
Hani Mansour, University of Colorado, Denver, and IZA
Terra McKinnish, University of Colorado, Boulder, and IZA
Nidhiya Menon, Brandeis University
Amalia R. Miller, University of Virginia
Michael Q. Moody, Miami University
Jessica Pan, National University of Singapore
Jessica Polos, University of Wisconsin, Madison
Claus C. Pörtner, Seattle University
Kerri M. Raissian, University of Connecticut
David C. Ribar, University of Melbourne
Yana van der Meulen Rodgers, Rutgers University
Elaina Rose, University of Washington
Maya Rossin-Slater, Stanford University
Lucie Schmidt, Williams College
Barbara Schone, Georgetown University
Olga Shurchkov, Wellesley College
Yeon Jeong Son, University of Illinois, Chicago
Anne E. Winkler, University of Missouri, St. Louis
Anna Zhu, University of Melbourne
The transformation of women’s lives in the past century certainly ranks among the most significant and far-reaching social and economic phenomena, deeply affecting not only women themselves but also their partners and children. In developed and developing countries alike, women are acquiring more education, marrying later, having fewer children, and spending a far greater fraction of their adult lives in the labor force. Because women remain the primary caregivers of children, issues such as work/life balance and the glass ceiling remain at the forefront of policy discussions in the developed world. In developing countries, many women lack access to reproductive technology and are often relegated to jobs in the informal sector where pay is variable and job security is low or nonexistent. Considerable occupational segregation and stubborn gender pay gaps persist in labor markets around the world.

Many colleges and universities around the world now offer courses on women and the economy or on gender issues in economics, and textbooks covering the main topics do exist at the undergraduate level; see, for example, Blau and Winkler (2018) and Hoffman and Averett (2016). But there is no comparable collection at a more advanced level, nor any volume that features the leading scholars in the field. This Handbook provides the first such comprehensive collection of chapters that addresses these fascinating issues using the powerful analytical framework of economics. The Handbook chapters are divided into three broad sections—marriage and fertility; the labor market; and special topics and policy issues. These chapters provide outstanding examples of the broader use of economic theory to illuminate behavior, often outside of formal markets. Separate and special attention is given to developed and developing economies, because women often face different constraints depending on where they live. In each chapter, an acknowledged expert (or experts) in the field reviews the key trends, surveys the relevant economic theory, and then summarizes and, as appropriate, critiques the empirical
research literature. The important issue of the identification of causal effects, as apart from correlations, is emphasized throughout, along with a clear-eyed view of what we know, what we do not know, and what critical unanswered questions remain. While the primary focus is on research in economics, where appropriate, the chapters incorporate the newest interdisciplinary research about gender from biology, psychology, and other disciplines. This Handbook should be of great value to a wide range of readers, from specialists to students, and also to scholars in other disciplines who want to see an overview of the most current research approaches concerning gender in economics.

In this introductory chapter, we first discuss the intellectual antecedents of the study of women in economics. How and why did women move from the periphery of economics to become one of its most studied and intellectually active research areas? Then we discuss the contribution that the study of women in economics made to the development of data and research methods that have enhanced research across almost areas of economics. Many methods routinely used in contemporary econometrics arose from the need to address specific problems posed by the analysis of women’s economic behavior. We then provide an overview of the structure of the book and the core focus of each of its thirty-one chapters. We conclude with a discussion of the big issues remaining in this exciting area of inquiry.

**Women, the Economy, and Economics**

Modern economics is often thought to have begun with Adam Smith’s *Wealth of Nations* in 1776. By that accounting, women were largely invisible within economics for a mere 175 years or so. Indeed, their activities were largely invisible in the recorded economy as well, since almost all their time was devoted to what we now understand and analyze as household production and thus was outside of standard measurements of economic activity. They are invisible no more. This Handbook is emphatic evidence of that and of the rich contemporary scholarship in economics on women’s issues.

Two parallel trends eventually moved women and women’s lives into the mainstream of economic analysis. First, women began to transfer some of their time from household production to market work and thus became more visible in official statistics and other accounts of national economies. For example, at the beginning of the twentieth century, market work by women in the United States was essentially determined by marital status, race, and immigrant status. Virtually no white, nonimmigrant married women worked, as Collins and Moody (chapter 24) discuss in detail, and virtually no women of any description successfully combined work and family. By midcentury, this had changed modestly, and by the turn of the twenty-first century, it had changed unrecognizably. This kind of seismic change was true across multiple dimensions, including marriage, fertility, education, and occupation, to name just a few, and across all countries to a greater or lesser degree. All of these changes and their causes and consequences are discussed in this Handbook.
Second, the discipline of economics moved beyond its traditional focus on markets involving monetary exchange with formal prices to examine activities that involved resource use under scarcity but without the presence of formal markets and prices. The starting points were Lancaster’s (1966) “A New Approach to Consumer Theory” and Becker’s (1965) “A Theory of the Allocation of Time.” While somewhat different in their approach, both involved reformulating demand theory in terms of the consumption of commodities that were the actual sources of utility and that were themselves the outputs of a production process involving market goods and time. That production process occurred outside of firms, primarily in households, and was performed predominantly by women. Interestingly, Lancaster never mentions women at all, and Becker, other than a few mentions in footnotes to empirical work by others, includes them only in a very odd context: “Women, the poor, children, the unemployed, etc., would be more willing to spend their time in a queue or otherwise ferreting out rationed goods than would high-earning men” (p. 516). But despite that conspicuous oversight, these papers opened the door to thinking more rigorously about activities outside the market sector using standard tools of economic analysis and thus made women’s activities, including marriage, fertility, and other forms of household production, ripe analytical topics. The development of human capital theory by Schultz (1961) and Becker (1964) was another important stimulus to research on women. Formal education and on-the-job training were clearly important sources of human capital investment, but so too were families, especially mothers. We see the fruits of this expansion of the domain of economics throughout this Handbook.

Two other developments also made the analysis of women and the economy more productive. One was the development of longitudinal datasets, such as the Panel Study of Income Dynamics and National Longitudinal Surveys in the United States and a number of longitudinal household surveys launched in other countries including European countries, Australia, and Canada to name a few; this development is discussed more thoroughly in the next section. These new datasets literally allowed economists to follow a woman as she moved through her life cycle, something that was impossible with cross-sectional data and which had been a critical issue complicating early analyses of women’s labor force participation (Mincer 1962). Goldin (1983, 1990) had pioneered the use of synthetic life cycles by linking up ten-year birth cohorts across US censuses to outline how women’s labor force activity varied in broad strokes over the life cycle. But these new longitudinal data sources provided much more information and facilitated more sophisticated micro-level analyses and the use of new econometric techniques.

Second, it also turned out that precisely because women’s economic activity was in such flux over the twentieth century throughout the world as social norms were evolving to allow a wider range of opportunities for women, their decisions were both more varied and arguably more responsive to economic incentives. For example, since the early 1900s and in the wake of multiple technological, social, and economic transformations, the labor force participation rate of prime-age men (age 25 to 54) in the United States fell by less than 10 percentage points. Over the same time period, the
corresponding participation rate for women increased by nearly 60 percentage points. To put it succinctly, women's economic behavior was both more varied and more interesting than men's. Explaining both cross-sectional differences and the time-series changes in women's behaviors was a fascinating challenge. Who worked and why? What were the roles of incomes, prices, and preferences? From a research perspective, there was not only more to explain but also potentially a greater role for economic analysis, because women were much more often on the margin of decision-making. The enormous changes in marriage and fertility rates were similarly tempting topics, as reflected in many of the chapters in this volume.

While economics and economists have provided a powerful analytical window into many women's issues, they have not always or consistently advanced the cause of gender equity. All economists learn about the efficiency of perfect competition, one implication of which is that in equilibrium, there are no unrealized opportunities for profit or gains to trade. It is a truly important and powerful result, but one limited to the existence of specific conditions that may not always exist in practice and also to an equilibrium situation that an economy is more often tending toward than actually residing in. Economists were, nevertheless, sometimes too ready to apply the implications of long-run competitive equilibrium to the status of women and the current state of gender inequities, concluding that the current state—whatever it was—was natural, inevitable, economically efficient, and therefore not usefully subject to change or policy intervention. If “greater gender equality was economically efficient,” they might argue, “it would already have been achieved,” because profitable opportunities are sought with monomaniacal zeal. Jacobsen (chapter 25) thoughtfully reminds us of these issues.

Becker, whose analytic contributions to the research literature on women's issues are unmatched by anyone, arguably did some of this. His model of taste-based discrimination famously concluded that gender pay differences unwarranted by productivity differences would disappear in appropriately competitive markets and thus focused much subsequent empirical research away from richer models of discrimination that might have fit gender issues more comfortably and toward finding productivity-based explanations of the gender pay gap. Becker also constructed models that rationalized an extreme gender-based division of labor in households and occupational segregation, derived from underlying differences by gender in market and household productivity that were typically not themselves the subject of analysis. In one paper rationalizing the gender gap in earnings, he concluded that “married women spend less effort on each hour of market work than married men” and “economize on the effort expended on market work by seeking less demanding jobs” (Becker 1985, 533). He wrote this in the midst of the decade of the greatest change in the gender wage gap in the United States and as women were in the midst of a meteoric increase in their representation in graduate and professional schools.

Eighty years earlier, the 1900 US census had done something similar. After reporting on the major occupational categories for women—servants and waitresses,
agricultural workers, dressmakers, laundresses, and teachers—the report noted that women were very lightly represented in the new and growing clerical and office work fields. Unhelpfully and stunningly incorrectly, the Census Bureau concluded, by the same kind of logic of inferring what will or should be from what is, that “many of these [clerical and copyist] occupations are not well adapted to the employment of women” (US Census Bureau 1907, 97). It is an easy error to commit: many of the chapters in this Handbook remind us that the many things that women do in their economic lives—from education and occupation to marriage and fertility—can and do change incredibly rapidly.

On a more personal note to the editors are the trends regarding women as PhD economists. Data from the Committee on the Status of Women in the Economics Profession (CSWEP) reveal that women remain underrepresented in the profession, although their numbers have increased substantially. In 1972, the first year that statistics on the status of women in the economics profession were collected, women accounted for only 6 percent of all faculty in economics departments, only 3 percent of full professors, and 12 percent of graduate students. By the mid-1990s, this percentage had increased to about one-third, and it has remained at that level ever since. The data make clear that, from entering PhD student to full professor, women have been and remain a minority in the economics profession. Within the tenure track, the higher the rank is, the lower the representation of women. In addition, women are far more likely than men to fall off the academic ladder at the time of promotion to tenured associate professor. This particular phenomenon appears to be unique to the economics profession, as reported in the CSWEP annual survey and report (2017). Women seem to be stuck at about 33 percent of all new PhDs—a number that has not changed in decades; even more discouraging is the fact that the percentage of undergraduate women who choose to major in economics is falling. And, just like at the top of the corporate ladder, women are particularly underrepresented at PhD-granting institutions compared to liberal arts colleges. Finally, in the more than 130-year history of the American Economics Association, only three women have served as president of the association.2

Interestingly, occupational segregation is even evident within the economics profession. The fields in economics that are represented in this Handbook are precisely those with the largest representation of women researchers within prominent economics departments (Dolado, Felgueroso, and Almunia 2012). Although women make up only 14.2 percent of faculty in the top fifty economics departments worldwide, they account for nearly one-quarter of all researchers in these departments in the field of health, education, and welfare. The next highest concentration of women in a field is labor economics (20 percent).

Finally, a systematic analysis of the comments on the website econjobrumors.org, a popular internet site for new economics PhDs seeking jobs, reveals derogatory comments disproportionally targeting women (Wu, 2017). This is suggestive of a hostile work environment still facing female economists.
Women and Economics: Data and Empirical Methods

The research on women featured in this Handbook would not have been possible without two parallel developments that transformed what kind of empirical work economists could do and how they could do it: the creation of new rich micro-data and the expansion of econometric methods that could be applied more easily due to advances in computing power. The two had a synergistic relationship: the new data allowed for more sophisticated analyses of, for example, women’s life cycle labor force participation, which, in turn, raised new econometric issues and required new approaches.

The evolution of empirical work in economics, in many instances, has had its genesis in the fields of labor economics in general and family economics in particular. As Jacobsen (chapter 25) notes, “modern labor economics, including the ‘new home economics,’ dates from the early 1960s and only began to gain significant traction with the rise in affordable and accessible mainframe computing and systematic collection and dissemination of nationally representative, individual-level datasets, including panel data, in the mid- to late 1970s. This led to a rise in empirical analysis of female labor supply.”

The availability of such data, including the original four cohorts of the National Longitudinal Surveys (NLS) and the intergenerational Panel Study of Income Dynamics (PSID) in the United States, provided fertile ground to apply panel data techniques to labor economics in general and the additional complications inherent in addressing gender issues in the labor market and in-home production. These data collection efforts, both begun in the 1960s, highlighted issues around gender, the labor market, and changing family and work responsibilities. In particular, the PSID, begun in 1967, was a family-based sample and adopted the then-standard convention of classifying the male in a married-couple family as the official family head for interviewing purposes. In 1976, the PSID recognized that this convention led to much poorer-quality data for wives, especially concerning work histories and earnings, and it fielded a separate wives’ questionnaire that provided some of the earliest information on women’s work histories. The initial cohorts of the National Longitudinal Surveys (older men, mature women, young men, and young women) consisted of separate surveys that focused on the particular issues faced by men and women in different age cohorts. These data included many respondents who could be linked by household identifiers to simultaneously observe married couples and in some cases their children as they progressed through the life course. As a reflection of the importance and greater variability of women’s work and family choices during the decades of the 1970s and 1980s, the two female cohorts continued through 2003, while the two male samples were discontinued in 1981. New cohorts of the NLS, including both males and females, began in 1979 and 1997 and continue today.
This longitudinal data that followed offspring allowed researchers to follow family members over their life course and link them together from generation to generation. Rather than using repeated cross-sections of data to infer the progress of successive cohorts, researchers were finally able to link decisions in early life to outcomes during the transition to adulthood and beyond.

The availability of data to examine issues of work and family was not exclusive to the United States. In the late 1970s, efforts began to harmonize sociodemographic and labor market data across middle- and high-income countries throughout the world. The Luxembourg Income Study now contains repeated cross-section micro-data on men and women in more than fifty countries. In addition, many countries gathered data on family behaviors in longitudinal household surveys such as the British Household Panel Survey, the Socio-Economic Panel in Germany, and the Household Income and Labor Dynamics in Australia. In developing countries, availability differs, but, beginning in the 1990s, most countries now administer demographic and health surveys that provide important insights into links between families, economic activity, and health.

Empirical work that focused on issues of women’s work and family contributions led to the development of new statistical techniques to deal with issues driven by gender differences in labor market behavior. An early example is Heckman’s famous selection correction approach designed to address problems associated with the empirical analysis of women’s labor supply (Heckman 1979). In the 1970s, female labor force participation in the United States hovered around 50 percent, posing a problem of missing data for the analysis of labor force participation. Economic theory emphasized the importance of wage rates in labor force participation and labor supply decisions, but researchers could observe wages only for working individuals. Naively imputing wages for nonworking individuals based on the observed characteristics of otherwise similar working women was clearly unsatisfactory. Heckman’s technique allowed researchers to correct wage estimates for the likely selection bias due to unobservable differences between women who work and those who do not. The impact of this technique on empirical research in economics cannot be overstated. A Google Scholar search in 2018 for the terms “Heckman sample selection” yields well over one hundred thousand research papers that have used this technique, including in applications unrelated to gender and work. It was specifically cited as part of the basis for his Nobel Prize in Economics in 2000.

Another important statistical method that evolved out of differences in labor market outcomes between men and women has become a standard part of the economist’s empirical tool kit and is now used across fields in economics. The Oaxaca-Blinder decomposition (Oaxaca 1973; Blinder 1973) provides a method for partitioning the difference in group means into explained and unexplained portions. The initial application was the analysis of the gender wage gap, where the technique is used to decompose the overall gap into one component that results from differences in productivity (endowments and prior investments in human capital) and a second component due to differences in the compensation that men and women receive for identical productivity; these two
components are, respectively, the explained and unexplained shares (or residual wage gap) of the wage gap. As of 2017, Oaxaca's original article has been cited more than seven thousand times, and a Google Scholar search for “Oaxaca decomposition” returns more than sixteen thousand results. In her chapter detailing the size and causes of the gender wage gap, Kunze (chapter 16) reports Oaxaca-style decomposition results from a large range of countries showing that differences in human capital characteristics (education and years of work experience) explain a sizeable portion, but less than half of the observed gender wage gap.

The hallmark of applied economic analysis is the focus on establishing causality by using statistical methods and strategic research design to combat problems of endogeneity. In this context, endogeneity can take a variety of forms, from sample selection, in which heterogeneous individuals select themselves into the treatment sample, to reverse causality and omitted variable bias. It is precisely this focused approach that has distinguished the empirical work of economists from others in the social sciences. Within economics, demographic and gender research has been an incubator for innovative empirical work to identify causality. To meet the challenge of designing empirical studies that can tease out causal relationships, economists have developed or adopted a number of experimental and statistical techniques to eliminate problems of endogeneity. Many of these techniques are highlighted in discussions of the empirical evidence applied to gender-specific topics in several of the chapters in this Handbook. A few of these examples are highlighted here.

Randomized controlled trials (RCTs) are considered the gold standard for addressing problems of endogeneity and thus establishing causality. By randomly assigning treatment to some participants (treatment group) but not to others (control group), the possibility of bias due to sample selection or omitted variables is eliminated. In her chapter on the biological bases of gender differences, Cobb-Clark (chapter 21) discusses the role of hormones as determinants of economic behavior. She describes an RCT study of postmenopausal women that finds no effect of randomly administered testosterone or estrogen on the results of numerous economic experiments designed to measure altruism, reciprocal fairness, trust, trustworthiness, and risk attitudes (Zethraeus et al. 2009). Opportunities for RCTs in social science research are more limited than in, for example, medical clinical research, but random assignment of treatment is often adopted to test the effectiveness of economic interventions in developing countries. The implementation of new programs, such as micro-credit programs, access to contraception, and income transfers to women, in randomly selected communities are discussed in chapters in this volume by Pörtner; Heath and Jayachandran; Menon and Rodgers; and Anukriti and Dasgupta.

