ABSTRACT

Title of Dissertation:	THE SOCIOECONOMIC ASSOCIATIONS WITH WOMEN'S PARTNERSHIP FORMATION AND DISSOLUTION IN RUSSIA, GERMANY, AND THE UNITED STATES
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This dissertation consists of three studies that evaluate how women form partnerships, leave partnerships, and the economic outcomes of those partnerships. These demographic transitions and outcomes are evaluated in three country contexts with differing political, welfare regimes, social history. I use longitudinal data from Russia to analyze marital status differences and trends in in poverty risk. Contrary to assumptions that unmarried mothers will have higher risks of poverty over time as welfare policy weakens, unmarried mothers and married mothers' risks of poverty came close to converging in the late 2000s. Second, I use German data to examine educational assortative mating in East and West Germany. I use the Revealed Preference Model (RPM). First, from bivariate analysis of the SOEP, I find that among the people who are partnering, they are doing so mostly homogamously in the East and the West. Highly educated women in the East are still less likely to partner

somebody of a lower education status. The RPM estimated parameters then showed that in West Germany and East Germany alike, educationally hypergamous partnerships were most preferable. Though the availability of higher educated partners in East and West Germany are different, the preference for hypergamy remains. Finally, I move on to the United States to estimate the divorce risk of partners of various education levels. I use the Survey of Income and Program Participation, providing accurate representation of the contemporary U.S. The model estimates divorce risk using women's own education, men's own education, and their relative education levels. It reveals several persistent patterns. Women's divorce risk decreases monotonically as education increases, so highly educated women have the lowest rate of divorce. Men's education, however, is less of a determinant on the risk of divorce. Relative to hypergamy and homogamy, hypogamous unions (woman marrying a man of a lower education status than herself) were more likely to divorce. This study supports past research that finds the female breadwinner model the most volatile when it comes to likelihood of divorce and continued support for this trend into the 2010's.

THE SOCIOECONOMIC ASSOCIATIONS WITH WOMEN'S PARTNERSHIP
FORMATION AND DISSOLUTION IN RUSSIA, GERMANY, AND THE
UNITED STATES

by

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Dedication

маме, папе, майе и нюше

Acknowledgements

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Introduction

My dissertation consists of three papers evaluating how women form partnerships, leave partnerships, and the economic outcomes of those partnerships. I will use three countries to explore these processes. The first paper focuses on Russia, the second on Germany, comparing East and West, and the third on the United States. I focus on these countries for several reasons. First, each have a unique history and therefore unique welfare regime. Under Esping-Andersen (1990), the U.S. is a liberal regime which focuses on means-tested assistance and market solutions. Germany's Western, former Federal Republic side is a conservative regime with a familial focus. The Eastern, former Democratic Republic side inherits a state socialist system that promoted mothers' labor force participant. Russia is difficult to categorize and like the rest of Eastern Europe, does not fall into the traditional typology. Like the Eastern side of Germany, however, Russia inherits a state socialist system and is sometimes referred to as a transition economy (Fenger 2007). These three countries each have differing relationships and histories between women and the labor force. In the United States, married women began entering the workforce in large numbers the 1970s and if they did return to full time work, they often do it quickly after a birth (Ruggles 2015). In Germany, however (especially in Western Germany), women are more likely to leave the workforce for a longer time during their child-bearing years (Gangl and Ziefle 2009). In Russia and Eastern Germany, rates of female employment were high throughout the 20th century and remain high to this day. Policies under the communist regime required women to work and provided the support for them to do so. I present these papers in this order to represent the

movement from a newly formed market system (Russia), to a mix of a traditional

market economy, conservative welfare system, and newly formed market (Germany),

and finally to the United States that has not seen any drastic regime change in the last

several decades.

Over time, these three countries have faced varying levels of political and

social shifts. The correlation between family processes and socioeconomic

differentials persists with generations building on top of each other to blend the old

and new guidelines of what is considered the norm. In Russia, do egalitarian values

persist if the socialist policies are removed after decades of influence? Germany is a

country divided between two political histories but connected by German heritage

and tradition. Finally, in the United States, after continuing decades of political and

social shifts from liberal and conservative economic policy, social trends have

continued towards increased inequality.

Research Question

How does cultural, historical, and political context affect socioeconomic correlates

and consequences of women's family formation and dissolution in recent decades?

Structure of Dissertation

I begin with focusing on the context of the Soviet Union and modern-day

Russia. Using the Russian Longitudinal Monitoring Survey (RLMS) spanning from

1994-2016, I investigate how the risk of poverty has changed for unmarried and

married Russian mothers over this period. The first ten years have been some of the

most turbulent in recent Russian history. Fertility rates were at their lowest and the life expectancy gap between men and women grew. Family policy and provisions that families depended on during the Soviet era were suspended or amended. Lower levels of state support for single mothers combined with the emergence of religious traditionalism and ideologies privileging women's roles as mothers, not workers, predict unmarried mothers' rates of poverty will increase relative to married mothers. However, the history of women's adaptive behavior to poor marriage prospects, inadequate and/or absent contributions from fathers, and high levels of employment among mothers, suggests that despite lower levels of state support, levels and change over time in poverty risk may not differ greatly between single and married mothers. The decision to study mothers in Russia has challenged the traditional assertion that market capitalism (specifically, a means-tested welfare system) will increase unmarried mothers' poverty risk relative to married mothers for all women. I use the Russian Longitudinal Monitoring Survey (RLMS) to predict poverty rates between unmarried and married women. Russia is a transitional economy that has gone through decades of socioeconomic shift, alongside her former occupied state to the west, East Germany.

In my second paper I focus on Germany, specifically the differences between the former Federal Republic of Germany (FRD; West Germany) and the German Democratic Republic (GDR; East Germany). Germany is a useful next step from studying Russia because Germany also suffered a large loss of life during World War II, many of those lives being young men who are fathers, partners, or would-be partners and therefore faced a sex-ratio issue in the 1940s and 1950s. Instead of a

whole country being taken over by communist rule, only approximately a fourth of the population after World War II was under the Soviet regime. Unlike Russia, Germany has two areas that are currently under one common rule but have two distinct histories. Similar to the Soviet Union, women in Eastern Germany were supposed to be good producers (workers) and reproducers (mothers). Women in Western Germany's roles as reproducers have been emphasized. Germany and Russia both have experienced lowering fertility rates, with Germany's Total Fertility Rate (TFR) averaging around 1.4 in the last 4 decades. Russia's TFR dropped from 2.22 in the late 1980's to 1.2 in 2000 and has been between 1.6 and 1.8 in the last decade (The World Bank; Fertility rate, total (births per woman), 2019). While the paper on Russia focuses on outcomes for single mothers, I use Germany as a way to study how people navigate the different marriage markets between Eastern and Western Germany. I use a newly developed method, a Revealed Preference Model (RPM, Goyal et al. 2020), to address this question. Traditionally, I would predict partnering using one's own education. However, in a marriage market we cannot ever properly discern whether couples choose to partner due to the preference for each other's characteristics, or the availability. The RPM allows family social scientist to get closer to the answer. For example, do women marry men of higher education because that is their preference (highly educated men represent a higher social status) or because that is the composition of the population (the population of men is highly educated)? Determining the strength of the association in East versus West Germany will contribute to the literature studying the lasting impacts of politically egalitarian policies in Eastern Germany versus their more conservative counterparts in the West.

With this paper I engage with an innovative statistical method that has the potential to allow demographers to further in differentiating mechanisms that drive two people to partner.

My final paper explores recent trends in divorce in the United States. The United States is the classic "liberal" system that offers less public support, and where that support is characterized as means-tested. Its trends in family formation and dissolution have been towards increased socioeconomic divergence or polarization. Like in Germany and Russia, the last several decades of demographic trends in the United States have been greatly influenced by female labor force participation, but also by macroeconomic structural change impacting men's economic positions across different levels of educational attainment (Cherlin 2010). Some traditional theorists expected that women who are highly educated and economically successful would have a harder time avoiding divorce (Becker 1974, 1985). However, the rates of divorce have risen primarily in women of lower education levels and have remained low for high educated women, but with variations related to their husbands' educational attainment (Raley and Bumpass 2003, Raley and Sweeney 2020). To further this research, I use Survey of Income and Program Participation (SIPP) to explore the most recent trends of education and divorce, considering how her own education and partner's education affects the couple's chances of divorce. The use of the SIPP's panel observation for the measurement of divorce is an innovation of this research, going beyond previous researchers' use of the SIPP's marital history topical module without considering the education of her partner. The panel observation

allows for both partners' educational levels to be accounted for in estimating divorce risk.

Diverging Destinies? Poverty Rates of Unmarried and Married Mothers in Post-Soviet Russia

Abstract

The transition from the Soviet Union to the Russian Federation allows us to observe the economic and social consequences for mothers' economic well-being of a shift from a state-controlled economy to a market economy. During the Soviet Union, family policies were controlled by the state and through employment, mitigating the economic penalty of single motherhood. After the political and economic transition, social welfare policies supporting families were substantially reduced and enforcement of remaining policies became more challenging. The culture of single motherhood in Russia is unique, as historical and social events have made single motherhood less stigmatized than it is in Western and traditional market contexts. Yet, economic disadvantages of single motherhood have likely increased in contemporary Russia with the erosion of social welfare safety nets vital for vulnerable populations. Relying on the Russian Longitudinal Monitoring Survey (RLMS), I observe how single mothers fared economically compared to their married counterparts in the decades after the fall of the Soviet Union and the determinants of poverty during those times. Contrary to assumptions that unmarried mothers will have higher risks of poverty over time as welfare policy weakens, unmarried mothers and married mothers' risks of poverty came close to converging in the late 2000s. However, when looking at the more vulnerable populations, married mothers' risk of poverty decreased more quickly than unmarried mothers.

Introduction

Understanding the multifaceted influences of economic, political, and cultural transformations on family formation and individual well-being motivates much recent literature on inequality and family demography (Brinton 2011, Cherlin 2014, Gerson 2011). This literature attributes the decoupling of marriage and childbearing to the erosion of the economic and normative foundations of marriage and the incomplete gender revolution, resulting in disparate opportunities and life outcomes of married and single mothers. Yet, little research has examined how these factors play out in countries that have experienced social and economic transformations and where single motherhood was more common and more "normalized" pre-transition (Utrata 2015). This project contributes to this developing evidence base by investigating how mothers in post-Soviet Russia have navigated poverty and determining if these trends vary by marital status.

Literature Review

During the three years of transition, the Russian economy went from being state run to being 70 percent privatized, a process termed "shock therapy". The intense reforms were heavily encouraged by the Washington Consensus, an economic reform policy developed by the United States and the International Monetary Fund. Little regulation was put into the privatization of the market and oligarchs soon developed (Shleifer and Teisman 2005). Privatization facilitated corruption and the speed of the open market caused skyrocketing inflation, yet wages did not keep pace with the increased price of good and services. The rapid dissolution of the Soviet state

and subsequent shift to a market driven economy yielded high unemployment and increased inequality especially in the ten years following the fall of the Soviet Union (Gerber 2002). Women, especially, were disadvantaged during the transition period, as the gender wage gap increased (Brainerd 1998) and more women were left without partners. Below we review how these factors affected trends in single motherhood and marital status variation in poverty pre and post transition from the Soviet Union to the Russian Federation.

Trends of Rising Single Motherhood

In 1989 during the time of *perestroika* (reconstruction), only about 14 percent of children in the Soviet Union were children of single parents. By 1994 that number had increased to 20 percent (Klugman and Motivans 2001). The shifting demographic trends follow global trends of the decoupling of marriage and childrearing, but in Russia these trends are also uniquely related to the economic crisis. Single parenthood was not new in the New Russia; it had been present far before the fall. In the Soviet Union single parents were economically worse off than married parents, but the communist government set up many universal welfare policies that provided financial resources to all families. Soviet policies included full labor market participation and universal childcare. Under a new Russia rule and a capitalist system, many of the welfare policies of the Soviet Union were dissolved or were difficult to enforce because of corruption and lack of regulation (Kolosnitsyna and Philippova 2017).

During the time of the Soviet Union there was little risk to marrying and childrearing at a young age relative to other developed countries. Couples would

receive assistance individually, but once married, a couple could also apply for the added benefit shared housing. Despite the Bolsheviks attempt to dissolve the 'shackles' of marriage, the bureaucratic process was still favorable to married pairs. Despite having liberal marriage laws, by the Western standard, divorce was legally easier but logistically still complicated. While housing was provided by the government, it was still limited, therefore it was difficult to escape a bad marriage. While a Soviet marriage had its privileges, the complications of divorce and the universal social welfare in the Soviet Union, citizens did not feel as incentivized to marry out of social pressure as those in other countries.

High rates of male mortality in World Wars I and II contributed to relatively high levels and public acceptance of single mothers. Scholars estimate that the Soviet mortality in World War II was 13.5 percent of the population, with most deaths occurring among young men (Andreev et al. 1994, 1990). The economic crisis of the early 1990s also yielded a significant decrease in life expectancy, particularly for men (Nemtsov 2002). With many women losing their partners or losing potential partners, Brainerd (2017) argues that this gender imbalance led to poor economic and social outcomes for women for many generations to come.

Sex ratio imbalances affecting outcomes for women are not unique to the Soviet Union and Russia. In Germany, a country that also experienced imbalanced sex ratios after World War II, women did not become mothers outside of marriage but instead compensated by marrying lower quality partners (Kesternich et al. 2018). In contrast to the Soviet Union after World War II, Germany instilled social welfare policies that incentivized marriage and thus creating norms that strongly discourage

single motherhood. In the United States, Black women have a weaker marriage market than women of other racial groups because of Black men's high rate of incarceration and experiences of structural employment discrimination, and strong norms of racial homogamy in marriage. Rates of single motherhood are highest among Black women, yet a highly educated Black woman's likelihood of employment increases if she lives in an area with higher incarceration rates for Black men rather than low incarceration rates (Liu 2018).

Scholars debate if the demographic changes experienced by Russia during the fall of the Soviet Union are attributable to the economic shock or cultural changes (Gerber and Berman 2009). Most industrialized Western countries have experienced broad demographic and attitudinal shifts, theorized to be attributable to the Second Demographic Transition (Lesthaeghe 1983, 2010). The Second Demographic Transition is characterized by a disconnect between marriage and childbearing, an increase in individual autonomy and decision making, and secularization. These shifts are intertwined with substantial increases in women's human capital investment and labor force participation, delayed or foregone transitions to marriage, and higher rates of cohabitation, divorce, and single parenting. However, although Russia's demographic patterns are beginning to mirror that of the West (Federal Statistic Service 2012), trends also coincide with slightly lowering levels of labor participation among women and higher levels of religious traditionalism. This is counter to Second Demographic Transition trends in Western countries, suggesting pathways between single motherhood and economic well-being may not mirror those of other countries.