Economists also conduct controlled experiments in the laboratory. Varying the constraints and/or options faced by participants allows the researcher to control for external variables affecting decision-making. In their chapter examining the impact of management practices on gender gaps in hiring and compensation, Kato and Kodama (chapter 23) highlight laboratory experiments designed to detect the presence of gender differences in preferences and decision-making. For instance, they discuss work by
Kuhn and Villeval (2015) in which participants are faced with real effort tasks in a laboratory setting that indicates that women are more likely than men to select a team compensation scheme as compared with compensation based on individual productivity.

One of the concerns about laboratory experiments is external validity. Can one set up a lab experiment in which the decisions required mirror those faced outside of the lab? Put differently, would an individual make the same decision when faced with the identical choices encountered in other settings? In an attempt to control the situations faced by research subjects outside of the context of a laboratory setting, field experiments are designed to impose randomization and control incentives and constraints in an externally valid setting. In this volume, Pan and Cortes and Shurchkov and Eckel both discuss research designed to answer the question “Are women less competitive than men?”

In recent work, Flory, Leibbrandt, and List (2015) randomly vary the degree of competition in incentive schemes offered to job applicants and find that women are less likely to apply for a job with a competitive payment scheme. The researchers are able to control the description of the pay scheme that is offered to each applicant, but the context of decision-making is not one that is artificially described as part of laboratory decision-making, but rather in the actual context of a job interview. Similarly, the use of audit pairs in job-search settings can shed light on discriminatory hiring practices. In her chapter on gender pay gaps, Kunze (chapter 16) discusses studies in which fictitious job applications that are identical except for the gender of the applicant (Petit 2007) or motherhood status (Correll, Benard, and Paik 2007) are submitted to employers. These field studies simulate an RCT and can provide a causal estimate of the impact of these factors that could not be obtained from standard cross-sectional survey data.

In the absence of a researcher-designed randomized experiment, economists look for opportunities to exploit “natural experiments,” in which forces of nature or government policies mimic random exposure to a change in prices or other incentives. In this way, some individuals, distinguished by characteristics such as geography, age, or time, face different constraints. Appropriate statistical methods, such as difference-in-differences, instrumental variables, or regression discontinuity, can then be applied to tease out responses to the “exogenous” change. Many examples of the use of natural experiments in understanding gender-related socioeconomic and labor market outcomes are highlighted among the chapters in this Handbook.

Adserà and Ferrer (chapter 7) discuss studies examining parents’ simultaneous decisions concerning the quality and quantity of their children. Describing the use of an instrument for the quantity of children, they note that “[a] different way to measure the quality/quantity trade-off is through exogenous variation in the quantity of children induced by multiple births or by employing the sex composition of the first children as an instrument for fertility, under the assumption that parents aim for a balanced-gender composition.” Adsera and Ferrer discuss other studies using twin births and sex composition on educational investments in children in India (Rosenzweig and Wolpin 1980) and Norway (Black, Devereux, and Salvanes 2005).

A clever use of a natural experiment, discussed in the chapters by Lehrer and Son and Fletcher and Polos, concerns the impact of the media on teen fertility in the United
States. The television series “16 and Pregnant,” which is about teen motherhood and is shown on MTV, a network targeting teens and young adults, has been identified as a vehicle for causing teens to think more realistically about the costs of an early birth. Using plausibly exogenous geographic variation in exposure to the airing of the show, Kearney and Levine (2015) find an increase in contraceptive inquiries via Google and Twitter and a corresponding decline in teen births.

Another statistical approach to identify causal relationships in research using natural experiments is difference-in-differences (DD). Under this approach, researchers compare behavior before and after the onset of the natural experiment for groups that were and were not subject to the treatment; the natural experiment essentially creates treatment and control groups. For example, Miller (chapter 22) describes a study that examines the impact of the gender composition of a board of directors on firm decision-making. The natural experiment occurred when Norway established a gender quota in 2006 for corporate leadership. In their study, Matsa and Miller (2013) use the board quota in public firms as a natural experiment that exogenously increased the proportion of women on the board, whereas private firms were not subject to the quota and served as a control group. Initially they compare the use of layoffs as a management strategy of firms before and after the externally imposed change in the number of women on governing boards. Adding another dimension of comparison, represented by a triple-differences model, they compare these pre- and postlayoff patterns of public firms (a control group not subject to the board quota) and private firms (the treatment group) with similar firms in other Nordic countries. They find that companies with more women on the board are less likely to lay off workers.

Instrumental Variable (IV) models can also be used to establish a causal relationship when endogeneity is a potential problem. A valid instrument provides exogenous variation in an explanatory variable without any independent effect on the dependent variable. In this way, the possibility of causality running in the reverse direction is eliminated. The chapters in this Handbook provide many examples of causal evidence provided by studies that employ IV approaches. As noted previously, natural experiments often serve as high-quality instruments. To determine the impact of sex ratios (the ratio of men to women) on a variety of family and labor market outcomes, researchers searching for exogenous variation in sex ratios have examined periods of high incarceration of men in the United States (Charles and Luoh 2010), war casualties in Europe (Abramitzky, Delavande, and Vasconcelos 2011), and enslavement of men in Africa (Teso 2016). These studies suggest causal impacts of declining sex ratios in lowering female marriage rates, increasing female education and labor force participation, and falling fertility rates (see Grossbard, Mansour and McKinnish, and Giuliano, this volume, for details of the findings of these studies).

Depending on the nature of the policy change, the impact of some natural experiments may be assessed by using a regression discontinuity approach. This type of analysis is appropriate when the control and treatment groups are distinguished by a discrete cutoff point along an observable continuous measure. For example, Guldi and
Schmidt (chapter 19) examine whether public insurance programs adversely affect labor supply. They discuss work by Dague, DeLeire, and Leininger (2017) that examines the effect of a sudden imposition of an enrollment cap for Medicaid eligibility on the work behavior of childless adults in Wisconsin. Using a regression discontinuity framework, they show that individuals enrolled just prior to the imposition of the cap are less likely to be working than comparable individuals enrolled shortly thereafter.

Sometimes the best that researchers can do is to rely on temporal ordering using longitudinal data. With the availability of longitudinal micro-data at the individual or firm level, fixed-effects models are widely used to address issues of endogeneity such as sample selection or unobserved heterogeneity. Time-invariant individual characteristics are controlled by the inclusion of fixed effects, and such models allow researchers to examine the impact of changes in circumstances on individual behaviors. Describing a study using fixed effects at the individual level, Blau and Winkler (chapter 17) describe evidence that motherhood impacts women’s wages. Endogeneity is a concern because lower wages among mothers might simply reflect selection into motherhood since women with lower wage offers will have lower costs of children. To address this specific concern, the common approach taken in this research is to estimate fixed-effect regressions. As Blau and Winkler report, Budig (2014) uses fixed effects to control for time-invariant individual-level factors in her study on fatherhood bonuses and motherhood penalties, finding evidence of a motherhood penalty but a wage premium for fathers.

Similarly, Johnson, Ribar, and Zhu (chapter 32) explore the relationship between homelessness and drug use. They discuss work by McVicar, Moschion, and van Ours (2015) in which “they used longitudinal data to consider the temporal ordering of these outcomes and used fixed-effects methods to control for unobservable individual characteristics that might contribute to both homelessness and substance abuse.”

As noted by Antman (chapter 29), “It is important to keep in mind that the [credibility of the] results of any empirical study will often hinge on the particular identification strategy.” One of the objectives of this Handbook is to include discussions of the identification strategy and credibility in establishing causal relationships in recent empirical work by economists that shed light on important gender-focused questions. These techniques are highlighted throughout the many chapters in this book.

**Structure of the Book**

Some readers might wonder whether a volume like this is necessary today. After all, over the past fifty years, there has been a dramatic decline in gender disparities in key labor market outcomes including wages, participation rates, and occupational distributions in nearly all developed countries and in many developing countries. However, as each author in this Handbook makes clear, important gender disparities in labor market outcomes persist, and many are linked to women’s family obligations.
This book is not a textbook per se. Each chapter can and does stand alone, although there are many valuable linkages and synergies among them and each includes cross-references to related chapters to aid readers in identifying associated material. In addition, readers will notice that many of the topics in one chapter also appear in another. This highlights the fact that decisions about marriage, fertility, education, and work are inextricably linked, particularly for women.

We divide this Handbook into three primary sections. Section I focuses on marriage and fertility. Section II focuses on women in the labor market, while section III is a compilation of chapters that address a variety of important topics and policies related to women and the economy.

Where necessary and/or appropriate, each chapter provides an overview of the key trends related to the outcome at hand, reviews the relevant economic theories that explain the underlying choices made by women, and then evaluates the empirical work testing these theories. Chapter authors have been careful to highlight studies with credible identification strategies. Each chapter suggests areas where future work is necessary. Because these chapters showcase the innovative empirical techniques discussed previously that are used to identify causal relationships, they present the most current thinking on the issues. Therefore, readers interested in doing research in these areas should find chapters in this Handbook to be a useful summary of the “state of the literature” and a helpful starting point for their own work.

Section I begins with marriage. Historically, marriage marked the beginning of adult life for women. Almost universally, women left their family homes once they married, usually ceased any formal attachment to the labor force, and in many cases/countries changed their names, thereby altering their identities. As economic circumstances have changed, patterns of marriage have changed. These changes have a strong educational gradient, as is evidenced in the next chapter.

Hani Mansour and Terra McKinnish focus their chapter on examining how marital sorting—who marries whom—has changed over time. Marital sorting is assumed to maximize the gains to marriage subject to the costs of marital search. Starting with a simple Becker model that predicts negative assortative matching on wages to maximize marital surplus, Mansour and McKinnish discuss theories that predict positive assortative matching and review the related empirical research. While much has been made of an apparent increase in positive assortative matching in the marriage market and its subsequent effects on income inequality, Mansour and McKinnish caution us that changes in the gains from marriage and the ways in which people meet prospective spouses are likely to change the degree of marital sorting. Whether these changes will decrease or increase the degree of assortative mating on characteristics such as age, education, or race/ethnicity depends on the relative importance of preferences versus search costs.

Shoshana Grossbard’s chapter reviews models of marriage, with special emphasis on how variations in the sex ratio can help explain outcomes such as marriage formation, the intramarriage distribution of consumption goods, labor supply, savings, type of relationship, divorce, and intermarriage. Importantly from a research perspective, she
notes that changes in sex ratios can have profound impacts on outcomes in the marriage market. As one example of this, she emphasizes how the distribution of marital output and decision-making authority will change when sex ratios are unbalanced, with the group in excess supply faring more poorly. Unbalanced sex ratios in particular markets delineated by ethnicity, race, or education may also cause individuals to look outside of their traditional marriage market to find a match (Chiswick and Houseworth 2011).

No discussion of the economics of marriage is complete without a discussion of marital dissolution. Evelyn L. Lehrer and Yeon Jeong Son address the economics of divorce, with a focus on child and family well-being. Divorce is clearly endogenous to well-being, and many of the issues that scholars grapple with here require the econometric techniques described in the previous section of this introduction. A discussion of the relatively new “gray divorce” revolution occurring in many developed countries provides a window into what the future may hold for women, as they live longer and spend more of their adult lives working and perhaps less of them partnered.

While the first three chapters are largely focused on developed countries, most of the world’s women live in developing countries. The distinctive features of marriage markets in developing countries are reviewed by S Anukriti and Shatanjaya Dasgupta in their chapter on marriage and families in the context of developing countries. In particular, they discuss two features of marriage markets that are today essentially nonexistent in developed countries—payments at the time of marriage (dowry and bride price) and polygyny. They pay special attention to the consequences of marital payments on socioeconomic outcomes. Anukriti and Dasgupta also discuss arranged marriages, which are much more common in the developing world although occasionally seen in parts of the developed world. They frame a discussion of assortative matching in a simple economic model that illustrates the conditions under which positive matching will occur and present the consequences of such matching, including the relative bargaining power of the partners. As their chapter makes clear, merely extending existing models of marriage that apply to developed countries will not capture the intricacies of spousal interactions in developing countries nor their economic consequences.

The next set of chapters focus on fertility issues. Fertility has been declining around the globe and in some developed countries hovers well below replacement level. In addition, in many countries, the proportion of births that are nonmarital is rising. These important changes and their causes and consequences are discussed in the next set of chapters.

Claus C. Pörtner starts with a discussion of declining fertility in the developing world and addresses four provocative questions: (1) Why have fertility rates in Sub-Saharan Africa not fallen as rapidly as those in other parts of the developing world? (2) What factors determine the timing of fertility, and how is timing related to schooling and labor market outcomes? (3) What is the role of bargaining power in determining fertility? (4) How do sex preferences affect fertility outcomes? He also discusses efforts at family planning in developing countries, noting the complexities that are rooted in evaluating the success of these policies—the experiments are often small in scale, which makes it more difficult to establish whether an effect exists due to lack of statistical power, and
noncompliance with randomization can be a problem. This can be particularly salient for family planning programs where the randomization often occurs at the community level, making it hard to avoid spill-over effects of, for example, information about contraceptives to nontreatment areas. Similar to the chapter on marriage in developing countries by Anukriti and Dasgupta, Pörtner’s chapter illustrates the complexities that underlie fertility decisions in low-income countries and the heterogeneity across these countries that affects the outcomes we observe.

Fertility in developed countries is the focus of the next three chapters. Low fertility, now often below replacement in developed countries, has become a primary concern to policymakers as they grapple with the labor market and pension/aging consequences of declining fertility.

Alicia Adserà and Ana Ferrer document current trends in childbearing behavior in developed countries—including large drops in fertility rates and delayed fertility—and review some of the mechanisms that can explain them. Ultimately, these trends are linked to shifts in couples’ demands for children following increases in women’s education and labor market attachment and changes in access to family planning. They also discuss the recent emergence of a positive gap between desired and actual fertility linked to adverse economic conditions and high housing costs, as well as barriers for women regarding the ability to combine family and work. The chapter closes with a discussion of patterns of fertility among immigrants and of recent fertility policy experiences in developed countries.

Leonard M. Lopoo and Kerri M. Raissian tackle the topic of policies designed to alter fertility in the developed world. Given the low birth rates in many developed countries, their focus is on pronatalist policies including child subsidies—often referred to as “baby bonuses”—which are essentially cash subsidies paid to families for having children. They also discuss family-friendly work policies including maternity leave and child care, as well as incentives built into tax codes that are designed to encourage births. Their careful review of the literature reveals that the efficacy of these policies is quite mixed. In particular, the policies often affect the timing (tempo) of fertility but not the number of children (quantum effect). These two chapters make clear that even after fertility rates decline, countries still wrestle with a host of issues, including the interconnectedness of the fertility and work/education decisions.

Digging deeper into fertility changes in developed countries is the task of Jason M. Fletcher and Jessica Polos, who focus on teen and nonmarital childbearing. The latter is on the rise in most developed countries and not surprisingly is linked to changes in marriage markets, discussed in the first two chapters. Both the causes and the consequences of nonmarital childbearing are examined. The consequences of teen and nonmarital childbearing have received a great deal of attention in the economics literature; here, the issue is whether the strong link between nonmarital childbearing and subsequent poor economic outcomes is causal or primarily correlational. This research is an excellent example of the way in which the analysis of women’s issues raised complicated econometric problems and led to econometric innovations and highly creative research approaches.
Introduction: Women, the Economy, and Economics

Historically, the United States has had (and as of the writing of this chapter still has) the highest teen birth rate in the developed world. Yet, that rate has been falling as of late. One of the proximate causes of this decline is dramatic change in contraceptive technology. Martha J. Bailey and Jason M. Lindo, in their chapter, discuss how these changes have affected women’s outcomes. Starting with the introduction of the birth control pill and legalized abortion in the 1960s and 1970s and continuing through to today with the introduction of long-acting reversible contraceptives (LARCs), they assess the impact of these technological changes on women’s education and labor market outcomes. They provide an up-to-date survey of this literature and highlight many places where more work needs to be done.

In the next chapter, Elaina Rose weaves together a fascinating look at child gender and the family that bridges fertility in both developed and developing countries. While we often think of child gender as an issue that is most salient in developing countries, many of which exhibit a strong son preference, she makes clear that this is not unique to the developing world and discusses the myriad ways in which child gender affects parental behavior.

Kasey S. Buckles examines a topic of particular concern in the United States, as well as many other developed countries: fertility rates have fallen among the most educated and hence are higher for women of lower socioeconomic status (SES). A rich literature in economics and the social sciences has shown that improvements in women’s SES can also improve the well-being of their children. This chapter identifies several channels for this effect, drawing on both theoretical and empirical work.

The last two chapters in this first section of this Handbook focus on two timely policy issues surrounding childbearing—child care and maternity and family leave. Jean Kimmel and Rachel Connelly tackle the convoluted child care policy in the United States, providing a historical look at what they argue is a patchwork of policies that often fail to serve those who need them the most. They then propose an alternative to current US child care policy, one that they assert benefits all stakeholders and enhances child well-being.

Maya Rossin-Slater turns the focus to maternity and family leave policies. She skillfully summarizes decades of research that aims to identify the causal effect of policies in various countries on women’s labor market outcomes and child well-being. Like the fertility policies highlighted in the chapter by Lopoo and Raissian, she finds that the efficacy of these policies varies substantially.

The inevitable conclusion of this first section of the book is that decisions regarding marriage and fertility are important determinants of economic well-being—indeed, they may matter more than labor market decisions.