Determinants of Poverty Pre and Post Transition

From 1917, the Soviet Union provided sufficient support to ensure that all people, regardless of marital status, were adequately economically and socially supported. These laws were especially helpful in diminishing the poverty gap between single and married mothers and lessening the stigma many single mothers face in other Western countries. The Soviet Union was far from Marx and Engels' idea of an ideal communist regime, but they did introduce policies that reduced financial incentives of marriage, provided readily accessible and free childcare, and encouraged better working conditions for women (Kaminsky 2017). The 1918 Soviet Code on Marriage and Family secularized marriage and equalized rights of children born in or outside of marriage (Berman 1946). These laws were further amended in the 1940s and 1950s to reduce inequalities between families (Kaminsky 2011). Despite the economic and social difficulties experienced under Stalinism, the state provided higher levels of support for single mothers than other families, in part via family allowances (Klugman and Motivans 2001). The allowance for unmarried mothers continued through the fall of the Soviet Union, but high inflation eroded tangible benefits. Moreover, employment-linked social welfare benefits were dissolved with the transition to a market economy. Single mothers were further disadvantaged by growing inability of many coresidential fathers to provide financial support for children and reversals of policies designed to encourage full employment and improved working conditions for women. The privatization of employment and tax loopholes increased fathers' ability to underreport income and thus make lower or avoid making any child support payments (Pascall and Manning 2000). Employment regulations that remained post-transitions were perceived as liabilities by employers,

and thus increased occupational and wage segregation for women (Pascall and Manning 2000).

The empirical evaluation of poverty is a relatively new process in the Russian demographic literature and policy-making environment. In the last 12 years, the most salient predictors of poverty for parents are employment, type of settlement (city, small town, village, regional center), marital status, pensioners present (usually elderly parents), marital status, and education (Kolosnitsyna and Philippova 2017). In the United States there is less focus on settlement types, but most other indicators are comparable in the Russian Federation, the United States and other Western democracies (Manning and Brown 2008, Brady and Burroway 2012). For single mothers in the 1990s, employment and reliance on other family members for support rather than state benefits is more important in reducing risks of poverty (Pascall and Manning 2000). Child benefits are more weakly linked with poverty risk in the Russian Federation, contrary to findings based on Western capitalist countries (Moller et al. 2003). Additionally, whereas in the United States, higher poverty rates among single mothers are associated with the educational gradient in family formation and related weaker employment returns of single mothers (McLanahan 2004, McLanahan et al. 2015), the emergence of an educational gradient in single motherhood is relatively recent (Perelli-Harris and Lyons-Amos 2014).

Womanhood and Motherhood in Soviet and post-Soviet Russia

Cultural shifts in the role of women in post-Soviet Russia have reinforced pre-transition processes that reduced the necessity of men's contributions to families and normalized single motherhood. During the Soviet Union regime, the primary roles for

men and women were defined by what was needed from them by the communist

state, namely as workers. Women had an additional obligation to contribute to society

through their role as mothers (Ashwin and Lytkina 2004, Zdravomyslova and

Temkina 2005). Legislation increasing women's rights and subsidizing household

labor were not designed to advance feminism, but rather to facilitate women's ability

to maintain a healthy family while simultaneously working full-time (Lapidus 1978).

Despite state collectivization of some housework and subsidies for carework, women

in the Soviet Union were plagued by second shift, or double burden of both domestic

and labor market work. Yet, contrary to other developed nations with strict female

domesticity norms, Russian women have actively remained in the labor force and

make up nearly half (49 percent) of the entire employed labor force in 2016

(Goskomstat 2016). Contemporary support for women's employment is high, but

women still are primarily responsible for domestic labor (Ashwin and Isupova 2018).

The worker-mother ideology is often separated from the involvement of men in

family life and research suggests women do not expect men to be highly involved in

raising children (Utrata 2015, 2019 Isupova 2018).

Current Study

Little longitudinal research on single motherhood in Russia has been done. Most

recently, Utrata (2015) interviews dozens of single mothers around Russia to better

understand how those mothers see themselves and to find how they believe their

society sees them. She found that life for single mothers became more difficult as the

market developed; the state no longer offered the same support to them or the fathers

of their children. Less than favorable economic conditions caused many married men

to leave or succumb to alcoholism and therefore there were more single mothers who were not able to support themselves and their children. Utrata found that women were not surprised by the men, but rather surprised by the state's lack of support. Longitudinal data from Russia since the fall of the Soviet Union will be useful in tracking the trends in poverty for unmarried and married women in Russia. I use longitudinal data from the Russian Longitudinal Monitoring Survey of the Higher School of Economics (RLMS) spanning 1991-2016 to investigate how the risk of poverty has changed for unmarried and married Russian mothers over this period. Findings based on the first wave of data (1991-1996) suggest decreasing government transfers to women are associated with increased poverty levels (Lokshin et al. 2000), these findings are supported by studies focusing on Western countries and their policy patterns (Brady and Burroway 2012). Lower levels of state support for single mothers combined with the emergence of religious traditionalism and ideologies privileging women's roles as mothers, not workers, predict unmarried mothers' rates of poverty will increase relative to married mothers. However, the history of women's adaptive behavior to poor marriage prospects, inadequate and/or absent contributions from fathers, and high levels of employment among mothers, suggests that despite lower levels of state support, levels and change over time in poverty risk may not differ between single and married mothers.

Research Questions

How does the gap in poverty between married and unmarried women behave as Russia moves further from the time of the Soviet Union? Is this gap consistent for all groups of women within the married and unmarried category?

Data and Methods

I use the Russian Longitudinal Monitoring Survey of the Higher School of Economics (RLMS) to analyze marital status differences and trends in poverty risk. RLMS is a nationally representative longitudinal survey with annual data from 1994 to 2016, except in 1997 and 1999 when no data were collected due to a lapse in funding (Kozyreva et al 2016). This survey is a joint effort of the Higher School of Economics in Moscow, Russia and The University of North Carolina at Chapel Hill. A multi-stage probability sample was employed to choose respondents for the survey. Due to the unique household structure in Russia, urban residents were based on dwellings (including communal apartments and dormitories) and rural households were interviewed in households. The survey was created with the intention of measuring post-Soviet national trends and can be used analytically as either a repeated cross section or as a longitudinal panel. I use the longitudinal panel data.

While 1994 is not the beginning of the transition to a market economy, it is early enough to offer a useful test of influences of the sustained economic turbulence and policy reforms through the 1990s on marital status differences in risk of poverty. I use a generalized linear mixed model to compare poverty risk of unmarried women (single, divorced, or widowed) to women who are currently married in 1994-2016. The sample includes all women ages 15-45 who have at least one child in the household and non missing values on covariates, this ends up being 30,312 person-year observations. In the sample, the average number of years present in the survey is 5.39 out of 21 (SD=5.14).

Dependent Variable:

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The main dependent variable is a binary indicator of poverty status, coded "0" if respondent income to poverty threshold is above 100 percent and "1" if it is 100 percent or below. I use the RLMS provided real (unadjusted) income measure, which combines all income related questions for each individual household in the RLMS, including salary (from all jobs), other income, and pension and cash transfers (private or government). To establish the poverty threshold, I use the real (unadjusted) thresholds provided by the Russian Federation Federal State Statistics Service (ROSSTAT, http://www.gks.ru/). The minimum subsistence level is based off a measure comparable to the nutritional food basket measure used to calculate U.S. poverty thresholds. ROSSTAT provides the minimum subsistence level for an individual in each region based on their age and gender (child, working age female, working age male, pension age female, or pension age male). Using the RLMS household roster and regional indicators, I add up the thresholds with the corresponding number of people in each gender and age group to make a household poverty threshold. Once I have the household poverty threshold, I can then compare it to the measured household income as collected in the RLMS.

Main Independent Variable:

In the Russian Federation, as in other countries, marital and parental status, household structure, education, age, and employment are predictive of poverty. Our main independent variable in this analysis is marital status. Women who are unmarried consist of those who are single, divorced or widowed at the time of interview (34.5 percent of sample, see Appendix Figure A1-1 for detailed distribution of partnership status over time).

Controls

To isolate influences of marital status on poverty risks, we control for education, urban/rural status, age, number of children, and employment status, and whether a pension-age woman is present in the household. A pension-age woman is commonly a source of childcare, especially after the fall of the Soviet Union and lack of free childcare (Urtrata 2015, Lokshin 2004, Pascall and Manning 2000).

Women who have higher education are traditionally protected against poverty due to their access to capital, especially in a market economy. Those who live in an urban environment, especially cities such as Moscow and St. Petersburg, have higher access to education, good employment, and government programs. Using the RLMS data, scholars have observed that the driver of rural poverty has been lack of secure labor opportunities (Gerry et al. 2008). I control for number of children in the model because the higher the number of children, the more money needs to be earned to feed, house, and clothe them. The more children that are in the household, the less time there is to pursue other goals such as increasing human capital (employment and training opportunities) and the harder it is to find child care

The sample includes women ages 15-45, they are not yet retirement age thus I do not expect a large influence of age on poverty risk. Younger women are more likely to be married, as age at first marriage is low. Women are then more likely to be divorced or widowed in their 30s and into their 40s.

Model

Using a generalized linear mixed effects model (GLMM), I predict the probability of being poor. GLMM is ideal for measuring a longitudinal trend with a

binary outcome (in poverty or not in poverty) where a woman is observed for multiple years with time varying characteristics. I use a continuous quadratic relationship with time (year, 1994-1996, 1998, 2000-2016) to more accurately model the points of very high poverty in the early 1990's and the quick decrease to lower poverty thereafter. I use a five tiered education variable, 1=Less than Secondary School, 2=Less than Secondary School, with Vocational Training, 3=General Secondary School, 4=Secondary School, with Vocational Training, and 5= University Plus. I use "1= Less than Secondary Education" as the reference category because that is the least privileged position, therefore making it easier to interpret how any more education creates a lessened risk of poverty. For number of children, I split the sample into having one child only (reference) or two or more children. It is rare to have three or more children, therefore creating a binary variable between parity =1 or parity= 2+ brings the least amount of bias.

GLMM involves two parts (mixed), first I have the model that does not consider the initial propensity for poverty and then another part that includes a random variable that accounts for that propensity. I model a random intercept (b_i) because of the assumption of random heterogeneity in a women's risk for poverty. I model poverty using variables that point to the structural determinants of poverty that are also available in the data, specifically region, age, family structure, and education. One limitation of the data and thus the analysis is the lack of other relevant data, such as whether women experienced poverty spells prior to becoming a mother.

Results

Table 1.1: Descriptives of Women Aged 15-45 with Children in Russia 1994-2016

	All	Unmarried		Married
Poor	0.363	0.407	*	0.361
Married	0.653	-		-
Year (Mean, SE)	2006.1 (6.9)	2007.6 (6.13)		2005.3 (7.0)
Presence of Grandmother	0.222	0.286	*	0.191
Urban	0.746	0.725		0.746
Age (Mean, SE)	34.20 (6.8)	34.69 (6.9)		33.94 (6.8)
2+ Children <18 years old in household	0.422	0.307	*	0.483
Employed	0.759	0.781	*	0.748
Education			*	
Less than Secondary	0.181	0.226		0.164
Technical Degree, No Secondary	0.130	0.138		0.126
General Secondary Degree	0.286	0.288		0.286
Technical Degree, With Secondary	0.064	0.054		0.069
University and/or Professional Degree	0.335	0.294		0.356
Sample N	31,478	10,395		19,937

Source: Russian Longitudinal Monitoring Survey
Notes: Proportions are presented, unless stated otherwise. Chi-squared difference test for categorical values between unmarried and married women, *p<0.01

Table 1.1 presents the weighted descriptives of the sample, all mothers, unmarried mothers, and married mothers. Averaging across person-years, the unmarried group consists of 23.7 percent never married women, 43.6 percent divorced and not remarried women, 9.3 percent widows, and 23.3 percent cohabiting women (see Appendix Figure A1-1 for trends over time). Results are estimated using the RLMS provided person level weights to adjust for survey and wave specific bias due to survey attrition. Table 1.1 indicates that average poverty level of mothers ages 15 to

45 in the 21-year 1994 to 2016 period was 36.3 percent. Unmarried women experienced on average a higher poverty rate than married mothers at 40.7 versus 36.1 percent, respectively. The average poverty level spans the 21 years that include the economic turbulence of the 1990s and the economic growth of the 2000s. Most of the sample is employed (74.6 percent), consistent with employment levels of Russian women generally. Unmarried women have a higher rate of employment than married women, 78.1 versus 74.8 percent. Averaging across person-years, about 65.3 percent of mothers are married with an average age of 34.2 years old. Across years, 42.2 percent of households have two or more children under 18, this was more likely for married women than unmarried women (48.3 versus 30.7 percent, respectively). However, unmarried mothers had more person-years with a coresident grandmother than married mothers[1] (28.6 versus 19.1 percent, respectively). Averaging across person-years, the modal group of education is university and/or professional degree (33.5 percent) followed by general secondary education, less than secondary, technical degree without a secondary, and technical degree with a secondary. On average, married women had higher education levels than unmarried women.

Figure 1.1

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[1]The percentage of unmarried mothers with grandmothers in the household has been higher than married mothers for all the study years. In all, percentage of mothers living with a grandmother in the household has increased. See Appendix Figure A1-2 for more detail.

Proportion of Women with Children in Poverty by Marital Status in Russia 1994-2016, weighted
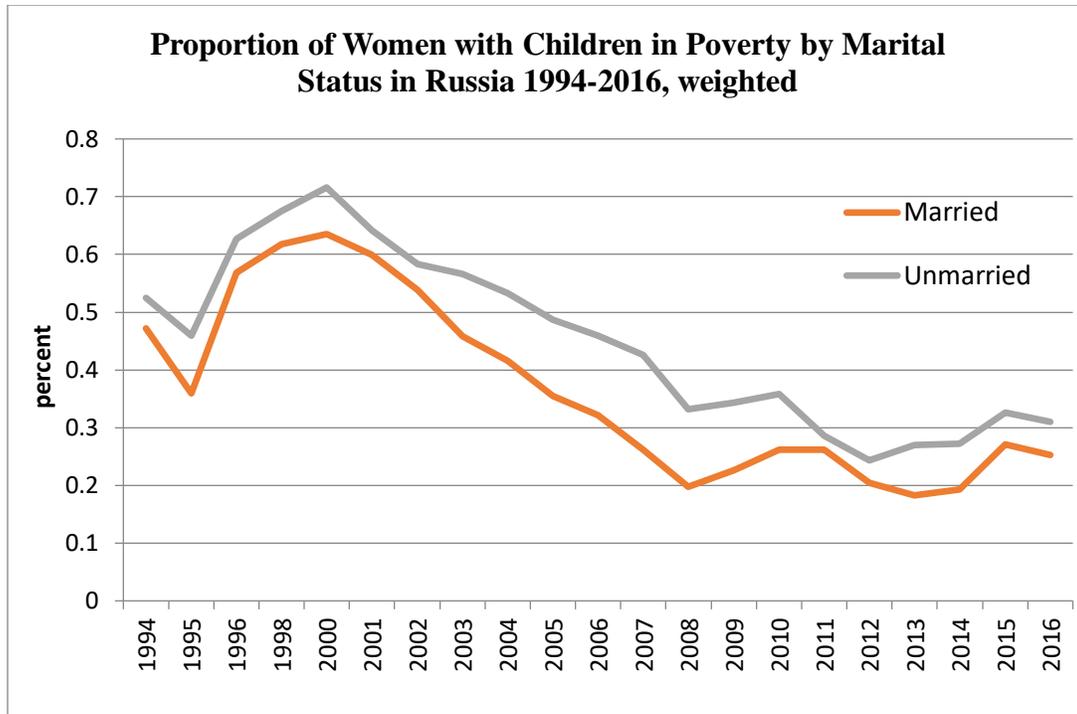
To determine the appropriate time (years) and treatment (marriage) relationship with poverty, I estimate the weighted proportion of women with children in poverty by marital status over time (Figure 1.1). Figure 1.1 indicates that poverty levels are higher for unmarried mothers compared with married mothers. Figure 1.1 also shows that the marital status gap in poverty is wider in the 2000s, relative to 1994-1998 and 2010-2016. The proportion of all mothers with poverty level incomes is particularly high from 1994 through 2000 (about 70 percent of unmarried mothers and about 61 percent of married mothers), and then declines steadily through 2009. The proportion in poverty then stabilizes around 2010, at approximately 20-25 percent of married mothers in poverty and approximately 30 percent of single mothers in poverty.