This brings us to the second section of this Handbook: “Women in the Labor Market.” Here, the authors tackle several important related topics: women’s labor force participation, employment, and earnings. Interspersed throughout these chapters are frequent references to fertility and marriage, which are inextricably tied to decisions regarding education, labor force participation, and earnings. Rachel Heath and Seema Jayachandran start this section with a chapter on women’s education and work in developing countries.
Two recent common trends in developing countries are an increase in female labor force participation and a narrowing of the gender gap in schooling. An important policy option discussed here is conditional cash transfers, which have been used with success to increase girls’ education in many developing countries. Increased education and labor supply have prompted women to delay marriage and fertility and have improved children's health. However, there are also potential negative impacts, such as (perhaps paradoxically) an increased risk of intimate partner violence.

Astrid Kunze follows with a chapter on the gender wage gap in developed countries. She begins by noting that, despite narrowing, a gender wage gap persists in all countries. She takes the reader through the list of possible explanations for the existence of a wage gap (e.g., human capital, occupation choices, risk preferences, discrimination), carefully explains the two most common ways of decomposing a gender wage gap, and provides examples of the results of these decompositions.

Francine D. Blau and Anne E. Winkler examine the nexus between work and family. They begin by presenting a portrait of US women’s labor market experience “then and now.” They focus on key challenges faced by women as they seek to combine motherhood and work: workforce interruptions due to childbearing, the impact of home and family responsibilities, and constraints posed by workplace culture and “how business is done.” They also draw attention to the very different experiences of women at the top and bottom of the educational distribution.

Despite the converging roles of men and women in the labor market, a strong common feature of labor markets around the world is occupational segregation. This segregation leads to wage differentials, as discussed by Patricia Cortes and Jessica Pan in their chapter on occupation and gender. While early work in this area attributed occupational segregation to gender differences in human capital accumulation or to discrimination being more pronounced in some occupations than others, more recent work has focused on risk preferences, attitudes toward competition, and women’s preferences for family-friendly work environments. This evidence is reviewed in this chapter; they conclude their discussion with an intriguing look at policies that might lessen gender segregation in occupations.

Labor economists have long been interested in the way that taxes and transfers affect individual labor supply decisions. An application of this to women is found in the chapter by Melanie Guldi and Lucie Schmidt, who examine the effects of US tax and transfer programs on women's labor market choices. These programs are particularly important for women for three reasons. First, women are more likely to live in poverty and are therefore more likely to be eligible for means-tested programs. Additionally, women are more likely to live in families with children, which often triggers either eligibility for transfers or larger transfers. Second, in the United States, taxes are levied on the family as a unit and not at the individual level, which in turn influences women's labor supply choices, since they are still more likely than men to be the second earner in a household. Finally, women’s labor supply has traditionally been more responsive to taxes and transfers than that of men, leading Goldin (2006) to argue that women “gave birth” to the modern study of labor supply.
In the next chapter, Olga Shurchkov and Catherine C. Eckel tackle the topic of how gender differences in preferences for competition, risk, and negotiation affect women’s labor market outcomes, focusing on the rich literature in experimental economics. They report that experimental evidence confirms gender differences in these areas and that these might be linked to occupational choice and earnings. They also consider how gender differences in social preferences (defined as preferences for cooperation and nurturing) might affect outcomes.

Do well-known biological differences between men and women contribute to gender differences in labor market outcomes? Deborah A. Cobb-Clark examines this question in her chapter on biology and the labor market. She focuses her attention on four broad areas: (1) behavioral endocrinology, (2) human genetics, (3) neuroeconomics, and (4) sensory functioning and time-space perceptions. Contributions of the newly emerging subfield of neuroeconomics play an important role in measuring some of these differences. Similar to Shurchkov and Eckel, she concludes that while we can establish gender differences along these dimensions, linking them definitively to the gender wage gap, for example, is still an area ripe for research, as few datasets contain both good information on labor market outcomes and these important factors.

The next two chapters address how women fare within firms. Despite decades of progress relative to men in work and schooling, women remain severely underrepresented among top corporate and political leaders. Amalia R. Miller discusses the current status and recent progress of women in leadership positions, focusing on corporate leadership. The effects of different policy interventions aimed at increasing female representation are assessed, with particular attention paid to gender quotas for corporate boards and to the question of spillover benefits from female leaders to other women. The effects of gender quotas in politics are also discussed and compared with those of gender quotas imposed on corporate governance boards. In a closely related topic, Takao Kato and Naomi Kodama peer inside the firm to see how women fare under various management practices. They review the high-performance work system (HPWS), as well as other management practices. Some of their findings may be surprising: for example, work–life balance practices that result in limited face-to-face interactions with coworkers may actually hamper women’s career advancement. A rat race model, in which long working hours signal a worker’s commitment, is a promising explanation for the gender gap in promotions. Corporate social responsibility practices may increase gender diversity.

While this book focuses on women and their economic lives, William J. Collins and Michael Q. Moody remind us in their chapter that the experiences of women are far from universal and an intersectional approach is imperative to understanding how different groups of women fared economically. Their focus is on African American women in the United States. They document and explore black–white differences in US women’s labor force participation, occupations, and wages from 1940 to 2014. They draw on closely related research on selection into the labor force, discrimination, and pre–labor market characteristics, such as test scores, that are strongly associated with subsequent labor market outcomes.
While this Handbook is unabashedly focused on analysis through a neoclassical economics lens, we would be remiss if we did not include a chapter on feminist economics. Joyce P. Jacobsen, one of the academic leaders in the field, provides an overview of this perspective. She starts by outlining “the feminist economics intellectual project” with an eye to its intellectual development. Then she applies it to two important topics: labor supply and earnings and, of course, caring labor. Along the way, she highlights the differences between standard neoclassical theory and predictions, and feminist economic theory and predictions. This seems a fitting way to close the second part of the book.

Finally, section III consists of topical chapters that address issues related to women and the economy that are not neatly categorized as marriage/fertility or labor market, yet are clearly important for understanding women’s role in the economy. The first chapter in this section is by Paola Giuliano, who leads us through the historical roots of gender differences. While we certainly all can identify gendered expectations for men and women, it is important to understand their origin. Reviewing work on the historical origin of differences in female labor force participation, fertility, education, marriage arrangements, competitive attitudes, domestic violence, and other forms of difference in gender norms, she illuminates how our past has shaped our present.

Much has been made recently about gender differences in longevity. Barbara Schone, in her chapter on gender differences in health, tackles this timely topic. There are important differences in the health of men and women. While women typically report worse health than men and suffer from more health conditions, they also live longer. These patterns become less paradoxical when analyzed in greater detail: women and men suffer from different conditions, especially at younger ages. In particular, women are more likely to suffer from chronic conditions, while men are more likely to suffer from life-threatening conditions. Schone documents these differences and summarizes biological, economic, and social explanations of sex differences in health. Despite a large literature exploring sex differences in health, much remains to be learned about the interaction of biological, economic, and social factors and their effects on health.

Nidhiya Menon and Yana van der Meulen Rodgers shed light on the relationship between economic development and women’s empowerment. They focus on the structural drivers and constraints associated with the transition of women from unremunerated or low-paid production to higher-value work in three important labor market domains: entrepreneurship, agriculture, and wage employment. The chapter closes with the links between gender equality and economic growth, concluding that promoting gender equality can be a “gender-smart” way to achieve sustained economic development.

Francisca M. Antman examines women and migration. A significant number of women migrate each year—most from lower-income countries to higher-income countries—and the overwhelming majority are searching for better-paid work, often to send remittances back to their families. For many countries, these remittances represent a sizeable share of the receiving countries’ gross domestic product. She also touches on the important ways in which nonmigrant women are affected by the migration of their spouses and other family members.
It is well known that women are more likely to perform work, paid or unpaid, that involves caring for others. In her chapter, noted feminist economist Nancy Folbre explains why care work often imposes a financial penalty that contributes to gender inequality. Such work often involves more personal connection, emotional attachment, and moral commitment than other forms of work. It creates public and private benefits, and its value is difficult to measure. All of these factors place care providers at an economic disadvantage and create what Folbre refers to as a “care penalty.”

Jobs in science, technology, engineering, and mathematics (STEM) are among the highest paid in most economies. Yet, women are underrepresented in such jobs. Taking a life cycle approach, Shulamit Kahn and Donna Ginther explore explanations for the underrepresentation of women in STEM. Their discussion of causes also leads to some suggested strategies to correct such imbalances in this labor market. Along the way, they document the STEM premium in earnings, making clear the importance of breaking down barriers to entry for women in these fields.

The last chapter, by Guy Johnson, David C. Ribar, and Anna Zhu, presents international evidence regarding women’s homelessness. There is very little academic literature on this subject and even less focused on women, despite the fact that women are a sizeable fraction of the homeless and are often homeless with children. They start by defining and measuring homelessness, noting factors that are unique to homeless women. They then provide a discussion of causes and consequences of women’s homelessness, reviewing important studies that have sought to credibly identify the effect of homelessness on outcomes including food security and drug use. Policy responses are an important aspect of this chapter as cities grapple with how to best serve this population.

**Women, the Economy, and Economics: Where Do We Go from Here?**

While this book provides the first comprehensive examination of women’s economic lives in both developed and developing countries, we are cognizant, and our chapter authors make abundantly clear, that there is still a great deal that we do not yet know. It is fair to say that we are still in the early stages of having a full understanding of women’s economic lives and the remaining challenges are substantial. No sooner do we come to grips with a particular issue—the wage gap, occupational segregation, or nonmarital fertility—than it heads off in a new, equally interesting, and sometimes unexpected direction. In the next two sections of this introduction, one focused on developed countries and one focused on developing countries, we highlight both the current state of knowledge, broadly speaking, and then the places where there is a dearth of evidence. An exhaustive summary here is not necessary; we strongly encourage readers to turn to
Susan L. Averett, Laura M. Argys, and Saul D. Hoffman

the individual chapters in this Handbook to gain a full sense of the issues and challenges scholars are currently facing.

Developed Countries

Women in developed countries have made tremendous economic progress. They have greatly increased their labor force participation over the last fifty years. Economic and social forces leading to these dramatic increases in female labor force participation, which have occurred to some degree in all developed countries, include women’s increased educational attainment, higher wages, improvements in household technology and contraceptive technology, and structural shifts in the economy that gave rise to greater availability of market substitutes for household production. In addition, structural changes in the economy that moved toward occupations requiring less physical strength facilitated women’s widespread entry into the labor force and across a broader range of occupations.

Changes in family structure have also been important drivers of this change in labor force participation. Women at all ages are less likely to be married than were their mothers and grandmothers. This retreat from marriage is in part due to women’s increased investment in their own human capital, the wide dissemination of reproductive technology including the pill and legalized abortion, changing laws that make divorce easier, and better household technology that frees up time from housework. In some countries, subsidized child care and paid maternity/family leave have also facilitated the entry of women into the workforce.

In many ways, in the developed world, today’s women “have it all,” certainly relative to earlier cohorts. As women’s labor force participation rate approaches that of men and as their educational attainment often exceeds men’s, studies report a narrowing of the difference in time spent in housework and child care by wives and husbands. However, just as in the past, women’s economic circumstances and their choices regarding marriage and fertility are still intertwined in a way that men’s choices are not.

Having it all, however, differs significantly by socioeconomic status. This is reflected in the education gradient in marriage and fertility that exists in many countries. This gradient suggests further inequality down the road. It is often the case that more educated women have fewer children and invest more in them than do less educated women. These differential investments in children portend an increase in inequality across families by mother’s education. Policy solutions to this remain elusive.

Traditional explanations for the gender earnings gaps emphasized human capital differences, family responsibilities that varied by gender, occupational segregation, and discrimination. Human capital differences in years of schooling and years of work experience have substantially narrowed; in many countries, including the United States, women now have more schooling than men. But at least two conspicuous gender differences related to human capital still exist. First, women are still substantially underrepresented in STEM fields. Because jobs in STEM fields are some of the highest paying
in modern economies, women’s underrepresentation here doubtless contributes to the persistent gender wage gap. Understanding what forces lead to this underrepresentation and designing effective policies to mitigate it are critical issues that many countries are still trying to address.

Second, at the top of the corporate hierarchy, where women and men often have identical human capital, women have yet to break into the highest levels of corporate management (the so-called “glass ceiling”). Women have made inroads into corporate jobs, but remain far less likely to be in leadership positions. As Miller notes, “Women make up 50 percent of the world’s population and 40 percent of its labor market participants, but they are severely underrepresented among business and political leaders. Only 19 percent of firms have female top managers and 23 percent of seats in national parliaments are held by women” (this volume, p. 539). This leadership gap undoubtedly contributes to the gender wage gap, because corporate leaders are typically among the highest-paid positions in business. Of course, leadership is accumulated through years of work experience, and given that women have only recently caught up to men in terms of experience and education, some lag in leadership representation is to be expected. However, just as in STEM fields, the pipeline leaks at many levels. Thus, even stocking the pipeline is no guarantee that women will catch up to men in this dimension, in part because of the glass ceiling that limits women’s advancement to the top echelon of management positions.

This glass ceiling may be a result of taste-based discrimination or statistical discrimination against women, but it may also reflect differences in preferences for various aspects of work, especially work–life balance. For example, a well-known study that followed graduates of the University of Chicago MBA program found that even when men and women graduated from the same prestigious business school, it was not long before a meaningful gender wage gap developed (Bertrand, Goldin, and Katz 2010). This gap is partly related to parenthood, which has a negative effect on women’s earnings and career trajectories, but not on men’s. It is also due to gender differences in niches within business professions: men tended to pursue finance jobs, while women chose marketing and other paths that were more family oriented (Bertrand et al. 2010).

This study was notable because it focused on men and women who had very similar training (from a single university program) and were likely equally ambitious. Yet they ended up taking very different paths after graduation. However, we cannot discount the role of subtle discrimination that may be more salient at the top of the corporate hierarchy. The pipeline of women is clearly well stocked if measured by the number of women who have attained MBAs; in the United States, for example, women have now reached parity with men. The fact that in the United States, the number of women who are chief executive officers at Fortune 500 companies hovers around six annually suggests that other subtle barriers keep women from advancing to the top. Measuring these barriers is difficult, and much of what we know is anecdotal. Yet, there is no shortage of advice in the popular media. Books such as Lean In exhort women to push harder to be heard in the corporate arena. Economists have contributed by documenting some factors that might be explanatory, and experimental economists have established that women
Susan L. Averett, Laura M. Argys, and Saul D. Hoffman appear to gain less from negotiation, have weaker preferences than men for risk and competition, and may be more sensitive to social cues. Yet, we have yet to develop theoretical frameworks to fully understand the lack of women at the top. We do know that providing quotas can help ensure that women reach the top, and there is evidence that firms with women leaders do better along some metrics (see Miller, chapter 22, for more discussion).

The continuing role of gender discrimination should not be minimized, although it is arguably not as overt as in the past. Measuring discrimination has been difficult. Decomposition models of the sort put forth by Oaxaca quantify explained and unexplained (residual) portions of the gender pay gap. It is well understood that the residual wage gap is, at best, only a rough proxy for discrimination. As women's measurable skills approach and exceed those of men, we are left with ever larger unexplained portions from these methods. The increased awareness of the limitations of the regression approach to measure discrimination has started to shift the empirical work on this topic toward field experiments such as audit studies, which aim to compare outcomes in the same job for two individuals who are identical in all respects other than gender. This approach has provided arguably cleaner evidence on gender discrimination in hiring and represents a promising path for further research, although it has its own limitations (Azmat and Petrongolo 2014).

Given that occupational segregation has certainly declined and the typical barriers are no longer as salient, more recent research emphasizes the role of gender differences in psychological traits, preferences for nonpecuniary (family-friendly) job characteristics, personality traits, and skills. Ascertainment that such gender differences exist has been the work of experimental economists, and we now have good data that suggests that women are more risk averse, less competitive, and less likely to negotiate than are men. What we do not yet have is good, consistent evidence on how these characteristics translate into either gendered behavior in the labor market or wage differentials. We are even further from having any sense of their quantitative importance. Still, these are potentially fruitful avenues for further research. Biological differences are also potentially important explanations for wage gaps and occupational segregation. The state of this research is remarkably similar to the experimental evidence about gender, risk-taking, and competitiveness: we know that men and women differ across many biological dimensions, but not whether these differences translate into meaningful labor market effects. For example, the RCT described earlier in this introduction found that levels of testosterone are important predictors of altruism, trust, and risk attitudes, among other outcomes. But whether these differences explain wage differentials is still an area ripe for research. Part of the difficulty in pursuing this line of research is that social science datasets with high-quality earnings and occupation information for representative samples rarely have information on measures such as competitiveness, risk aversion, and testosterone levels, while health datasets that have biological information are typically small and unrepresentative and lack high-quality earnings information. Hence, it has been difficult for researchers to translate these into explanations for earnings differentials. It is also not fully understood how much of the
observed gender differences in tastes and preferences for particular job attributes is environmental and how much is biological. The answer to this question is critically important to policymakers and managers who strive to make the workplace more egalitarian to harness the talents of all employees.

One potentially useful exercise would be to carefully examine countries that have achieved greater gender equality in earnings. For example, Belgium and Hungary have made remarkable progress in closing their unadjusted gender wage gaps (gaps in these two countries have narrowed by over 70 percent) and Italy, Norway, and the United Kingdom have narrowed their gaps by over 30 percent over the same time frame (authors’ calculation from the Organisation for Economic Cooperation and Development [OECD]). At the same time, the gender gap in the United States has been virtually unchanged since the early 1990s. Whether this narrowing of the gap in these European countries is due to family-friendly policies in the workplace, a larger portion of women working in the public sector where wages tend to be more egalitarian, or the selection of only high earners into the workforce has been the subject of a great many studies and is an important area of ongoing research (see, e.g., Christofides, Polycarpou, and Vrachimis 2013).

While women have increased the human capital they bring to the workplace, firms have also tried to make their management practices more women friendly. Kato and Kodama (chapter 23) note that firms have sought out management practices aimed at leveling the playing field between men and women to varying degrees of success. Work–life balance initiatives that allow women (and men) to have more flexibility regarding work often limit an individual’s face-to-face interactions with coworkers, and this may, paradoxically, hamper their career advancement. However, a lack of a comprehensive theoretical framework for understanding how firms’ management practices are expected to affect women’s earnings and employment coupled with a lack of firm-level data hinders our efforts to fully understand what goes on in the “black box” that is the firm. As in many other areas of economics, understanding the nuances of what occurs in firms is an important area of future research.

What can we do about the need to balance work and family responsibilities, which still fall mainly on women? Women predominantly bear the burden of caregiving, and with the aging of the population in developed countries, women are often tasked with caring for elderly parents, as well as their own children. This comes at a price and it is not unusual for a woman to leave the workforce or scale back her hours or career aspirations to fulfill her caring responsibilities, thus contributing to gender gaps in employment and earnings. We still regularly take it for granted that women are more nurturing and thus are more suited for such caring labor. A Becker approach would contend that because women’s earnings are lower, they are the logical (efficient) choice when it comes to specializing in household production. However, these explanations are no longer very satisfying, as traditional gender stereotypes have been eroded. It is worth taking a step back and asking where these gendered expectations of caregiving responsibilities came from. The chapter by Giuliano demonstrates that gender role differences tend to arise in response to specific historical or technological circumstances and can persist long
after those conditions have shifted. Changing these norms is thus a challenging task for policymakers. Policies that encourage men to take leave around the birth of a child have been enacted with some success in some countries (see Rossin-Slater, chapter 14) but are far from universal.

Many developed countries have made great strides when it comes to policies aimed at helping families (women) balance work and family. Paid maternity leave (often quite generous) is the norm in Europe, but is conspicuously absent in the United States. In fact, Blau and Winkler (chapter 17) report that the gap in family-friendly policies between the United States and other countries is large and growing, with consequent effects for women’s labor force participation rates. Female labor force participation in the United States has declined relative to other economically developed countries, and they argue that this is due to the greater expansion in OECD countries of family-friendly policies, including the length and generosity of parental leave, mandates for part-time availability, and expenditures on child care. The chapter by Kimmel and Connelly in this volume makes clear that the United States is woefully behind in the provision of child care as well.

But providing maternity leave and child care that can aid women as they move forward in their careers is probably not sufficient to ensure gender equality in labor markets. The very nature of work has evolved in some occupations in ways that are decidedly not compatible with work–life balance, for either men or women. A famous study by Goldin (2014), which is discussed in several chapters in this volume (e.g., Blau and Winkler, Kunze, Cortes and Pan), examined why the gender gap for college-educated women in the United States varied across occupations by linking those gaps to inherent characteristics of the occupation, including the degree of autonomy and whether time flexibility was likely to be easy or difficult to accommodate in terms of production. For example, some occupations, such as law, business, or some medical specialties, may require extensive amounts of “face time” or client interaction or otherwise be structured so that different workers are poor substitutes for one another in production. As a result, these occupations may develop nonlinear pay schedules in which long hours are highly rewarded. Other jobs may have a more linear relationship between hours and pay, especially where technological change allows a job to be performed by two or more different persons at different times without loss of productivity. Goldin cites pharmacists as an example of this last category. The advent of medical records technology means that patients are not tied to a specific pharmacist; instead, pharmacists are near-perfect substitutes for one another. Consequently, hours worked by pharmacists are more flexible than in the past and the gender gap is among the smallest of any occupation. The tricky part here is to understand what can be done about jobs with nonlinear relationships between hours and pay. Goldin is optimistic that technological changes that facilitate off-site and off-hours communication may play a role. Restructuring client expectations is another possibility, but it is also possible that women are less likely to select these jobs either because they are less family friendly or because they require a more competitive nature. Finally, we cannot discount the idea that within certain occupations the expectation of long hours has become a social norm, even where it is
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not technologically required. These norms may create an unnecessary barrier as a form of subtle bias against working with women in these roles.

While the gender gap in schooling has closed—and even reversed—in most developed countries, there are remaining gender differences in pay and employment levels, as well as in the types of activities that men and women perform in the labor market. Understanding these persistent differences is the task of the next generation of labor and demographic economists. Closer collaboration between economists and both psychology and medical researchers may be necessary as scholars turn to biological and social differences to fully understand remaining gaps.

Developing Countries

Despite falling marriage rates and rising age at first marriage, developing countries are still characterized by higher rates of marriage and earlier age at first marriage as compared to developed countries, which often translates into lower education for women and higher fertility, with all the attendant child and maternal health issues this high fertility involves. Because women are often less valued in these economies, authority within marriage is often unequal. Some of the most interesting research has focused on the interactions between marriage institutions and norms and women's education and fertility. In this volume, Anukriti and Dasgupta emphasize that these interactions have strong policy implications for the well-being of women. For example, the value of education for women may vary across groups that do and do not engage in bride price payments at marriage, because a more educated bride may command a higher bride price. Polygyny is still practiced in some developing countries, with its own implications for fertility and women's autonomy. The role of polygyny in economic growth is another issue for further study.

In part a reflection of these changes in marriage, fertility is falling across developing countries. Differences in preferences for children by husbands and wives raise issues related to bargaining power when explaining fertility declines in developing countries. As women gain bargaining power, it is often thought they will want fewer children, but the reality is likely to be more nuanced. As Pörtner makes clear in his chapter in this volume, the role of bargaining in fertility is still an area where researchers need to know more to better inform policymakers. Merely providing access to contraception may not be enough to reduce fertility unless the relative bargaining power of wives in the decision to use contraception is accounted for.

An especially important aspect of intrahousehold allocation is son preference, which remains important in China and India, as well as some other countries. Son preference can affect both the timing and spacing of births. A strong son preference can mean an imbalance in the sex ratio and is blamed for the phenomenon of “missing girls.” Achieving gender equality is hampered when there are missing women. The widespread adoption of technology that allows couples to determine the sex of an unborn child, combined with lower desired fertility as in India or more formally as with China’s
One Child Policy, can paradoxically worsen the problem of missing girls as women lower their fertility rates but maintain their preference for sons. This leads to undesirable changes in the sex ratio that affect both marriage markets and the labor force. The relaxing of China’s One Child Policy may do more to equalize the sex ratio than any gender-targeted policy can.

One of the driving factors for lowered fertility has been improved opportunities for education for women in developing countries. Although the link between education and fertility is strong, the mechanisms are not well understood. Does education increase knowledge about contraception use or does the higher opportunity cost of children operate to reduce fertility? Furthermore, we do not know exactly how much education is enough to lower fertility. Is completing primary school sufficient or do girls need to get through high school? Pörtner (this volume) reports that one reason for persistently higher fertility in Sub-Saharan Africa is that it may take a higher level or better quality of education for girls before the effect on fertility is seen. Clearly, we need to know more about this important linkage.

Like women in developed countries, women in developing countries have primary family responsibilities and perform the bulk of unpaid care work. Lack of child care alternatives coupled with the need to gather basic supplies such as water and cooking fuel create time-consuming barriers to women’s employment in developing countries. According to the World Bank’s 2012 World Development Report: Gender Equality and Development, closing these gender gaps matters for economic development and policymaking (World Bank 2012). Greater gender equality can enhance economic productivity, improve development outcomes for the next generation, and make institutions and policies more representative.

Women in developing countries have also seen important changes in their working lives. Women have been identified by multinational corporations as cheap, productive, and reliable labor, particularly in the textile industry, and this has consequences for their bargaining power as economic development has meant more jobs in the formal sector. Yet, it remains the case that when women are in paid employment, they are more likely to be engaged in part-time rather than full-time work and in the informal rather than the formal sector, and across the globe women earn less than men for comparable work.

A lack of well-paying jobs in developing countries has often pushed women to migrate in search of work. As Antman (chapter 29) notes, women are both likely to migrate and to be left behind as their husbands migrate. Thus, understanding the impact of migration and remittances on households “left behind” in source countries is important as it has profound implications for economic development. Remittances from a spouse of other family members are a source of income for women left behind, and remittances from women who migrate can be an important source of revenue in their countries of origin.

Economic development has the potential to be advantageous for women; hence, it is important to understand their role in that development. To that end, economists and policymakers are interested in understanding how microcredit can lift women out of poverty by providing them small loans to start a business. Made famous by the Grameen
Bank in Bangladesh, microcredit has swiftly moved across the developing world. Heath and Jaychandran (chapter 15) note that while microcredit is not necessarily a gendered policy, many organizations do target female entrepreneurs, who are known as being good borrowers, and repeated studies have shown that when money is in the hands of women, it is more likely to be invested in children. As Menon and Rodgers note in their chapter in this volume, such initiatives target individuals who have difficulty obtaining conventional loans through commercial banks. Women, in particular, have faced such difficulties due to their lack of collateral, a problem that is exacerbated by weak or nonexistent property rights for women in many developing countries.

Several RCTs have evaluated the efficacy of microcredit in terms of its ability to foster female entrepreneurship. These studies tend to find positive but small impacts; however, the precise impact on women’s empowerment and entrepreneurship varies by program specifics and context. Other studies have noted that business skills training can be effective in the developing world to help women as they work toward self-employment, and land ownership rights to women result in improved economic sufficiency and increased overall productivity. Though promising, additional evaluation is necessary to understand if widespread gains are possible from these types of programs. It seems apparent that cultural context and patriarchal attitudes may moderate the effectiveness of these programs, but there remains work to be done to fully understand the effectiveness of these policies in varying contexts.

Finally, economists are studying the relationship between women’s empowerment and economic development. Much has been made in the world of economic development of the strong correlation between women’s empowerment and economic growth both within a country and across developing countries. Yet defining what it means to improve women’s economic empowerment and move toward gender equality is difficult. For example, should we focus on the equality of opportunities or the equality of outcomes? Untangling causation from correlation in this context is difficult. Clearly economic growth itself has provided and will continue to provide more opportunities for women. As Menon and Rodgers (chapter 28) note, improving educational attainment for women and girls can strengthen the ability of household members to engage in productive activities and improve the efficacy of the labor force, thereby bolstering the economy’s growth potential. Yet, without economic growth, there may not be schools and infrastructure to support women’s increased schooling. And, given women’s roles as caretakers, policies that facilitate entry into the labor force, ensure equality in earnings and access to employment, and provide safe workplaces are essential to harnessing the full potential of the world’s women. Yet, it remains the case that in many developing countries women lack sexual and reproductive autonomy or the ability to own property or to obtain an education.

Understanding the impact of policies that aim to strengthen women’s political and economic autonomy is an important ongoing goal, but one that faces challenges. Though researchers are often able to implement demonstration programs that include the collection of data from randomized studies, the impact of implementation on a larger scale and in different cultural contexts is often unknown.
In recent years, social and economic forces have changed the landscape of both family and work life, and women are at the center of these changes. The chapters in this Handbook make clear that addressing the link between work and family is crucial to women's continued economic progress. In addition, promoting gender equality is essential for economic growth and for the well-being of the next generations.

Despite considerable progress, a number of gaps remain in our understanding of economic gender differences. As Anukriti and Dasgupta point out, “more rigorous theoretical and empirical work is needed to understand the implications of various cultural norms, customs, and practices for marital matching, intrahousehold decision making, and macroeconomic outcomes. . . . Such a focus is also extremely policy relevant, and can help us understand the unique challenges and trade-offs involved with policymaking” (this volume, p. 114). As our expert authors have also noted, collecting better data will allow us to further refine our understanding of barriers that keep gender wage, employment, and occupation gaps from closing. Continuing to advance and test theories that can uncover the increasingly nuanced reasons for gender differences in behaviors and outcomes is also imperative. Having this information at hand is crucial for policymaking. Policymakers can only make informed policy when they have good data about which policies are effective. Many countries are motivated to develop policies to advance women’s economic well-being. It is our hope that this Handbook will be an important resource for scholars, who will then provide the knowledge necessary to make effective policy choices in the future.

Notes

1. Becker’s taste-based model was developed primarily to explain discrimination based on race and it is premised on a “dislike” of the group subject to discrimination (Becker 1957). That preference fits gender discrimination somewhat awkwardly. To be fair, the recognition of the existence of gender-based discrimination was still a decade or more in the future.

2. The first woman to serve as president of the American Economics Association was Alice Rivlin (1985), a well-known nonacademic economist. She was followed by Anne Krueger (1996) and Claudia Goldin (2013).

3. A well-known early use of this work-history data is Corcoran and Duncan (1979).

4. See information on the Demographic and Health Surveys programs, with information about surveys across ninety countries, at http://dhsprogram.com/Data/.


6. Biology also affects gender differences in well-being through another path. Differences in life expectancy across gender are also important. While women live longer than men in virtually all countries, life expectancy varies greatly by socioeconomic status, and women
are generally less healthy compared to men. As Schone (this volume) notes, some of these differences may be biological and hence perhaps less mutable to policy, but others are clearly rooted in social and economic factors.

7. Alesina, Giuliano, and Nunn (2013) show this in the very specific context of plough versus shifting cultivation (slash and burn) agriculture, linking those technologies to differences in gender roles and even to current attitudes.

8. The source of the occupational characteristics data is O*Net, the US Department of Labor successor to the earlier Dictionary of Occupational Titles. This dataset is still relatively little used, but may be a promising avenue for future research.

References


PART I

MARRIAGE AND FERTILITY
Chapter 2

Marriage-Market Search and Sorting

Explanations and Evidence

Hani Mansour and Terra McKinnish

The choice of marriage partner is a fundamental life decision that directly influences many individual and household outcomes that are central to individual well-being. The resources available to the household are largely determined by the productive characteristics of the two spouses. Spouses must decide on a number of important joint choices, such as where to live, how many children to have and when, and how to invest in those children.

This chapter reviews topics and research related to marital sorting. To think about what type of person an individual will marry, it is necessary to first think about why people marry at all. The first section of the chapter discusses economic models of gains from marriage and their implications for marital sorting. The second section discusses economic models and research on marital sorting, with particular attention to the roles of preferences and search costs. The next three sections focus on marital sorting on three specific dimensions: age, education, and race/ethnicity. The final section discusses the interactions between marital sorting and income inequality, as well as the role of age of marriage.

Gains from Marriage and Marital Sorting

Individuals marry when utility in the married state exceeds utility in the single state. In other words, there must be gains from marriage. Marital sorting, or who marries whom, therefore, depends in part on the source of these gains.
Becker (1973, 1974, 1991) proposed gains through specialization as an important source of returns to marriage. Gains from specialization are generated when one spouse has a comparative advantage in market production and the other has a comparative advantage in household production. Crucially, in Becker’s model, individuals have the choice to invest in capital that raises their productivity in the market or to invest in capital that raises their productivity in household production. Total output and gains from marriage are maximized when some individuals choose to invest only in household capital and then marry spouses who have chosen to invest only in market capital.

The principal role of marriage, therefore, in Becker’s analysis, is to protect those who have invested entirely in household capital by ensuring the commitment of a spouse who will provide the household with market income. Without such commitments, it is not optimal for any individual to forego investment in market capital. With less specialization in human capital investment, gains from specialization, and therefore marriage, are diminished.

The simplest marital sorting predicted by Becker’s model is generated when men and women differ only in market wages. In this case, we would expect perfect negative assortative matching on wages. High-wage men should match with low-wage women and low-wage men should match with high-wage women. Within each household, the low-wage spouse spends more time in household production and the high-wage spouse spends more time in market production.

Becker does, however, predict that for many other traits, we should observe positive assortative matching, because these traits are likely complements in nonmarket production, particularly the production of children. He attributes the well-documented marital sorting based on traits such as education, religion, and ethnicity to complementarities in nonmarket production.

Economists have noted that technological changes in household production and rising wages of women have reduced gains from specialization as a primary source of gains from marriage. Researchers have therefore proposed that joint consumption of household public goods (such as children) and shared leisure are another source of marital surplus. In this case, larger gains to marriage are generated when individuals match with spouses with similar preferences for consumption (Lam 1988; Stevenson and Wolfers 2007; Lundberg 2012). For example, if children are household public goods, then investments one spouse makes in their care and well-being are nonexcludable and are enjoyed by the other spouse. Therefore, gains from marriage will be larger when spouses agree on which investments in their children are most beneficial. Similarly, one spouse’s efforts to cultivate a beautiful flower garden in the backyard generate greater marital gains when he or she is partnered with a spouse who also derives great pleasure from backyard flower gardens.

As Lam (1988) points out, a limitation of Becker’s approach to the economics of marriage is that his formal model does not include gains to marriage derived from joint consumption economies. Lam develops a model that includes a joint public good. He shows that gains from marriage from investment in a joint public good will generate positive assortative matching. While in Becker’s formal model married
couples only produce a single private commodity, Becker does acknowledge, in his discussion of assortative mating, that individuals have an incentive to marry spouses with similar preferences if similarities in consumption between spouses lower costs, or if some commodities are jointly consumed. In other words, it is beneficial for couples to agree on where they want to live, what sort of house they want to live in, how many children they want to have and when, and where they want to send them to school. Bergstrom (1997) refers to these as “public choices” that are made in the marriage.

Couples who generate marital surplus through specialization and exchange do not necessarily need to like each other or enjoy spending time together for the utility in the married state to dominate utility in the unmarried state. In contrast, couples who engage in relatively little specialization likely require compatibility of preferences and positive utility from joint consumption to generate sufficient marital surplus. Mansour and McKinnish (2014a) use the American Time Use Survey (ATUS) from 2003 to 2011 to test whether couples who engage in less specialization (e.g., are more similar in hours of market work) spend more time together. They find that among married couples without young children, those with a greater difference in weekly hours of work between husband and wife spend less time together on nonworking weekend days. Importantly, this relationship is quite symmetric between couples in which the husband works greater hours and couples in which the wife works greater hours. They do not find evidence of a relationship between specialization and couple time together among couples with young children. These results are consistent with a model in which couples who engage in less specialization experience gains from marriage due to joint consumption.