Table 1.2: Generalized Linear Mixed Effects Modeling Poverty for Women ages 15-45 who have at least one child in Russia

	Model 1		Model 2	
	Beta	SE	Beta	SE
Married (ref: Unmarried)	-0.371*	0.063	-0.455*	0.062
Year	-0.128*	0.006	-0.124*	0.006
Year^2	-0.002*	0.001	-0.002+	0.001
Presence of Grandmother			-0.344*	0.055
Urban			-0.786*	0.061
Age			-0.023*	0.003
2+ Children <18 years old in household			0.851*	0.046
Employed			-0.749*	0.045
Education (Ref: Less than Secondary)				
Technical Degree, No Secondary			-0.118+	0.070
General Secondary Degree			-0.343*	0.062
Technical Degree, With Secondary			-0.265*	0.088
University and/or Professional Degree			-0.891*	0.065
Year*Married	-0.008	0.008	-0.006	0.008
Year^2 *Married	-0.002*	0.001	-0.003*	0.001
Estimated Random Variance	3.051	0.129	2.339	0.107
Constant	-0.551*	0.054	1.613*	0.134
Sample N	30,312		30,312	

Notes: + p<0.10, * p<0.01

Year is centered
Source: Russian Longitudinal Monitoring Survey 1994-2016

Table 1.2 presents the main results of the generalized linear mixed effects

model. I present an unadjusted model, treatment and time with no covariates, and an

adjusted model with all covariates included. In both models I use a two-degree of freedom test, I test the interaction between year and marital status on poverty and find it to be significant (p=0.006). Including the quadratic interaction in unadjusted model, the squared interaction is significant. Once I include the covariates (adjusted), the interaction strengthens in statistical significance. This signals that there is sufficient evidence that there is a positive relationship between marital status and poverty over time and that relationship becomes slightly stronger over time. As expected, for an individual woman, being married significantly reduces the risk of poverty, this is consistent with the weighted means presented in Figure 1.1. Having a grandmother in the household, living in an urban environment, being older, having only one child, and being employed are all also significantly protective against poverty. Higher education, especially having a university degree versus less than secondary school reduces poverty risk.

The random intercept term in the unadjusted model is 3.051, with the added covariates the initial variability in poverty risk between individual women becomes smaller at 2.34. Using the covariates, we have accounted for some of the heterogeneity between our respondents' initial risk of poverty. This means that for the full model, initially 95 percent of women have a risk of poverty between (0.200, 0.990). This is a large range, thus we can assume there is a high heterogeneity between individual women in terms of their risk for poverty when they enter the sample.

Figure 1.2

Average Predicted Probability of Women with Children in Poverty by Marital Status in Russia, 1994-2016, weighted
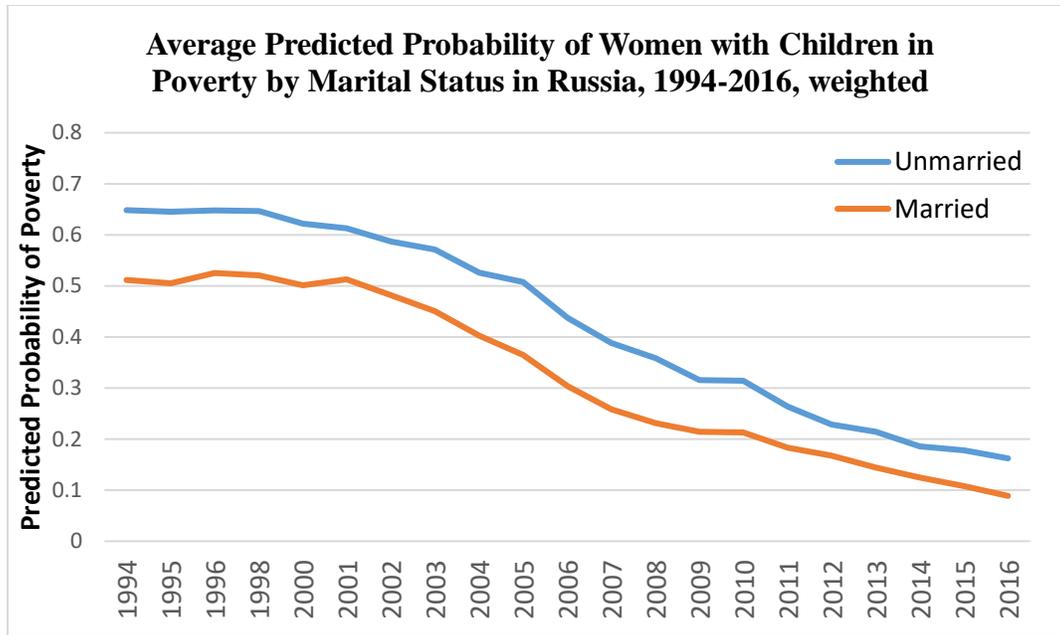
Source: Russian Longitudinal Monitoring Survey 1994-2016
N=30,312

Figure 1.2 presents the modeled average predicted probabilities estimated from the adjusted model in Table 1.2. It shows a decrease in general risk of poverty, in parallel with better economic conditions in the Russian Federation. Because model results indicate the decrease in the gap between married and unmarried mothers is significant, this indicates that over time the gap in risk of poverty for an individual woman who is married versus another who is unmarried becomes smaller. This conclusion affirms the main hypothesis, that the relationship between unmarried and married motherhood and poverty is not parallel. The overall model supports the assertion that marriage becomes less of a determinant of poverty despite the decreased state support over time.