Lundberg (2012) provides additional analysis on the shift from gender specialization in marriage to joint consumption. She analyzes the effect of personality traits on selection into marriage using the German Socio-economic Panel Study and finds that among older cohorts, personality traits affect selection into marriage very differently for women and men, consistent with gender specialization in marriage. For example, agreeableness increases selection into marriage for women, but decreases it for men. This is consistent with selection into marriage of women who are nurturing and men with earnings power. In contrast, for younger cohorts, she finds no difference between men and women in how personality predicts marriage. This is consistent with marital surplus generated from joint consumption, rather than specialization. These results are therefore consistent with a shift over time from gains from marriage being generated by specialization to gains from marriage being generated by joint consumption.

The evidence in the literature, therefore, points to a shift over time toward greater realization of gains from marriage from joint consumption and fewer gains from specialization. We would therefore expect to see an increase over time in positive assortative matching, especially with regard to characteristics that predict investment in household public goods, particularly children. The observed increase in assortative matching on education, for example, is consistent with this prediction.
Models of Marital Sorting: Preferences and Search Costs

Assortative matching patterns in the population based on characteristics such as age and education likely reflect a preference by each of the spouses to maximize gains from marriage. Models of marital matching have focused on analyzing matching based on exactly one such characteristic and typically define marriage markets as broad and frictionless. In other words, they assume that all market participants have costless and full information about the conditions of the marriage market and all potential matches available to them. For instance, many studies have analyzed assortative matching patterns based on age (Choo and Siow 2006), income and education (Grossbard-Schechtman 1993; Pencavel 1998), fertility (Chiappori and Oreffice 2008), or other types of preferences such as risk aversion (Legros and Newman 2007; Chiappori and Reny 2016).

Despite the many advantages of these models and their ability to explain certain patterns of assortative matching, they are not able to accommodate important features of matching that are observed in real life (Chiappori, Oreffice, and Quintana-Domeque 2012). First, the assumption of a frictionless and large marriage market characterized by different types might not be realistic. Recent empirical evidence, for example, suggests that the ease of meeting a potential spouse at college or work plays an important role in determining one’s match (Kaufman, Messner, and Solis 2013; Mansour and McKinnish 2014b, 2016; Pestel 2016). Second, there is strong empirical evidence that spouses tend to be similar in a variety of characteristics such as age, religion, and appearance, suggesting that matching processes are not one-dimensional (Hitsch, Hortasçsu, and Ariely 2010; Chiappori et al. 2012).

The ability to consider the relative importance of different characteristics in the marriage market offers many advantages that allow researchers to address the limitations of more traditional matching models and to better understand the formation of different types of marriages. For example, previous research has noted that higher-weight women are more likely to marry lower-earning husbands and are less likely to be in a relationship (Averett and Korenman 1996; Averett, Sikora, and Argys 2008). Hamermesh and Biddle (1994) show a negative correlation between women’s physical attractiveness and their husbands’ education levels. These studies, however, rely exclusively on the weight and beauty measures as reported by women. As a result, the trade-offs they identify do not control for the men’s corresponding physical attributes. Chiappori et al. (2012) overcome these issues by using data from the Panel Study of Income Dynamics (PSID), where reports of body mass indexes (BMIs) are available for both wives and husbands. Their findings suggest that men are willing to trade one extra year of education for up to two BMI units. Similarly, women are willing to accept a husband with 1.3 additional BMI units for a 1 percent increase in wages.
It is also useful to consider the implications of multidimensional matching in the presence of market frictions. For example, one could study matching processes when there is a shortage in the supply of men/women of certain attributes. Chiappori, Oreffice, and Quintana-Domeque (2014) study these issues in the context of matching between smoking and nonsmoking spouses. The main feature of their model is that the share of smoking men in the population is greater than the share of smoking women. Nonsmoking women prefer to match with nonsmoking men, but due to the shortage in the supply of nonsmoking men, their model predicts that nonsmoking women will “marry down,” essentially accepting lower-educated nonsmoking men. The Chiappori et al. (2014) framework can be applied to other contexts in which individuals prefer to match within a certain category but face a shortage/surplus of prospective spouses within that category.

Another mechanism that could explain patterns of assortative matching is related to search costs—that is, the ease or difficulty of finding a spouse with a given attribute (Kalmijn 1998; Kalmijn and Flap 2001). Using data from an online dating site, Hitsch et al. (2010) estimate matching preferences to predict stable matches under the assumption of frictionless search. Although the assortative matching they generate is similar to patterns observed in the broader marriage market, they underpredict sorting by education and race/ethnicity, suggesting that meeting opportunities at school or work play an important role in marital formation. Belot and Francesconi (2013) use data from a speed-dating service in Britain to show that both men and women choose dating partners along an assortment of assortative traits, such as age and weight. Importantly, the nature of the speed-dating data allows them to analyze the impact of changing the set of potential dating partners on dating choices and conclude that meeting opportunities play a significant role in the observed matches. Using data from an online dating site in Korea, Lee (2009) finds that matches generated online exhibit less marital sorting by hometown or industry compared to the whole population, again indicating that search costs play an important role in the matching process.

In addition to evidence from online dating sites, a growing literature has documented the role of schools and workplaces as local marriage markets. For instance, McKinnish (2007) and Svarer (2007) found that individuals in sex-integrated workplaces have higher divorce rates, suggesting that individuals in marginal marriages face lower search costs in workplaces with many prospective mates of the opposite sex. Kaufman et al. (2013) use a regression discontinuity design and show that attending an elite college is associated with better-quality spouses for both men and women. Interestingly, they found the results to be more pronounced for men in fields with many women. Mansour and McKinnish (2014b) found that spouses with a large age difference are, on average, lower quality as measured by a host of characteristics, such as ability (as measured by the Armed Forces Qualification Test scores), education, and physical appearance. They provide evidence that low-quality individuals have age-diverse networks that facilitate marriages where the age gap between spouses is large. In contrast, high-skilled individuals have more homogenous age networks, especially during the part of the lifecycle in which marriages are likely to form.
The implications of the search cost mechanism suggest that early life choices such as the decision to go to school, what field to choose, and where to work can impact the matching process by changing the composition of people one interacts with most often, and not only through the marital surplus that such matches can generate. As a result, residential segregation, access to schooling, and job availability can directly impact marital formation. The increasing importance of such factors highlights the necessity to understand the relative significance of preferences and search cost mechanisms in the process of marital formation.

Mansour and McKinnish (2016) attempt to disentangle the relative importance of preferences and search costs by observing that married individuals are more likely to marry spouses who share their occupation, even if the share of perspective mates in one’s occupation is likely only a small fraction of the total number of available mates. Same-occupation matches could be more desirable if individuals have a preference to marry an individual who shares their occupation or if it is simply easier to find a spouse within one’s occupation. Their empirical framework relies on the insights developed in Chiappori et al. (2014). If these matching patterns are generated because of a preference to marry similar-occupation spouses, then women should “marry down” in occupations where men are in short supply. Their findings, however, suggest the opposite, that women marry lower-quality husbands in occupations containing many men. This result is consistent with a model in which women are willing to trade off husbands’ quality to avoid the search costs in the outside-occupation marriage market. They also show that these patterns are stronger in occupations that facilitate worker-to-worker interactions.

**Sorting Based on Age**

A well-documented feature of the marriage market is that individuals match assortatively based on age and that the most common pairing is one in which the husband is a few years older than the wife (Presser 1975; Glick and Lin 1986). This section first reviews the theoretical literature on martial age gaps and then discusses the empirical evidence.

Bergstrom and Bagnoli (1993) develop a model in which the delayed age of marriage for men, compared to women, and the resulting marital age gap, is explained by differences in household specialization between men and women. Central to their model is the assumption that men's value in the marriage market, meaning their earnings potential, is revealed at later ages than women's value in household production. All women marry young, because delays in marriage do not improve their productivity in home production and, therefore, their value on the marriage market. Higher-quality women (those with greater productivity in home production), however, marry higher-quality older men who have delayed marriage to reveal their high earnings potential. Lower-quality young women marry lower-quality young men, who do not bother to delay marriage because their earnings potential does not improve over time. In this
model, both men and women in differently aged couples are higher quality than men and women in similarly aged couples.

Siow (1998) also develops a model that has the theoretical prediction that older men who marry younger women are financially successful. His model, like Bergstrom and Bagnoli’s (1993), also has the feature that all women marry young (generated by declining fecundity). Young men all have the same wage, but some exogenously experience labor market success and have high wages as older men. Never-married and divorced old men are only able to marry or remarry young women if they are high wage.

Coles and Francesconi (2011) generate a similar prediction by assuming that both men and women receive utility from their partner’s “fitness,” which decays with age. Their model assumes that all workers earn low wages early in the lifecycle, but a fraction of workers receive high wages later in the lifecycle. If both men and women have similar probabilities of experiencing labor market success and receiving high wages at older ages, then we will observe both men and women who have experienced labor market success partnered with younger, fitter, but financially unsuccessful spouses.

While the previously discussed papers assume earnings differences across the lifecycle to generate pairings between older and younger spouses, Diaz-Gimenez and Giolito (2013) use only the fact that fecundity declines more rapidly for women than men over the lifecycle. Simply using these differences in fecundity, their theoretical model replicates key features of the US marriage market in terms of gender differences in age at marriage and marital age gap.

Studying changes in the age difference between spouses can contribute to our understanding of the changing gains from marriage and offer insights into matching mechanisms. Table 2.1 includes descriptive statistics on the distribution of age differences using data from the 1960–2000 US census. The sample includes couples in their first marriage, aged 25 to 60, and the age difference is defined as the man’s age minus the woman’s age. Using the full sample in panel A, the share of similarly aged spouses has increased over time. For example, the proportion of couples where the man is no more than one year older or one year younger than his wife increased from about 29 percent in 1960 to about 34 percent in 2000. This increase seems to be driven by women with a college degree (defined as having four or more years of college education), whose share among married women increased from 6.2 percent in 1960 to 27.3 percent in 2000. For married women with a college degree, the share of couples with a similarly aged spouse (marital age gap of one year or less) increased from 36 percent in 1960 to about 40 percent in 2000 (panel B). A more modest increase in the share of similarly aged spouses appears to have occurred for women without a college degree, but the overall patterns still suggest that couples are becoming increasingly similar in age over this time period, with a peak observed in the 1990 census.

In contrast, the share of men who are five to seven years older than their wives decreased by about 4 percentage points over this time period. This decrease occurs for both women with and women without a college degree. Table 2.1 also shows that the share of women who are older than their husbands has increased over time, with the biggest increase concentrated among couples where the wife is two to four years older.
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<td>–2 to –4</td>
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<td>–5 to –7</td>
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<td>1.93</td>
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<td></td>
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</table>

Age difference is man's age minus woman's age.

Data is drawn from the 1960–2000 Integrated Public Use Microdata Series (IPUMS). Samples include couples aged 25 to 60 who are in their first marriage.
than her husband. This likely reflects the increase in the age at first marriage for women, but despite popular perceptions about older women marrying younger husbands, it is still relatively uncommon for women to be older than their husbands.

As we discussed, while theoretical models in economics generally predict that couples with a larger age gap should be positively selected on characteristics such as education and wage, recent empirical evidence suggests otherwise. Mansour and McKinnish (2014b) find that differently aged couples tend to be negatively selected. In National Longitudinal Survey of Youth 1979 cohort (NLSY79) data, men and women married to differently aged spouses have lower cognitive skills scores compared to those with similarly aged spouses. In US Decennial Census data, men and women with differently aged spouses have lower educational attainment and, conditional on educational attainment, work in lower-wage occupations and have lower annual earnings. Finally, Mansour and McKinnish (2014b) also analyze the National Longitudinal Study of Adolescent Health (Add Health) and find that men and women with differently aged spouses received lower ratings of physical appearance in high school.

Coles and Francesconi (2011) find that women who are older than their husbands are more likely to be economically successful than their husbands. Bloemen and Stancanelli (2015) find that married couples in which the husband is older by five or more years or the wife is older by five or more years are both more likely to be “wife sole provider” couples than similarly aged couples. The results in Mansour and McKinnish (2014b) suggest that these previous findings reflect the fact that men with differently aged spouses on average have much lower earnings outcomes.

Much of the theoretical literature assumes that, conditional on income, individuals receive higher utility from younger, more fecund or more attractive, partners. Other research suggests that individuals might receive utility from similarly aged spouses. For example, Choo and Siow (2006) develop and estimate a structural model of the marriage market. They estimate systematic net gains to marriage based on age of husband and wife, and find that women maximize their net gain with slightly older husbands and men maximize their net gain with slightly younger wives. They also find that the distribution of net gains by partner’s age becomes more dispersed as an individual ages. These gains are inferred from the observed matching rates. In other words, because the most common pairing is one in which the husband is slightly older than the wife, the model attributes the greatest net gains to such a match.

Analysis of online and speed-dating contexts indicates that both men and women prefer to contact similarly aged prospective mates (Belot and Francesconi 2013; Hitsch et al. 2010). To the extent that joint consumption and similarity in preferences are increasingly important sources of gains from marriage, this would seem to make similarly aged pairings more attractive. Spouses who are at similar points in their lifecycle are more likely to agree on joint choices such as location, housing, children, and leisure activities. In fact, there is evidence that the age difference between spouses is negatively related to marital stability and life satisfaction (Cherlin 1977; Lillard, Brien, and Waite 1995; Lee and McKinnish 2016).
For instance, Lee and McKinnish (2016) analyze whether married individuals are more satisfied with similarly aged spouses or differently aged spouses using the 2001–2013 Household, Income, and Labor Dynamics in Australia (HILDA) data. They find that both men and women on average report greater satisfaction with younger spouses and less satisfaction with older spouses. For both men and women, marital satisfaction declines more rapidly over the duration of the marriage for those married to differently aged partners compared to those married to similarly aged partners. These steeper declines erase the initial higher levels of marital satisfaction experienced by men married to younger wives and women married to younger husbands.

**Sorting Based on Education**

One of the most studied dimensions of assortative mating has been the tendency for individuals with similar educational attainment, especially those with college degrees, to marry one another (Mare 1991; Kalmijn 1998; Schwartz and Mare 2005). In contrast to assortative mating based on ethnicity, race, or socioeconomic background, education is an acquired trait, a choice that an individual makes early in adulthood (Mare 1991). As such, educational attainment is influenced by a person’s background, the chances of labor market success, and the potential benefits from education in the marriage market. In turn, education influences spouse choice and quality, the source of gains from marriage, and other key elements such as family size and investments in children.

Patterns of educational assortative mating are especially pronounced at higher levels of education and have been increasing over time (Mare 1991; Blossfeld 2009). They also coincide with the rapid rise of female college enrollment relative to the enrollment of men, a dramatic change that women in many countries have experienced during the second half of the twentieth century (Goldin, Katz, and Kuziemko 2006). Thus, discussing the sources of the rise in educational assortative matching has to account for changes in women’s education and their increased role in the labor market relative to home production.

Generally, researchers have decomposed returns to schooling into labor market returns and nonpecuniary returns, which among them is the marriage market return (Goldin 1992; Oreopoulos and Salvanes 2011). The increase in the returns to schooling for women can be attributed, in part, to lower discrimination against women in the labor market, improvements in the technology of home production, and changes in the norms about the role of women in the household (Chiappori, Iyigun, and Weiss 2009; Albanesi and Olivetti 2009). Higher labor market returns to education enable college-educated women to increase the possibility of higher household income by marrying similarly educated men, while also changing their relative bargaining power within the marriage and improving their outside options (Lundberg and Pollak 1993; Iyigun and Walsh 2007).
Marriage market conditions also contribute to the degree of educational assortative mating and to the premarital decisions to invest in schooling. One important determinant of the degree of assortative mating is the ratio of men to women in the population, that is, the sex ratio. Theoretical models predict that a decrease in the sex ratio improves the outcomes of men in the marriage market and worsens those for women (Becker 1973; Bloch and Ryder 2000; Chiappori, Fortin, and Lacroix 2002). Empirically, Abramitzky, Delavande, and Vasconcelos (2011) analyze how male scarcity in post-World War II France impacted assortative matching and show that a decrease in the sex ratio allowed men to marry women from higher social class as measured by men’s occupations. Charles and Luoh (2010) study the impact of changes in the sex ratio due to the increase in the male incarceration rate in the United States. They find that a decrease in the availability of marriageable men decreases the likelihood of women to ever marry, and for those who do marry, they find an increase in the likelihood of matches where the woman is more educated than her spouse.

Interestingly, however, Charles and Luoh (2010) also found that women in marriage markets mostly affected by male incarceration have increased their schooling and labor supply in response to the decrease in the sex ratio. These patterns suggest that premarital investments in schooling are likely endogenous to marriage market conditions. Iyigun and Walsh (2007) and Chiappori et al. (2009) formalize this idea by introducing a marriage market in which the returns to schooling for women exceed those for men because of the higher marriage market return for women. They show that under such conditions, the share of educated women will exceed that of men, leading to a change in the marital surplus and the way it is divided. The excess supply of educated women implies that some educated women will marry uneducated husbands but that uneducated women marry only uneducated husbands.

Lafortune (2013) provides empirical evidence on the relationship between the sex ratio and premarital investments in schooling. Following Angrist (2002), she exploits the imbalance in the sex ratio faced by second-generation Americans in their state and ethnic group at the turn of the twentieth century. She finds that an increase in the share of men to women in a given state and ethnic group induces men to obtain more education. In contrast, females from ethnic groups that have high rates of intermarriage choose to acquire less formal schooling. These results suggest that marriage market conditions have a long-run effect impacting not only the likelihood of marriages and matching but also investments in schooling.

The increase in the educational attainment of women in recent decades has also contributed to the rise of higher education as an important marriage market (Blossfeld 2009). In most countries, individuals attend college around the same age when they are searching for a mate, creating peer groups that are homogenous in both age and expected educational attainment (Blossfeld and Timm 2003). As a result, interactions in college, through networks of friends, or in posteducation employment settings increase the chances of meeting a spouse with a similar educational background and contributes directly to the formation of homogamous marriages where both spouses share many
attributes such as age and educational attainment (Blossfeld and Timm 2003; Mansour and McKinnish 2016).

Although sociologists have pointed out the importance of educational systems as marriage markets, this mechanism has received less attention from economists, despite some recent evidence on the relationship between attending elite universities and the choice of field of study on a person’s marital outcomes (Kaufman et al. 2013; Pestel 2016). For example, Kaufman et al. (2013) use a regression discontinuity design to study the effects of attending an elite university in Chile on marriage outcomes. They find that women who were just above the admission cutoff to attend a higher-ranked university marry higher-quality men compared to similar women who happen to be just below the admission cutoff and who had to attend a slightly lower-ranked college. Pestel (2016) takes advantage of the variation in sex ratios within fields of study and over time and finds that women in fields where men are scarce marry lower-quality husbands. Similarly, he finds that in fields where men are in excess supply, they are more likely to “marry down” compared to fields where men are scarce. Mansour and McKinnish (2016) present empirical evidence that much of the observed spousal matching based on field of study among college graduates is driven by the lower search costs of meeting potential partners in your own field of study, rather than preferences for partners from the same field of study.

**Sorting Based on Race and Ethnicity**

In addition to sorting based on characteristics such as education and age, individuals disproportionately marry within racial/ethnic category. This pattern of racial/ethnic sorting, or endogamous marriage, can be generated by preferences for racial/ethnic similarity with a spouse. Spouses from the same ethnic background may, for example, have more similar preferences for joint consumption of cultural and/or religious practices, particularly with regard to raising and investing in children. Marital sorting along racial/ethnic lines can also be generated if there are “taboos” or perceived social costs of marrying an individual from an ethnic category with lower average social economic status, even conditional on the individual's own productive characteristics. In this case, the individual from the category that generates these costs would have to compensate a spouse who engages in intermarriage. Under these circumstances, as long as there are similar-quality prospective mates from their own racial/ethnic category who would not require such compensation, intermarriage will be rare. Additionally, such sorting could result from differences in meeting opportunities if individuals are more likely to live, work, go to school, and attend places of worship where they meet a disproportionate number of prospective mates from their own racial/ethnic group.

Furtado and Theodoropolous (2011) analyze the relationship between ethnic and educational similarities and find that individuals with higher levels of schooling are
more likely to match across ethnicities. The authors interpret this schooling effect as evidence that education facilitates the ability to adapt to different customs, as well as the communication and negotiation skills to navigate differences between spouses in cultural backgrounds and expectations. They also find that for native-born individuals and immigrants who arrived at young ages, higher education increases the odds of endogamous matching for those who belong to a high-education ethnicity, but not for those who belong to a low-education ethnicity. They argue that this suggests that while immigrants who arrive as teenagers have a preference for matching based on ethnicity, native-born and early-arriving immigrants are more concerned with matching based on education. Finally, they find no evidence that education affects intermarriage of Asians, which indicates strong preferences for endogamy in this group.

Qian (1997) also finds evidence of strong preferences for endogamous matching among Asians. While Asian Americans have a high rate of intermarriage, this is largely due to the fact that they are a relatively small fraction of the population, so that only a small fraction of their prospective partners in the marriage market are also Asian. Once group size is taken into account, Asians are more endogamous than whites or Hispanics, but less endogamous than African Americans. There is also evidence that Asian women who marry white husbands “marry up” in the husband’s education compared to Asian women who marry Asian husbands.

Wong (2003) investigates the low rate of intermarriage between black men and white women by estimating a structural model that allows for a “mating taboo.” She finds that the taboo, or preferences, explains the majority of the shortfall in this form of intermarriage. Gullickson (2006) shows that higher-educated blacks are more likely to intermarry and that white women–black men pairings are more educationally hypergamous, meaning that wives in these pairings are disproportionately likely to be marrying up in terms of the spouse’s educational attainment. These results are consistent with a social cost to intermarriage that must be compensated for the white spouse. Also consistent with this idea of compensation for intermarriage are the findings from Grossbard, Gimenez-Nadal, and Molina (2014) on household work and intermarriage. Using the American Time Use Survey for 2003–2009, they find that both white men and women on average perform less household work when married to a black spouse compared to those married to white spouses. Similarly, they find that black men and women on average perform more household work when married to a white spouse than when married to black spouses.

Angrist (2002) studies marriage among second-generation immigrants in the United States using US census data from 1910 to 1940. During this period, rates of endogamous matches among native-born children of immigrants were still quite high. Focusing on ten ethnic groups (e.g., Italian, Irish, British, Russian/Polish, Mexican), he makes use of the fact that within some ethnic groups, the sex ratio (number of men to women) is much more favorable for women wanting an endogamous match than others. He finds that second-generation women had higher marriage rates, obtained higher-quality husbands, and had lower levels of labor supply when the within-ethnicity sex ratio was more favorable.
Most of the papers on ethnic and racial intermarriage focus on the role of preferences in generating marital sorting by ethnicity, but it is likely that meeting opportunities also play a role. For example, the higher rates of intermarriage for more highly educated black and Hispanic individuals documented by Furtado and Theodoropolous (2011) could in part reflect the fact that more blacks and Hispanics with high education attainment search for partners in more integrated school and work environments. An intriguing piece of suggestive evidence on the role of meeting opportunities and intermarriage is found among those with military service. Fryer (2007) discusses the fact that while intermarriage rates were similar among veterans and nonveterans up until 1960, since then intermarriage rates have increased faster for white veterans than white nonveterans. It is not possible from the raw statistics to distinguish between competing explanations of selection into the armed forces of individuals more prone to intermarriage, an effect of military service on preferences for intermarriage, or whether military service facilitates marital search in a more racially and ethnically heterogeneous pool of potential spouses. Fryer does point out that the rise in intermarriage among veterans corresponds to the timing of integration of the armed forces.

**Inequality, Age of Marriage, and Marital Sorting**

Marriage market researchers have pointed out potential interactions between marital sorting and income inequality (Schwartz 2013; Autor 2014). Increased income inequality can generate a greater degree of sorting based on socioeconomic status. If, for example, returns to education increase, so that differences in average income across education groups also increase, then it becomes more costly for a high-education individual to marry a spouse with low educational attainment (Fernández, Guner, and Knowles 2005; Schwartz 2013). The costs to “marrying down” in education are even greater if the increased income inequality is accompanied by increased residential sorting and growing disparities across neighborhoods in school quality. This suggests that as economic inequality increases, we should see increased positive assortative matching based on education.

Fernández et al. (2005) analyze household-level surveys from thirty-four countries using data from the Luxembourg Income Study (LIS) and the Inter-American Development Bank (IDB). They find a significant positive relationship between returns to education and marital sorting based on education. Carbone and Cahn (2014) argue that growing earnings inequality combined with growing gender equality explains the observed rise in positive assortative matching in the United States that started in the 1970s. Cornelson and Siow (2016) point out that Carbone and Cahn (2014) only use stylized facts and qualitative evidence to support their argument, and that while the correlation between returns to education and marital sorting has been documented, no one
had previously assessed how much of the increased positive assortative matching could be explained by increased inequality. Cornelson and Siow (2016) therefore empirically evaluate the Carbone and Cahn claim using state-level data from the decennial censuses and American Community Surveys (ACSs) for the years 1970–2012. They find that while there is a positive relationship between wage inequality and sorting based on education, the relationship is not strong enough to explain much of the observed changes in marital sorting during this time period.

It is also the case that increased marital sorting can exacerbate income inequality. If high-earning men marry high-earning women and low-earning men marry low-earning women, this will magnify individual-level earnings inequality, resulting in higher overall household-level income inequality. The effect of sorting by education on income inequality will be diminished to the extent that women’s labor force participation is low or responds negatively to husbands’ earnings. Greenwood et al. (2014) use census data from 1960 and 2005 to calculate how much the increase in positive assortative matching contributed to the concurrent rise in household income inequality. They find that imposing random matching in the 2005 data only has a modest effect on the calculated Gini coefficient. The rise in single-person households, due to a decline in marriage and rise in divorce, is a much more important explanation for the rise in household-level inequality during this period.

Goldin and Katz (2002) investigate how the increased availability of oral contraceptives to college-aged women in the 1960s and 1970s changed their marriage and career investment behavior. Their model predicts that by lowering the cost of marital delay, high-ability women will delay marriage and invest in human capital and careers. This allows them to realize their full potential in the labor market, making them more attractive to high-ability men. The Goldin and Katz model therefore predicts that changes in conditions that encourage women to delay marriage will also lead to greater assortative matching. Carbone and Cahn (2014) argue that the increase in educational attainment of women allowed high-education women to differentiate themselves on the marriage market from low-education women, encouraging positive assortative matching. The result, they argue, is that low-education women are then left behind with only low-education men available as marriage partners, who themselves were experiencing declining labor market outcomes.

Loughran (2002) argues that higher male wage inequality increases the returns to marital search, and therefore should generate delays in marriage for women. Using data on 124 Standard Metropolitan Statistical Areas (SMSAs) from the 1970, 1980, and 1990 US census data, he finds that rising wage inequality explains 7 to 18 percent of the decline in marriage rates for white women aged 22 to 30. He does not predict or test for changes in assortative matching. Similarly, Gould and Paserman (2003) find that women living in cities with high income inequality spend more time searching for a husband. According to their estimates, rising income inequality explains about 25 percent of the decline in marriage rates in the past few decades.

While models such as Goldin and Katz (2002) predict that marital delay will increase assortative matching, it is not the case empirically that later age of marriage predicts
more homogamous matching. This is because the marriage pool changes as an individual ages. To illustrate this with a simple example, suppose that 35 percent of men and 40 percent of women in their mid-20s are college graduates. Assume that there is very strong assortative matching so that almost all of the college-educated men marry college-educated women. It is easy to see that the college-educated women who did not marry sufficiently early in the lifecycle will end up eventually with a marriage market in which unmarried college-educated women substantially outnumber the remaining unmarried college-educated men. Those women who have delayed marriage will increasingly have to marry down in the spouse's education to match with a spouse, but the same is not true for men. Akin and Platt (2016) develop and calibrate a model that documents that spousal quality (as measured by educational attainment) declines more rapidly with age at marriage for women than men. Results from their calibration of a nonstationary sequential search model indicate that, as women age, they drop their reservation value for spouse quality more rapidly than men due to the dwindling pool of educated men and oversupply of educated women.

Conclusion

Changes in the gains from marriage and the ways in which people meet prospective spouses are likely to change the degree of marital sorting. Whether these changes will decrease or increase the degree of assortative mating based on characteristics such as age, education, or race/ethnicity depends on the relative importance of preferences versus search costs.

For instance, if current assortative matching based on age and race is due, in part, to the homogenous composition of search pools, then the rise of Internet dating should reduce the cost of searching in more diverse pools. In such a case, the likelihood of interacting with prospective partners with diverse demographic characteristics will lead to a decrease in the degree of sorting based on attributes such as education, age, and race, potentially reducing household-level inequality.

On the other hand, lower search costs can increase sorting based on dimensions about which individuals have strong preferences, but for which sorting is limited by thin markets. For example, if some individuals have a strong preference to match with someone who shares their religion or ethnicity, then online dating may increase sorting based on these characteristics. The extent of the increase in sorting in this scenario will be larger for individuals from small religious or ethnic groups who face thin marriage markets. It is also important to note that the interaction between lower search costs, thin markets, and preferences could have bigger impacts at the tail of the distribution of a given characteristic. For instance, lower search costs would allow the very most physically attractive individuals to find individuals who are similar to them in attractiveness, leading to an increase in sorting based on beauty at the tail of the distribution.
Disentangling the importance of preferences and search costs will crucially depend on the development of new theoretical models that can accommodate the possibility of heterogeneous search costs in addition to frictions such as the sex ratio. Such models, combined with the availability of new data sets on how individuals meet their spouses, are guaranteed to improve our understanding on how modern marriages form and on their wider impacts on society.

Notes

1. A match is defined as stable if it is not possible to find a man and a woman who are willing to abandon their current partners and match with each other (Hitsch et al. 2010).
2. Hoffman and Averett (2016) report that in 1970, the share of college graduates among US men and women ages 25 to 34 was 19.7 percent and 12 percent, respectively. By 2014, the share of female college graduates in the same age group has increased to 39 percent, while the share of male college graduates has increased to 31.6 percent.

References


CHAPTER 3

MARRIAGE AND MARRIAGE MARKETS

SHOSHANA GROSSBARD

This chapter reviews models of marriage that can be used to explain outcomes such as marriage formation, the intramarriage distribution of consumption goods, labor supply, savings, type of relationship (e.g., cohabitation vs. marriage), and divorce. The idea that economists have something to contribute to the study of marriage formation and its impact on economic outcomes was first advanced by Gary Becker (1973, 1981). Becker used rational choice theory and models that had been applied in more conventional economics applications (i.e., market based) to understand individual marriage decisions. In his approach, rational decision-makers are motivated by gains from marriage, especially the benefits of specialization and exchange between spouses. Other possible gains from marriage include opportunities to consume jointly and the ability to capture returns to scale.

In these models, the sex ratio is one of the important factors that affects marriage market outcomes, consumption and savings, human capital, and labor market outcomes. Although there is a biological basis for the sex composition of a population, sex ratio differences may occur for many other reasons, including war casualties, immigration that varies by gender, differences in mortality or incarceration, and parental preferences for gender of children. Sex ratio differences in marriage markets can also arise even if the overall gender ratio is in balance if fertility rates are rising or falling and if women and men typically marry at different ages. Specific well-known examples of interest include male gender preference in China and India, sex ratio differences within the US African American population, gender imbalance in the United States by educational attainment, and the effect of the US baby boom and baby bust. It is important to understand the consequences of these substantial swings in sex ratios.
I begin by reviewing Becker’s (1981) supply and demand model and then discuss extensions of this model that incorporate work in household production in which spouses may have conflict about allocations (Grossbard 1976). The next section of the chapter discusses challenges in identifying exogenous variation in sex ratios and summarizes empirical evidence on their impact on labor supply, consumption, savings, and other outcomes. A conclusion follows.

A Simple Becker-Style Model of the Marriage Market

In the Treatise on the Family, Becker uses the phrase “marriage market” metaphorically: it signifies that “the mating of human populations is highly systematic and structured” (Becker 1981, 39). Nevertheless, Becker presents two marriage market models that use the market concept in a more literal sense and that are reminiscent of other applications of market analysis. Both models result in a market equilibrium with an equilibrium marriage rate (the quantity axis) and an equilibrium division of marital output (the price axis). The first model assumes that there is only one type of man and one type of woman. The second Marshallian market equilibrium model has multiple types of men and women participating in separate, but interrelated, marriage markets.

In this latter model, multiple marriage markets are composed of homogeneous women and homogeneous men with an equilibrium price and quantity in each market. Equilibrium depends on the number of participating men and women and on substitutability between various types of potential spouses across markets. Figure 3.1 models a market for a particular type of man $M_i$ and a particular type of woman $F_j$. Following Becker, this represents the market for husbands, as men are on the supply side and women on the demand side; the roles could be reversed with no change in results. It is assumed that together, a $(M_i, F_j)$ couple can produce marital output $Z_{ij}$. This output is then divided into a portion that goes to the man ($m_{ij}$) and another that goes to the woman ($f_{ij}$), with $Z_{ij} = m_{ij} + f_{ij}$. The vertical axis shows $m_{ij}$, men’s share of the marital output. If men are single, their output is $Z_{i0}$, and if women are single, their output is $Z_{0j}$. Women’s demand for husbands is downward sloping: the more output women $F_j$ share with men $M_i$ (i.e., the higher the “price” of this type of husband), the less women are interested in marrying them rather than remaining single or marrying a man of a substitute type. The most a woman of this type is willing to “pay” for creating a joint household with this type of man is the output they can produce together ($Z_{ij}$) minus what she could produce had she remained single ($Z_{0j}$). The more that women are willing to substitute between this kind of man and the other $(I-1)$ types of men, the more elastic their demand for men $M_i$.

Men’s supply is upward sloping because the larger the share of marital output they get from this type of woman, the more men $M_i$ are likely to switch from being single or
marrying other types of women to marrying women of type $F_j$. Men's supply starts at $Z_{i0}$, their output if they remain single. All individual demands and supplies for these two types are aggregated at the marriage market level, and an equilibrium male share of marital output ($m_{ij}$) is obtained at the intersection of demand and supply, namely, point $e_0$. Given that $Z_{ij} = m_{ij} + f_{ij}$, this equilibrium also implies the equilibrium price of women $f_{ij}$. At that equilibrium point, both men $M_i$ and women $F_j$ are more satisfied being with each other than being in a couple with a substitute of type $k$.

Factors affecting marriage market conditions—including sex ratios—influence the division of marital output and income and each spouse’s access to consumer goods. Because changing sex ratios are reflected in shifts in the market demand or supply of potential mates, they impact the distribution of marital output between the spouses. The more men there are relative to women (i.e., the higher the sex ratio), the more competition there will be among men and the higher will be women’s share of marital output. A higher sex ratio is illustrated in Figure 3.1, by the shift from $S_0$ to $S_1$, representing an increase in the number of men in the marriage market. Men’s equilibrium share of marital output decreases from $e_0$ to $e_1$, and the share of marital output obtained by women increases accordingly. The opposite occurs when there is an increased number of women, represented here by an increase in the demand; in that case, women’s share of marital output will go down and men’s will increase.

In the model with different types of men and women who are either substitutes or complements, changes in the sex ratio in one marriage market can also affect prices and access to marital output in other marriage markets. A higher aggregate sex ratio in the economy does not necessarily translate into a higher sex ratio in each $(M_i, F_j)$ marriage market. For example, there may be an oversupply of men at the national level, but not in a particular submarket (e.g., the college-educated or by race, religion, or ethnicity).