Figure 1.3

Predicted Probability of Women with Children in Poverty by Marital Status in Russia at age 30 1994 – 2016, weighted
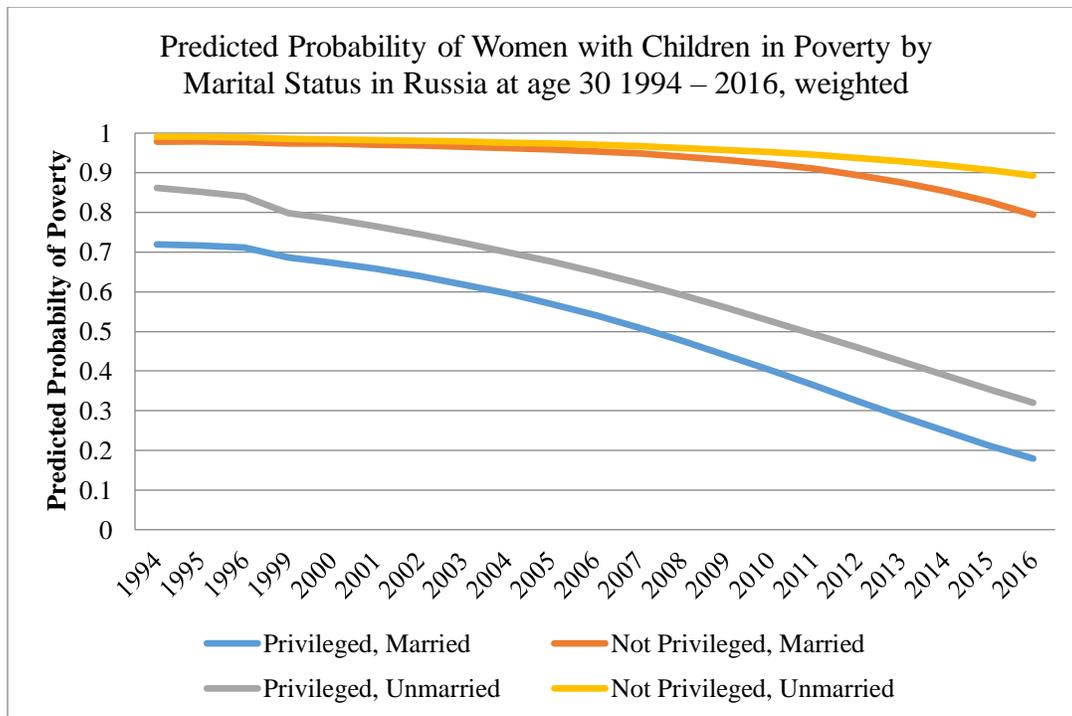
Source: Russian Longitudinal Monitoring Survey 1994-2016

To further this analysis, I compare the average probability of poverty for employed mothers age 30 who are relatively privileged to those who are less privileged. I define privilege based on characteristics that are protective of poverty: presence of a grandmother in the household, living in an urban setting, only one child, and highly educated. Lack of privilege is defined based on the absence of these characteristics, e.g. no grandmother in the household, living in a rural area, two or more children, and the lowest level of education. Both groups of women are employed because that is the modal category of women in Russia. Figure 1.3 shows the predicted probability of being in poverty for four groups: privileged, married; not privileged, married; privileged, unmarried; and not privileged, unmarried. The most interesting finding is that the marital status gap for privileged mothers is consistent over time whereas the gap increases in the late 2000s among less privileged mothers

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due to unmarried mothers higher risk of poverty. Therefore, amongst 30-year-old employed women, the gap between married and unmarried risk is very small until the late 2000's where there is a decrease in risk for married women. Even amongst the least economically and socially privileged group, marriage appears to become a deciding factor in the level of poverty when that was not the case in the ten years following the fall of the Soviet Union.

Conclusion

Transitional economies have been an interest of scholars for the last several decades, Russia being an important point of study. Observing not only how the market fares but also socioeconomic outcomes of individuals is important to assessing the progress of a vulnerable economy. The decision to study mothers in Russia has challenged the traditional assertion that market capitalism (specifically, a means-tested welfare system) will increase unmarried mothers poverty risk relative to married mothers for all women. While the model confirms that unmarried mothers are consistently at a higher risk, the gap between unmarried and married mothers poverty decreases over time. In all, marriage is a weaker predictor of poverty over time. What has remained consistent is the protective nature of grandmother's presence, as outlined by Utrata (2019). Having a grandmother in the household does not only bring in the extra pension income, but it allows the mother to receive consistent childcare and support. Grandmothers presence is protective against poverty in the United States as well, Snyder et al. (2006) find that for unmarried mothers, the presence of a grandmother resulted in a 31 percent lower odds of poverty. When we break it down and look at the most disadvantaged groups, we see a significantly

higher probability of being in poverty in the later 2000s for 30-year-old unmarried women compared to married women. There is more work to be done to pin down the mechanisms of what is driving unmarried mothers to not fall into poverty as intensely. More analysis can be done looking at network support in the RLMS. Both married and unmarried mothers were more likely to live with their grandmothers in the later year of RLMS. 31.7 percent of unmarried mothers lived with a grandmother in 2016 while only 23.7 percent of married mothers had a grandmother present. What we can see is that inferences about the life circumstances and chances of single and married mothers based on research on industrialized Western countries are not necessarily observed and economic consequences may operate differently in a context as unique as Russia.

There are several major limitations of this study. The first is the dependent variable of household poverty. This poverty measure focuses primarily on economic attainment, there is more nuance to poverty that may not be reflected in a minimum food basket price. I have also not controlled for any macro-economic factors, such as employment levels in the region during a particular year or general partnering trends. In future iterations of this project I hope to use macro-level economic trends to help explain some of the differences married and unmarried women may be facing over time.

An Application of a Revealed Preference Model: East and West German Partnering by Education 1992-2016

Abstract

Research has studied the longstanding effect of communism in East Germany and how demographic and social outcomes remain different in East Germany to this day. An important social determinant for future outcomes is one's own education and the education of their partner. I use the German Socio-Economic Panel to show educational assortative mating patterns between the East and the West. I use the Revealed Preference Model, a two-sided logistic model which gives the partnering probability as a function of both preferences and availability yet allows me to extract preference parameter estimates independent of availability. In the East, there is a higher proportion of lower educated men relative to lower educated woman, therefore giving higher educated women fewer choices to partner homogamously. In the West, there are more lower educated women than there are low educated men. Using the Revealed Preference Model, I estimate partnering matrices for the East and the West. In both regions homogamous relationships remained to be the most prevalent, followed by hypergamous then hypogamous. In West Germany and East Germany alike, educationally hypergamous partnerships were more preferable than hypogamous partnerships. Though the availability of higher educated partners in East and West Germany are different, with more medium and highly educated women in the East as shown in the bivariate analysis, the preference for hypergamy over hypogamy remains.

Introduction

Three decades after the fall of the Berlin Wall, economic and social differences persist in between East and West Germany. After World War II, the Soviet Union had control of East Germany and East Berlin from 1949 to 1990 and those regions were governed as socialist states. West Germany and West Berlin were a capitalist and democratic society. The fall of the Soviet Union and the subsequent reunification of Germany meant that East Germany was quickly returning to the same governing rules as West Germany and became the only post-Soviet country connected to a non-Soviet state.

East and West Germany are two former states that stand as a powerful natural experiment on what happens when one country is split in half and ruled under different regimes and then reunited once again. The East was ruled by the Soviets; therefore, they saw generous family policies that required all women and mothers to work (Klett-Davies 2007). West Germany, however, was observed to have better economic outcomes yet more conservative social policies. After unification, there was a large migration out of East Germany to the West and several trends have converged between the two former states. Scholars have long used East and West Germany to evaluate social, economic, and political trends in the separate states over time. Sociologists have explored how policy changes in Germany effect the East and West differently (Hanel and Riphahn 2011, Pfau-Effinger and Smidt 2011, Ziefle and Gangl 2014) and how family roles have developed in the two former states (Cooke 2007, Klärner 2015). Germany is additionally embedded in a wider context of increasingly more educated women relative to men in Europe (Nitsche et al 2018), and elsewhere, including the United States (DiPrete and Buchman 2006). Disparities

in the availability of women and men of the same education levels is expected to be a major driver of social adjustments both away from educational homogamy, in which women and men partner with those of equal education levels, and away from educational hypergamy, in which women partner with men of a higher education level (Blossfeld 2009).