![Figure 3.1](image)

**Figure 3.1** A Becker-style model of the marriage market.
Shoshana Grossbard

More generally, anything that shifts the supply or demand curve will affect marriage market equilibrium. For example, an improvement in women’s nonmarriage alternatives, due to either better labor market opportunities or more-accepting social views of single women, would shift their demand curve for husbands down (i.e., a decrease in the number of women willing to marry at any value of $f_{ij}$). This would decrease the proportion of men and women married and, more important, result in a transfer of some marital output from husbands to wives. This seems broadly consistent with recent demographic trends of a falling proportion of men and women married at a point in time and toward marriages that are more egalitarian. Another example is the rising acceptance of sexual activity outside of marriage, which plausibly improves outside options for both men and women. This would cause both supply and demand to decrease, thus providing a further impetus to falling proportions married; because both curves shift, the impact on the distribution of marital output is uncertain. See Hoffman and Averett (2016) for a further discussion of these issues.

**Sex Ratios, Marriage Markets, and Work in Household**

Grossbard (1976) modified Becker’s marriage model framework by recognizing the possibility of in-marriage conflict regarding who does the household production and how individuals who work at household production are compensated. While this model contains many of the same elements as Becker’s marriage market model, it models the wife and husband as separate agents making decisions regarding both production and consumption. The model incorporates elements from labor and personnel economics, where firms and workers are typically considered as separate agents—before, during, and after employment. Even when there is a match between a worker and a firm and employment occurs, their diverging interests regarding the level of effort and compensation may lead to conflict. Firms are often concerned about low worker productivity due to principal-agent problems.

Similarly, in Grossbard (1976), spouses are separate agents who may have conflicting interests regarding household production, for example, the production of food and children. Consider a husband who prefers to delegate childrearing responsibilities to his wife and thinks his child needs more time with her mother than the wife is willing to spend. This creates a principal-agent problem. In the example given here, the husband is the principal who has “hired” his wife as his agent in childrearing (this, of course, is only an example—the roles are completely reversible in principle, if not in practice). In marriage, husbands and wives may also have conflicts regarding any jointly consumed household-produced output, including happiness from joint children. The individual spouses may typically prefer to obtain more and/or better-quality marital output, but may be unwilling to devote their own resources and efforts to the production process.
Furthermore, production-related conflicts may occur regarding marital output that only benefits one spouse but that is produced by the other.

To facilitate the application of labor market analysis to marital firms, Grossbard (1976) and Grossbard-Shechtman (1984) defined the concept of work in household (WIHO), which is a service that is of benefit to one spouse (e.g., the wife) but involves an opportunity cost on the part of the spouse supplying the service (e.g., the husband). Demand for WIHO is similar to the demand for labor and is downward sloping. The more productive the WIHO worker and the more valuable the product of WIHO to the (potential) beneficiary, the higher the demand. Supply of WIHO is similar to the supply of other types of labor: it is upward sloping and shifts as a function of the characteristics of both worker and “job” (in this case characteristics of the spouse or potential spouse). Multiple markets for various types of WIHO workers differentiated by education, ethnicity, age, and so forth set WIHO prices within marriage based on demand and supply.

Representative markets for the WIHO of men and women of a particular type are presented in Figure 3.2. In each market, there is a market demand and a market supply, which are derived from individual supply and demand curves. Assuming heterosexual marriage, men are represented by the demand curve in the market for WIHO performed by women (f), and women are represented by the demand curve in the market for WIHO performed by men. Each demand is a downward-sloping function of \( Y \), the quasi-wage per unit of WIHO. This wage measures how much a potential or actual spouse is willing to compensate a person for work that benefits him or her. Each WIHO supply curve is upward sloping, because people are willing to produce more if they are paid more and because men can choose between different types of women and women can choose between different types of men. In equilibrium, the intersection of market D and S yields the equilibrium compensation, \( Y_m \) and \( Y_f \), for WIHO received by a husband of type m or a wife of type f. These WIHO prices are reflected in the allocation of marital output.

\[ Y_f \]
\[ D \]
\[ D_1 \]
\[ S \]
\[ WIHO_f \]

\[ Y_m \]
\[ D \]
\[ S \]
\[ S_1 \]

\[ WIHO_m \]

**Figure 3.2** Markets for work in household (WIHO) supplied by woman of type F and men of type M.
These prices, similar to equilibrium wages in labor markets, guide coordination and sorting, help resolve conflicts of interest, and thus contribute to cooperation and productivity in the household. For example, the conflict between men who want more mothering for their children than women choose to supply may be resolved by a transfer of marital income and/or consumption from fathers to mothers. Thus, fathers are “paying” mothers to do more household production than they had originally intended and women are compensated for increasing household production time.

Allocative efficiency is reached if quantity demanded equals quantity supplied at the market price. This holds for both labor markets and marriage markets, now defined as markets for WIHO. Contracts between workers and employers can help resolve principal–agent problems in labor markets. Similarly, in marriage markets, contracts between spouses can resolve possible conflicts regarding compensation for work in household production benefiting the spouse (WIHO). Marriage institutions regulate (often informal) labor contracts between spouses in a manner similar to how employment institutions regulate labor contracts between workers and employers (see Grossbard-Shechtman and Lemennicier 1999), except that both quantities of labor (WIHO) and prices are more difficult to observe and measure in the case of marriage markets. Another difference between commercial firms and marriage firms is that when it comes to conventional firms, the distinction between the worker and the firm is clear, but in “marriage firms” that is not always clear: both spouses can possibly hire each other as household production workers.

An important prediction developed in Grossbard-Shechtman (1984) and Grossbard (2015) is that sex ratios will also affect individual labor supply outside the home through their effect on the price of WIHO. A higher sex ratio is represented in Figure 3.2 by the shift of the demand curve to $D_1$ in panel A and the shift to $S_1$ in panel B. As a result, the WIHO price for women’s work increases, reflecting their relative scarcity and stronger bargaining position, while the WIHO price for men’s work declines. The increase in women’s WIHO price translates into a higher value for time spent in WIHO relative to the labor market and, as a result, leads to fewer hours of labor market work by wives. Conversely, if sex ratios are lower, female WIHO workers will be more likely to work outside the home.

Sex ratios may affect individual savings of men and women in different stages in the life cycle, for example, before, during, and after marriage (Grossbard 2015, chap. 11). Grossbard and Pereira (2010) integrate sex ratios into an overlapping-generations model with WIHO that assumes a traditional gender-based division of labor and in which WIHO workers are paid by their spouses for their work in household production. In this model, prior to marriage, young single men save to be able to afford to purchase women’s WIHO as priced in marriage markets. In contrast, young women who hope to marry don’t need to save as much as men, as they anticipate that after marriage they will not only earn their income from work in the labor force but also will get paid for their WIHO. After marriage, women may save to prepare themselves against the risk of losing that income, whereas married men may save less as a proportion of their income, relative to what they saved prior to marriage: they may have little personal disposable
income left after making intramarriage transfers to their wife. These gender differentials depend on the price of WIHO. The higher the intramarriage transfers from husband to wife, the more divorce is likely to bring both married men and married women toward saving at the rates that singles save, for they would anticipate the likelihood of re-entering markets for WIHO. The higher the price of women’s WIHO, due, for instance, to a higher sex ratio, the higher the savings rate among young single men (or their families) preparing for marriage, but the lower the savings rate among married men. In contrast, a higher sex ratio leading to higher pay for women’s WIHO is predicted to lead to lower savings among single women and higher savings among married women. The net effect of sex ratios on aggregate savings rates will depend on the relative size of these four effects on unmarried men and women and married men and women.

The inclusion of WIHO in marriage models also links changes in sex ratios to changes in marital status and family structure. Since higher sex ratios are associated with higher prices for female WIHO work, it follows that when sex ratios are higher, women are more likely to marry than remain single. If men and women differ in their preferences for divorce, sex ratios may also affect divorce rates: with higher sex ratios, women are more likely to get their divorce-related preferences fulfilled and men less so. In this context, sex ratios may also affect the likelihood that a woman is a single mother. Ekert-Jaffe and Grossbard (2008) show that there would be fewer single mothers where sex ratios are higher and, presumably, women are “paid” better for doing the WIHO of raising the child of her male partner.

Marriage markets for spouses with different characteristics exist side by side. The higher the demand for an individual with particular characteristics—for example, physical appearance, labor market success, race, religion, or ethnicity—the more that individual is likely to get his or her first choice of partner. In some cases, intermarriage with a partner from a higher-status group may be the preferred state, and the higher the price of the WIHO worker, the more that individual is likely to marry up (see Grossbard-Shechtman 1993).9

Similar models have been used to explain the impact of sex ratios on other outcomes for women. For example, low sex ratios would lead women to obtain more education: the more they expect to participate in the labor force, the more valuable additional education will be (Heer and Grossbard-Shechtman 1981). Lower sex ratios, which reduce the probability of marriage for women and/or result in low compensation for WIHO, may also lead women to have fewer children. This framework also predicts that where sex ratios are lower, it is more likely that polygyny (men marrying multiple women) will be allowed (Grossbard 1980).10 Otherwise, in societies where women have few options other than domestic production and reproduction, unmarried women or their relatives may put political pressure on those supporting the institution of compulsory monogamy, which makes it difficult for some women to have their own children.11

The greater the demand for WIHO workers with particular characteristics, the higher their price in marriage. In turn, this will affect all the outcomes discussed previously—education, labor supply, type of relationship, intermarriage, and so forth. Furthermore, characteristics of those who demand WIHO will also affect the price of WIHO in a
manner reminiscent of compensating differentials in labor markets. In the commercial sector, firms or industries with less desirable characteristics must pay more for the same workers relative to what employers in firms or industries with more desirable employers have to pay. Likewise, *ceteris paribus*, the less attractive the characteristics of those demanding WIHO, the more they must pay. To the extent that women are performing WIHO, then compensating differentials are what men with less desirable characteristics pay above what men with more desirable characteristics pay. For men, compensating differentials will be expressed in extra pay for their WIHO, when married to less desirable women. The idea of compensating differentials in marriage has many testable implications, including implications for labor supply, time spent doing WIHO, marriage versus cohabitation, ethnic intermarriage, and number of wives in a polygynous society.

Another testable prediction regarding women’s labor supply, still assuming that women do the WIHO, is that women who are young relative to their husbands are likely to work less in the labor force. This assumes that their youth is a highly valued trait and therefore these young women may receive a higher WIHO price than women older than their husbands (see Grossbard-Shechtman 1984). More generally, this prediction applies to individuals who are more attractive, are younger, are more educated, belong to race/ethnic/religious groups with higher status, or are otherwise viewed as “more desirable” (Grossbard 2015).

**Empirical Evidence on Sex Ratio Effects**

Marriage markets, characterized by sex ratios in the theoretical models described earlier, are hypothesized to impact the likelihood of marriage, the quality of a spouse, the allocation of resources and consumption within marriage, and a number of behavioral outcomes such as human capital accumulation, leisure, labor supply, saving, fertility, and even crime. Confirming the existence and measuring the magnitude of these effects require empirical investigation.

**Exogenous Variation in Sex Ratios**

Empirical analyses of the impact of sex ratios on marriage and other outcomes must address the issue of possible endogeneity of marriage market sex ratios. For example, it is difficult to determine whether the inverse association between the sex ratio and women’s labor supply in studies based on cross-city variation such as Grossbard-Shechtman and Neideffer (1997) or Chiappori, Fortin, and Lacroix (2002) is causal or whether it indicates that women migrated to cities with more job opportunities for women. The most reliable tests on how sex ratios affect a variety of outcomes are from
studies using natural experiments that generate exogenous variation in sex ratios, so that the causal effects can be more confidently identified. Sex ratios in a population can vary for many reasons: preference for sons in some cultures in conjunction with the development of new technologies to ascertain a fetus’s gender; differential mortality by gender, especially following war; differential immigration by gender; and differences by gender in incarceration.

Fluctuations in sex ratios resulting from sex-selective fertility are often catalyzed by policies restricting overall fertility. In China, the one-child policy was instituted in 1979 and, combined with a strong preference for sons, between 1988 and 2004 the sex ratio for young adults aged 16 to 25 rose from 1.02 to 1.06 (Edlund et al. 2013). Edlund et al. (2013) also compute city-level sex ratios for individuals aged 18 to 45, assuming a two-year spousal age gap. This sex ratio, based on only one census year and a wide range of ages, varied between 0.851 and 1.899, clearly indicating that gender-specific migration may play an important role in determining sex ratios by location.

Sex ratios also vary across ethnic, racial, and religious groups. For example, studies have compared sex ratios among blacks and whites in the United States (e.g., Wilson 1987; Brien 1997). Sex ratios are far more balanced for whites than blacks because of differential mortality and incarceration. However, when geographical variation in the sex ratio is used to explain outcomes such as marriage rates or intrahousehold allocation, there is always the possibility of spurious correlation due to endogenous migration or unobserved differences rather than causal mechanisms. To circumvent this problem, researchers have relied on natural experiments to identify exogenous variation in sex ratios. For example, Charles and Luoh (2010) used incarceration of men, and particularly African American men, as an exogenous determinant of sex ratios in marriage markets. Their study compares blacks and whites in various age groups in US counties to examine the impact of sex ratios on behavioral outcomes discussed later.

Gender imbalances in mortality can also have a dramatic impact on sex ratios and provide exogenous variation. Abramitzky, Delavande, and Vasconcelos (2011) examine differences in marriage matching for cohorts in France differentially affected by casualties from World War I. Other studies have examined variations in sex ratios in marriage markets defined by ethnicity. Relying on patterns of marriage endogamy (marriage within ethnic group) and differences in immigration flows from various countries, Angrist (2002) examines the impact of sex ratios on outcomes for second- or third-generation migrants to the United States.

Sex ratios in marriage markets may also vary by birth cohort, even if sex ratios at birth are balanced, when the number of births is trending either up or down. This imbalance arises because women typically marry men who are somewhat older than they are; in the United States, the difference in median age at first marriage was approximately 2.5 to 3.0 years from 1890 to 1970 and 1.5 to 2.0 years since then (US Census Bureau, 2016). For example, in the early 1950s in the United States, there were more marriage-age men than women because of declining births following the Great Depression in 1929. Conversely, in the mid-1960s, when the first baby boomers, born between 1944 and 1963, entered the marriage market, women were in oversupply. Heer and Grossbard-Shechtman (1981)
calculated that in the United States in 1956, the sex ratio was balanced. By 1965, however, there were eleven fewer men for every one hundred women aged 17 to 24, reflecting the increase in fertility in the mid-1930s.

Sex ratios from US Census data for five-year age groups, assuming a two-year age difference at marriage and measuring sex ratios at ages 20 to 24 or 25 to 29 for the period 1916–1980, varied from .87 for women born in 1946 to 1950 and men born in 1944–1948 (a period of increasing fertility) to 1.07 for women born in 1971–1975 and men born in 1969–1973 (a period of declining fertility) (Grossbard-Shechtman and Neuman 2003). These fluctuations, resulting from an almost constant spousal age gap and large fluctuations in number of births, are substantial, larger even than the sex ratio changes observed in China and India resulting from gender-specific abortions, infanticide, and adoptions abroad.

Sex Ratios, Consumption, and Bargaining Power

Becker’s marriage market model and related theories suggest that as women become scarcer in the marriage market relative to men, their bargaining power increases and they receive a larger share of the marital surplus. Chiappori et al. (2002) extend the bargaining power literature to expressly focus on the role played by sex ratios in increasing bargaining power as scarcity increases. In keeping with this model, economists have examined the effect of sex ratios on “assignable consumption”—in other words, examining whether women obtain a greater share of marital output when sex ratios are higher. Examples of such assignable consumption items are tobacco and alcohol, consumed primarily by men, and investments in children’s human capital, which women typically favor.

Two studies using Chinese data present evidence that the sex ratio affects outcomes linked to household bargaining power. Using both cohort-based and cross-sectional data from mainland China, Porter (2016) finds that when sex ratios are higher, men consume less tobacco and alcohol and high sex ratios improve the health of sons. More specifically, the recent imbalanced sex ratio of 120, relative to the usual average sex ratio of 107, was associated with a 56 percent reduction in men’s daily tobacco consumption and a 31 percent increase in boys’ short-term health. Edlund et al. (2013) show that when the sex ratio is higher, women have more authority in the household. They are more likely to participate in or make decisions about purchase of consumer durable goods and men spend more time in food preparation, washing clothes, and child care. The effects are modest in magnitude: a 10 percent increase in the sex ratio (half a standard deviation) reduces the gender gap in household chores by approximately 13 percent and decisions about the purchase of durables by about 10 percent.

The effect of sex ratios on leisure among spouses in Taiwan was recently tested by Chang, Connelly, and Ma (2016). They defined total work time as employment, commuting, and housework and compared three cohorts using cross-sectional data. As a reflection of increased bargaining power, the higher the sex ratio, the more leisure
time women had and the higher husbands’ share in total work time. More specifically, if the sex ratio increased by one standard deviation (0.1), the husbands’ share in total work time increased by 0.0058, which is about 1 percent of the average total work time share. Similar effects are obtained if shopping and studying are reclassified as work, although the magnitudes of the effects are somewhat smaller, and the precision of the leisure share results is reduced for both husbands and wives. In addition, college-educated men in Taiwan were found to have experienced an even larger sex ratio effect and do a substantially higher share of the total work within the couple than less educated men when faced with the same county-level sex ratio. This finding suggests that the sex ratio is more binding in thinner markets or for populations not working near the physical maximum of work hours.

**Sex Ratios and Savings**

The impact of sex ratios on savings has been tested by Wei and Zhang (2011), who investigated recent changes in China's household savings as a function of China's increasingly high sex ratio. The sex ratio at birth in China climbed from 1.06 in 1980 to 1.27 in 2007, implying that men outnumber women at age 25 or below by at least thirty million. They found that increases in sex ratios account for about half of the observed increase in Chinese household savings in recent years, as men compete for wives by saving to improve their position in the marriage market. Much of this savings takes the form of investment in real estate and financial investments. Horioka and Terada-Hagiwara (2017) estimated how household savings varied with sex ratios in India and Korea using time-series data for 1975–2010. They found that the sex ratio (unadjusted for differentials in age at marriage) had a negative impact on savings in India, where the bride's family tends to pay substantial dowries to the groom's family at marriage. In Korea, where, as in China, the groom's family has to bear a disproportionate share of marriage-related expenses including purchasing housing for the newlywed couple, the sex ratio had a positive impact on saving.

Du and Wei (2013) provided cross-country macro evidence based on data for 159 countries from 1990 to 2010. They found that the more sex ratios diverge from one, either positively or negatively, the higher the savings rates. Both Wei and Zhang (2011) and Du and Wei (2013) interpret their findings as evidence of a competitive savings motive: when there is an excess number of men in the marriage market, young men (or their parents) will compete more to find a wife and therefore save more.

**Sex Ratios and Labor Supply**

From 1960 to 1975, the labor force participation rates of US married women aged 20 to 24 rose dramatically from 31.7 to 57.0 percent. This increase coincided with the entry of the first baby-boom women, who were born shortly after World War II, into
marriage and labor markets. This increase is consistent with marriage market analysis. The baby-boom women participated in marriage markets with low sex ratios for women compared to men a few years older (thirteen fewer men for every one hundred women for the five-year cohort born after World War II), and these low sex ratios may have pushed married women into the labor force. Later baby boomers, who entered labor and marriage markets in the late 1970s and early 1980s, had more balanced sex ratios, reflecting the decline in births after 1960. This coincided with the end of the big surge in young women’s employment. Using data for 1965–1990 and controlling for other factors that changed over time, Grossbard-Shechtman and Granger (1998) showed that early baby-boom women experienced more rapid growth in labor supply than women born earlier or later. This was precisely the cohort with the lowest sex ratio.

A number of studies use variation in the sex ratio in marriage markets to examine the relationship between sex ratios and women’s labor force participation or labor supply. Using data from married male and female respondents in the Panel Study of Income Dynamics combined with age- and race-specific sex ratios from the census, Chiappori et al. (2002) estimate the impact of changing state-level sex ratios on hours worked by married women. They find that as the sex ratio falls (as women become scarcer), wives’ labor supply significantly increases. For example, they found that a 1-percentage-point increase in the sex ratio decreases wives’ annual labor supply by over seventeen hours and at the same time increases husbands’ annual labor supply by forty-five hours.

Also relying on sex ratio variation in marriage markets defined by age, Grossbard and Amuedo-Dorantes (2007) analyzed employment data over the period 1965–2005 for US women aged 25 to 44 born between 1926 and 1980. Their examination of the impact of changes in the sex ratio on labor force participation suggests that cohorts of women with lower sex ratios had above-average labor force participation, whereas cohorts of women with higher sex ratios—such as women born during the baby bust after 1961—had below-average labor force participation. An increase in the sex ratio of .10 was found to have the same effect on young women’s labor force participation rate as two more additional years of schooling.

Both of the aforementioned studies acknowledge that relying solely on observed sex ratios by age and location may not fully address the concerns of endogeneity, and many recent studies rely on natural experiments to provide evidence of a causal relationship. Angrist (2002) reports findings similar to those in the aforementioned studies that suggest a negative relationship between marriage market sex ratios and women’s employment and labor supply. Relying on more plausibly exogenous variation in sex ratios resulting from changes in the number of allowable immigrants to the United States by country of origin, he finds a large negative effect of sex ratios on female labor force participation among second- and third-generation immigrants. Similarly, within marriage markets defined by race, Charles and Luoh (2010) find an increase in African American female labor force participation and labor supply hours as men of marriageable age became scarce due to changes in mandatory drug sentencing laws that dramatically increased incarceration of prime-age African American men.
Sex ratio analysis can lead to some predictions about US women’s future labor supply. Consider women between ages 30 and 54. Each year, some women age out of this age group and are replaced by millennials just turning 30. Millennials are characterized by more balanced sex ratios than the older cohorts who were part of the baby-bust generation and faced high sex ratios. This change is, therefore, likely to increase the labor force participation of women aged 30 to 54. Recent data confirm this expectation (Grossbard 2016b).

Evidence from outside the United States suggests a similar relationship. Teso (2016) has shown that sex ratios have also influenced labor force participation of African women. The enslavement of men in Africa led to a very low sex ratio, thereby pushing women into the labor force and changing the division of labor in society. Accordingly, the African ethnic groups that were more severely affected by the trans-Atlantic slave trade are today more likely to exhibit higher female labor force participation and more equal gender role attitudes.

Additional Sex Ratio Effects

Sex ratios can help explain racial differences in marriage rates. Wilson (1987) emphasized low sex ratios as a key factor in the declining marriage rate among US blacks. He focused not on sex ratios per se, but on the number of marriageable men relative to the number of women, where “marriageable” meant that a male was employed. Using census data, he showed that changes in marriage rates by broad region of the country were related to the corresponding regional changes in this ratio. Brien (1997) found that racial differences in the timing of marriage were related to state-level differences in sex ratios, more so than to local-level sex ratio differences. Using this definition of marriage markets, Brien’s results suggest that variation in race-specific sex ratios in the market for “marriageable” men, defined by education and/or employment, explain a substantial portion of the black–white gap in women’s marriage rates. Charles and Luoh (2010) found that lower sex ratios in marriage markets defined by race, age, and location, due to higher incarceration rates, were associated with lower marriage probabilities. Specifically, they find that a one-standard-deviation increase in incarceration rates reduced the probability of marriage for an African American woman by 5 percent. Exploiting exogenous changes in sex ratios among immigrant groups due to variation in immigration policy that varied by country of origin, Angrist (2002) found that high sex ratios had a large positive effect on the likelihood of marriage for women and a slightly positive effect on the marriage rates of second-generation men.

There is also evidence that sex ratio imbalance leads individuals to move across marriage markets. Chiswick and Houseworth (2011) examined the effect of sex ratios on ethnic intermarriage and found that in the United States, the more members of the other gender from the same region of origin are available in a particular location, the less likely it is that an individual will intermarry. Evidence of marrying up or down in terms of education is also evidence of movement across marriage markets. Using variation in the
supply of potential husbands due to World War I casualties in France, Abramitzky et al. (2011) found that when men were scarcer, they improved their position in the marriage market by marrying older women of higher social class. Further support for this notion is provided by Charles and Luoh (2010), who find that a decrease in the sex ratio due to male incarceration increases the probability that black women marry spouses with low levels of education.

Furthermore, cohort changes in sex ratios have been linked to changes in fertility. Heer and Grossbard-Shechtman (1981) attribute part of the decline in marital fertility that occurred in the late 1960s to the decline in the sex ratio associated with the entry of the first post–World War II women into dating and marriage markets. As sex ratios dropped dramatically, women opted out of the “first marriage, then children” model, and without pressure for extra fertility on the part of men, overall fertility dropped. Bitler and Schmidt (2012) show that states with larger shares of men aged 19 to 25 who were drafted during the Vietnam conflict experienced sharper decreases in birth rates for women aged 15 to 29. Their preferred estimate indicates that an additional man drafted in a state per one hundred men in this age group leads to a 1.6 percent decrease in the birth rate for women younger than 30. The gradual phase out of the draft in the early 1970s was associated with an increase in the birth rate of between 3.9 and 4.7 percent. In the United States, it thus seems that sex ratios and fertility have moved in the same direction. In contrast, Francis (2011) documented that as sex ratios rose in Taiwan, the total number of children in a family decreased, in apparent contradiction with the US time trend. It could be that these diverging results for the United States and Taiwan are due to the larger proportion of married mothers in Taiwan. With higher sex ratios, married women in Taiwan may have been better able to actualize their preferences for small families. In addition, Francis (2011) found that a ten-point increase in the marriage market sex ratio led to a 0.06 increase in the fraction of female children in a family. It is possible that this effect is the result of fewer selective abortions and infanticide of females: women's higher intrahousehold bargaining power associated with higher sex ratios may have led them to protect their female fetuses and infants more proactively.

The entry of the first post–World War II baby boomers—the lowest-sex-ratio generation—into marriage markets in the late 1960s and 1970s also led to large increases in women's college attendance in the United States (Heer and Grossbard-Shechtman 1981; Grossbard-Shechtman 1993). Charles and Luoh's (2010) finding of a positive association between the incarceration rate and the fraction of women with any college education is consistent with a negative association between cohort-based sex ratio and women's education. There is evidence of similar effects outside of the United States. Edlund et al. (2013) found that in Chinese cities with higher sex ratios, women are less likely to obtain additional education.

Evidence from China also indicates that sex ratios affect investments in children. Porter (2016) showed that when sex ratios are higher, sons are healthier. The causality may be as follows: when sex ratios are higher, married women have more bargaining power relative to that of husbands, and since mothers often control the use of the household's resources, they prefer to invest more in their sons' health capital. Francis
(2011) also documented that sex ratios were positively related to children’s years of education, especially for boys in Taiwan.

Sex ratios also may be related to male crime rates. Edlund et al. (2013) linked sex ratios to crime rates in China. Using data for thirty Chinese provinces in the period 1988–2004, they found that men in cohorts with a higher sex ratio at birth were more likely to engage in crime. Their results were sensitive to the inclusion of a province time trend, which suggests that the findings may be partially driven by migration of men to certain cities that have higher crime rates and not solely capturing sex ratio effects. In the United States, the decline in the crime rate in the 1990s could reflect the high sex ratios in marriage markets at that time, due to the falling fertility of the early 1970s. Increased competition among men for relatively scarce women due to high sex ratios may thus be related to crime rates in different ways in different cultures. When women are in a better bargaining position in marriage markets, they may incentivize men toward a reduction in their criminal activities (which is consistent with US findings), rather than encourage men to accumulate more assets by illegal means (which is consistent with Chinese findings).

**Conclusion**

Analytical tools that economists routinely apply to understand the determinants of traditional outcomes such as wages and labor supply can also be used to understand how marriage markets affect personal access to consumption goods, individual savings, leisure time, and labor supply. The same tools also shed light on choice of living arrangements, including choice between marriage, cohabitation, and coparenting; fertility; and investments in own and children's human capital. In both the Becker and WIHO models, the sex ratio has important effects on the relative position of men and women in marriage markets. When the sex ratio is high, women obtain a higher equilibrium share of marital output in the Becker model and receive a higher price for their household work time in a WIHO model.

This chapter has focused on one important variable reflecting marriage market conditions: the sex ratio. By affecting demand and supply in marriage markets, sex ratios can have an impact on numerous outcomes, including consumption, labor supply, savings, and crime. I reviewed evidence on sex ratio effects, with an emphasis on studies that establish causality. There is widespread evidence for many parts of the world that sex ratios have important effects on savings, labor supply and consumption, and a variety of other outcomes.

If sex ratios influence marriage market conditions and a number of important outcomes related to these conditions, then it is plausible that factors other than sex ratios could have an impact on marriage market conditions and the same outcomes. Among these factors are personal characteristics related to success in dating and marriage. To the extent that individuals with traits that are relatively valued in marriage markets can
obtain a higher price for their WIHO (if they supply it) or can get away with paying less for their partner’s WIHO (if they are on the demand side), these traits are expected to affect labor supply, consumption, savings, and the other outcomes covered in this chapter (Grossbard 2015). For example, there is some evidence that individuals with higher body weight work more hours in the labor force than their counterparts with average weight (Oreffice and Quintana-Domeque 2012). This could reflect their lower value in marriage markets.

Furthermore, unmeasured characteristics could be positively associated with the likelihood that an individual becomes part of a couple (married or not), and at the same time these same characteristics could affect the individual’s bargaining power in marriage and prior to marriage: if an unmeasured characteristic affects demand for WIHO, then it will push up both the quantity (likelihood of marriage) and the price of WIHO. Consequently, given that such price influences individual bargaining power in marriage (current or future), the unmeasured trait is likely to affect the outcomes of interest. It may therefore be worthwhile to estimate predicted likelihood of (inter) marriage and individual outcomes simultaneously, as in the case of a study of savings among single women in Japan by Kureishi and Wakabayashi (2013) and of time that individuals spend in household production (Grossbard, Gimenez-Nadal, and Molina 2014).

Notes

1. Examples given by Becker and others are typically phrased in terms of marriage between a man and a woman. However, the benefits of specialization can also apply to same-sex couples with different skills.
2. At birth, there are typically 105 males born per 100 females. Due to higher age-specific mortality rates for males, the biologically based sex ratio typically declines with age (WHO 2017). See Schone (this volume) for a discussion of biological sex differences.
3. This assumes that all goods are private goods—that is, there is no joint consumption. See Lam (1988) for a discussion of the model with public goods.
5. Most economic models of the family only recognize principal-agent problems in the case of divorce, when children are under the custody of one parent (e.g., Weiss and Willis 1985). It follows from Grossbard (1976) that this problem is not limited to divorced parents.
6. Bethmann and Rudolf (2017) have found that in South Korea marriage makes men happier than women; this is related to the fact that women perform more WIHO in Korea (as well as elsewhere, on average). Perhaps they are not paid well enough for their WIHO?
7. This is consistent with the effect of an increase in the sex ratio in Becker’s model, which increases a wife’s access to marital consumption goods and leisure.
8. This assumes that WIHO workers respond to prices and have an upward-sloping supply function. Other motivations may be present, such as love, devotion, or feelings of guilt or duty, but they are not expected to neutralize the role of prices.
9. See Mansour and McKinnish (this volume) for a detailed discussion of marital sorting and heterogamy.
10. For a detailed discussion of polygyny and polyandry in developing countries, see Anukriti and Dasgupta (this volume).
11. Grossbard (1980) also presents a rationale that helps explain why some societies have polyandry, an institution allowing marriages with multiple husbands. These are early examples of the “institutional economics of marriage.” More on the economics of polygamy can be found in Grossbard (2016a).
12. This appears to be especially true for China and India. For a detailed discussion of gender preferences and interactions with the one-child policy, see Rose (this volume).
13. See Portner (this volume) for a discussion of fertility issues in developing countries and Lopoo and Raissian (this volume) on fertility policy in developed countries.
14. Chiappori, Fortin, and Lacroix (2002) use age-specific state-level sex ratios pegged to the actual age of an individual’s spouse. They test robustness by constructing sex ratios assuming a two-year marriage age gap and a two- to five-year marriage age gap. They also include policy measures that are expected to alter intrahousehold bargaining power. In this context, they use a divorce law index that identifies shifts in divorce laws that favor women.
15. The average is defined for the analytical sample.
16. Wilson computed the Male Marriageable Pool Index (MMPI), defined as the number of employed men in an age × race cell divided by the corresponding number of women in that age × race cell. The ratios were well below 1, were lower for blacks than whites, and fell sharply for blacks between 1970 and 1990.
17. See Mansour and McKinnish (this volume) for a detailed discussion of marital sorting and gains to marriage.
18. Francis (2011) constructed sex ratio measures using the number of men aged 15 to 39, excluding mainlanders in the military, divided by the number of women aged 15 to 39, then multiplied by 100. He did not include mainlanders enlisted in the Taiwanese military because the government did not permit them to marry. He defined the sex ratio at the regional level based on five standard geographic regions for the period 1950–1984.
19. An alternative explanation of the decrease in the crime rate, advanced by Donohue and Levitt (2001), is that the legalization of abortion in the early 1970s led to a large reduction in births among lower-income women. They argue that the aborted births may have been disproportionately persons with a higher probability of committing a crime.

References


ECONOMIC analyses of divorce started in the 1970s with the seminal research of Gary Becker and his colleagues (Becker 1973, 1974; Becker, Landes, and Michael 1977). In this work, marriage is viewed as a partnership that helps coordinate and facilitate production, investment, and consumption activities, including raising children. The amount of gain associated with marriage varies across couples, depending on the traits of each spouse, the quality of their match, the degree of specialization, and the level of investments in general and marriage-specific human capital.\(^1\) Divorce means that although initially both partners expected to be better off married to each other compared to their best alternatives, at a subsequent time this is no longer true. Thus, either expectations were incorrect or major unforeseen events occurred. Unions where gains from marriage started at a high level can better withstand the winds of mistaken expectations or unforeseen events. Early studies in the literature, surveyed by Weiss (1997) and Lehrer (2003), followed closely the analytical framework developed by Becker and his colleagues and the path that they illuminated. The present chapter reviews some of the main strands in the more recent literature, with a focus on US studies.

**TRENDS**

The pronounced increase in the divorce rate over much of the twentieth century is one of the most salient demographic trends in the US landscape. In this section we discuss this
trend, along with the subsequent decline in the divorce rate. We also discuss differences by socioeconomic status (SES) and the emergence of the “gray divorce” phenomenon.

**Changes over Time in the Divorce Rate**

The divorce rate in the United States was unusually low in the 1950s and early 1960s, and unusually high in the 1970s—over this period the annual divorce rate more than doubled. But the long-term trend line shows a pattern of secular increase over time—from less than 5 divorces per 1,000 married couples at the beginning of the century to approximately 23 in 1979, followed by a modest decline to approximately 17 in 2005; the recent decline is evident also if divorces are measured relative to the population (Stevenson and Wolfers 2007; Isen and Stevenson 2011). By historical standards, however, the divorce rate remains very high. Figure 4.1 graphically illustrates the recent trends since 1960.

Several factors contributed to the long-term increase in the divorce rate. Becker (1981) emphasizes the role of declining gains from marriage stemming from division of labor and specialization: as women’s education, wages, and participation in the labor force increased, women became more similar to men in their productivity characteristics. In turn, there is some evidence that the higher expected probability of marital dissolution may have fueled a further increase in female labor supply (Johnson and Skinner 1986). Major technological advances in the household sector also contributed

![Figure 4.1 Divorce rate, Unites States, 1960–2013.](image)

*Source: Hoffman and Averett (2016, 84).*