In this paper I will use the German Socio-Economic Panel Study (SOEP) to explore how men and women evaluate the choice between partnering with someone of higher status, lower status and staying single between East and West Germany.

Literature Review

Finding an ideal partner is driven largely by the marriage market and two of the most important factors are availability and preference. Availability implies a compositional effect while preference implies a cultural effect. Discerning which element is at play in the partnering market can shed light on the mechanisms through which inequality operates and reproduces. For a heterosexual woman, the availability of possible partners depends on the number of eligible men in her geographic area. An imbalance in availability can come from gender selective migration or a traumatic national event such as war (Brainerd 2017, Abramitzky et al. 2011). After the fall of the Berlin Wall, on the county level, the sex ratio in East Germany was highly affected by female emigration to Western Germany due to a labor market that favors men but educational attainment structure that favors women. Therefore, women are left with fewer potential partners (Kröhnert and Vollmer 2012, Leibert 2016). If there are fewer men, a woman may be more lenient on her preferences for a certain type of man and therefore be more likely to marry a man of a different status than her own.

Preference is closely intertwined with the availability of partner but incorporates cultural and contextual influences that are not as easily discernable by purely population dynamics. Preferences may shift due to availability over time or cultural changes. In the assortative mating literature, preference can look like many things such as racial, religious, or ethnic dimensions (Schwartz 2013).

In this paper, I will be focusing on preference as it is defined by education and assuming that a similarly educated or more highly educated partner is desired. Recent demographic changes, such as a move to cohabitation, has been used as a possible explanation for the increase in educationally homogamous unions. A cohabitation can select successful, preferred, and homogamous couples into marriage and take heterogamous ones out. While heterogamous couples are more likely to divorce than homogamous ones, but they are not more likely to divorce as they move from cohabitation to marriage in the U.S. context (Schwartz 2010). In Eastern Germany under the communist regime, female education and employment was encouraged and supported by equal pay and childcare policies. The legacy of these policies persists today, with childcare quality and access still determining women's employment in Eastern Germany (Kalmijn 1994, Schober 2015, Zoch 2020). In the early 1990's, gender dynamics in Western Germany were more traditional than what was observed in Eastern Germany, especially when it comes to women combining marriage, employment, and children (Trappe and Rosenfield 2004). The culture of the importance of work for women remains strong to this day in Eastern Germany, with women returning to work quicker after having a child than in Western Germany where male breadwinning models are more common (Boelmann et al. 2020). In

Western Germany it is common for a woman to take a long, or indefinite, break from work after giving birth to her first child. The male breadwinner model in West Germany (and now all of Germany) is reflected not only in the behavior of West German families, but also the tax code which favors a single earner (Pfau-Effinger and Smidt 2011).

Some convergence in gender ideology has been observed between the East and the West, mostly with the West becoming more liberal, however the East remains to be consistently more egalitarian and unified in that ideology (Lee et al. 2007, Bauernschuster and Rainer 2012, Ebner 2020). With a culture of women being economically more equal to men, women in Eastern Europe may be more likely to choose to stay single rather than partnering with a man of lower education. If a woman does decide to partner in East Germany, is she likely to choose a more desirable partner considering the choice to stay single is more attractive? Men in the East have been found to do up to 4 more hours of housework and more likely to engage in childcare a week than men in the West (Cooke 2007). If the availability of the desired men is low (due to an economic structure that does not favor men's educational attainment), how much of the women's choice is left to preference? Zoch and Schober find in 2018 that education was a pivotal predictor of differing attitudes and use of childcare by women in the East versus the West, but not necessarily uniform in ideology *between* the two States (Zoch and Schober 2018). For example, low educated women in West Germany have shifted to less traditional ideologies while the low educated East German women shifted the other way with the new childcare accessibility increase across the country. The authors illustrate an example

of where the availability (public child care expansion) may have increased for all families, the unique history and experience of low educated women in the two states makes their preferences for childcare not align.

To my knowledge, there is only one study that has compared the educational homogamy patterns between East and West Germany. Grave and Schmidt (2012) use German Microcensus data from 1976 to 2005 and a one-sided logistic model to find that especially for newly married couples, homogamy is more prevalent in East versus West Germany. Several studies have explored assortative mating across cultural, political, and historical contexts that include Germany. In an evaluation of over 50 countries in the 1970's and 1980's, there is a negative relationship between modernization of the country (which depends on labor force participation in agriculture and per capita) and homogamy (Smits et al. 1998, Smits et al. 2000, and Smits 2003). However, post-socialist countries do not fit the same traditional definition of modernization as most of Eastern Europe levels of economic inequality and instability increased in the last several decades (Katrnak et al. 2006). In more recent years, in an analysis of 22 countries in Europe, Germany had one of the top rates of educational homogamy, joining other post-communist countries (Domanski and Przybysz 2007). Germany was also one of the few countries (joined by Poland, Estonia, and Slovenia) and the only Western European country in a European study where the men's education had a positive effect on being partnered but women's education did not (Kalmijn 2013). Germany is unique with its Western European rule but influences of Eastern European culture, making it a good candidate for how the regimes differ to this day.   A study by Stauder and Kossow aims to address how the

partnering market in Germany is influenced by availability. Authors use logistic regression, linear probability models and average marginal effects at the individual level using SOEP data. This study, however, does not compare between East and West Germany (Stauder and Kassow 2021). The current study builds on Stauder and Kossow's work by comparing partnering behavior in East and West Germany and by using a two-sided choice modeling framework in estimating preference difference.

Research Questions

What patterns of educational homogamy, hypergamy, and hypogamy are found in partnering in East versus West Germany? What are the availability differences by educational attainment between East and West Germany? How much of the difference in partnering in East versus West Germany is due to the availability of a partner versus a preference of and for a desirable partner?

Data and Methods

Data

The SOEP is an annually collected representative longitudinal survey of households in Germany with data collection beginning in 1984 (Socio-Economic Panel 2019). In 1990, the survey was expanded to include a sample from East Germany. Several large samples were added into the survey to account for survey attrition, immigration, and other macro demographic changes that affect the representative nature of the survey. The 1984 sample covered approximately 9,000 individuals; in 2017 the survey covers approximately 33,000 individuals. The only ways of entering the survey are birth,

residential mobility, partner into the survey, or new sample and the only way to exit is

through death, moving abroad, or non-response. All household members that are 16

years or older are eligible for a personal interview. Once young sample members age

into independent adults they move away from their original household and the survey

follows as long as they stay within Germany, and their new family become sample

members (Goebel et al. 2019).

For this analysis I will be using the maximum amount of years available for

both East and West German exposure: 1992-2016. In total, there are 95,380

individuals at risk of partnering. 5,704 men and women entering into a new

partnership starting in the year 1993 and 89,676 remaining single.

Key Variables

Education

SOEP provides three main summarizing variables for the measurement of education;

Comparative Analysis of Social Mobility in Industrial Nations (CASMIN),

International Standard Classification of Education (ISCED), and years of completed

education. CASMIN and ISCED are both generated using information on completed

degrees and certificates. I choose to use the ISCED (Schneider 2008). The ISCED

scale was revised in 2011 from the ISCED 1997 to ISCED 2011 scale, SOEP reported

the ISCED 1997 since the start of the survey but began reporting ISCED 2011 in

2009. I therefore use the ISCED 1997 scale up to 2009 and thereafter use ISCED

2011. I follow the practice of Eurostat in dividing the scale into three categories: low,

medium, and high (Eurostat 2020). Low education contains those who are still in

school or have completed at most lower-secondary schooling. Medium level of education includes upper secondary as well as vocational schooling. Higher education includes tertiary education such as a bachelor's degree and above. I am not using education to compare across countries and therefore internal consistency amongst categories what is most important, the choice of ISCED as the scale of choice is also influenced by not being missing in the data as often as CASMIN. Table A2-1 in the appendix presents the levels of the ISCED classifications and the corresponding German educational qualifications in Germany and how I divided that into the three categories used in this paper.

Partnership

Respondents identify what type of relationship they are in, the choice is no relationship, cohabiting, and married. Every survey year, if a respondent is identified as cohabiting or married, a partner identifier is collected. With that information I have created a partner-year data set where each partnership and each single person serve as their own observation. For this study, I am focusing on heterosexual relationships between a person who identifies as a man and a person who identifies as a woman in the survey. I observe not only marriages but also cohabitations. Given being in a partnership is a good predictor of birth and high non-marital fertility rates in Germany, it is important to include a wider definition of partnership. Cohabitation is more prominent in the East and is less likely to lead to marriage, but childbearing rates remain high (Kreyenfeld and Konietzka 2010). To identify a new partnership, I determine whether a respondent went from being single to either cohabiting or married. Also, a respondent can go from cohabiting to married or from

cohabiting/married to one person and then cohabiting/married to a new person the next year and that is considered as entering into a partnership.

Geography

Since reunification in 1990, East Germany has lost 1.2 million people through internal migration. Therefore, the indication of East or West status in the SOEP as it pertains to partnering is non-trivial as many participants have moved over time. Less than one percent of person-year records in the SOEP have experienced a move between East and West Germany. This is likely due to attrition, as those who moved are difficult to track in a panel survey. In this study, I identify East versus West by the location at year of entry for those who remain single the whole time of exposure. For those who partner, their East versus West designation is determined by their location at the time of partnering to ensure identical geographic identification for both partners.

Weighting

SOEP provides documentation on standard weighting practices for data analysis using the SOEP data (Pannenberg et al 2005, Siegers et al. 2020). Both cross-sectional and longitudinal weights are provided. The cross-sectional weights are ideal when using one year of the data and the longitudinal weights are useful when people are followed over several years. In this analysis, I am using every year as a cross-section, but I will still need to take into consideration how the sample will change over time because I am relying on the partnership status on the year before observation. In order to maintain a representative sample and keep up with the changing German population, SOEP introduces several refresher samples between 1992 and 2016. Weights become

crucial in understanding any population level results using these data. The longitudinal weights represent a staying probability from one year to the next, but the longitudinal weights need the cross-sectional rates to also account for that year's population structure. I will use the cross-sectional weights for this analysis when using the RPM as the RPM relies on weights specific to partnership and sample entry rather than change over time.

Statistical Methods

The goal for this study is to determine how much of the heterosexual partnering trends are driven by the availability of desirable partners and how much is driven by the preference for a desired partner. This type of matching problem is unique considering all actors can choose only one partner or they can choose to remain single. In a modeling framework, partnership is a two-sided process and both partners need to decide to partner. Qian and Preston introduce the use of data on partnering transitions (in their case, from marital history questions in the Current Population Survey) to evaluate individuals' characteristics before they partner and the characteristics of the partner they choose (Qian and Preston 1993). Qian and Preston calculate the "force of attraction" (in this study, preferences) which can be differentiated from the availability of partners in the market who are of that exact observed type for which that attraction is estimated. Several studies since then have gone further methodologically to improve the model to include also availability of other types of prospective partners that can be "substituted" as needed to achieve a match (Choo and Siow 2006, Dupuy and Galichon 2014, and Menzel 2015).

To best approach this studies questions, I will use a Revealed Preference Model (RPM; Goyal et al 2020), which represents a development and implementation of the Menzel (2015) model. The RPM is useful in this context because a partnership is a two-sided process and both partners need to decide to partner and because the SOEP has individual panel data to observe participants before and during a new partnership (Goyal et al. 2020). Theoretically, everyone would prefer a partner with the most socially desired attributes, in some contexts that can mean, high education, wealth, and labor market position. However, every society does not have an unlimited amount of highly desirable individuals. Using SOEP data with the RPM is ideal because from the RPM we measure the characteristics (in this case, education) of people when they are single and when they experience an observable outcome (in this case, partnership), both available in the longitudinal format of the SOEP. From the results of the RPM I can discern how individuals will choose to behave based on what they have available *and* who they actually end up choosing to partner with.

The model assumes that every individual has their own starting utility and that an individual's goal is to maximize their utility with the partners available in their market. Using the RPM means that I am assuming that all single men want to partner with one single woman and that all single women want to partner with one single man. Using a two-sided logit, the model gives us the partnering probability that is a function of both *preference* and *availability* and allows us to extract preference parameter estimates that are independent of availability. Availability, in this case, is the sex ratio and the educational distribution of each sex. The two-sided logit contains for each woman and each man, two portions of their utility achieved from a particular

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pairing: the deterministic and the random utility component. The random component accounts for unobserved information about the population (in this case: age, race, socioeconomic status, and other metrics not captured by education). The total utility of the pairing represents the couple's gains to partnering, independent of availability, and is the sum of the woman's and the man's utilities from that pairing.

The RPM adjusts for unequal probability between those who partner into the sample (newly married or cohabiting with a person already sampled, 'flow') versus those who were in the sample and then partnered ('stock'), described as a "stock-flow" sample (Rendall et al. 2021). The SOEP follows a stock-flow sample, as those who were sampled into the initial survey are considered the stock and those who come in to partner are flow.

First, I present several simple weighted bivariate results to describe the SOEP data that I am using. I look at the educational distribution of men and women at risk of partnering in East and West Germany to illustrate differences availability. I show the distribution of hypergamous, homogamous, and hypogamous unions among new partnerships in East versus West Germany to further inform what I might expect to see in the RPM results. In both bivariate analysis I run chi-squared tests to determine whether the differences in the Eastern and Western German distributions are statistically significantly different.

To run the RPM, I used an open-source R package `rpm` (Hancock et al. 2021). Next, using the RPM model, I present the modeled partnering matrix. The partnering matrix is a 4x4 table with the proportion of the population in each category: newly partnered by own and partners education or single by own education. I will show the

results for three models which inform all calculations modeled in the RPM: one on all of Germany, Western Germany, and Eastern Germany. My results will show the relative utility of partnering to remaining single and the log odds of remaining single.

Results

Table 2.1: Educational Distribution for Men and Women at Risk of Partnering in West and East Germany, ages 18-59, 1993-2016 Weighted

		West+		East+	
		Men	Women	Men*	Women*
Education	Low	0.240	0.252	0.177	0.175
	Medium	0.569	0.555	0.606	0.559
	High	0.191	0.193	0.218	0.266
	Sample N	32,317	36,397	12,681	13,985

Source: German Socio-Economic Panel Study 1992-2016
Notes: Chi-squared difference tests included (+ within region between gender: West=15.8 p=0.02, East=89.3 p<0.01, * within sex between region: Men=189.4 p<0.01, Women 451.7 p<0.01)

Table 2.1 represents the weighted educational distributions of the men and women in Germany by region in the sample of interest, those who are at risk of partnering. In Western Germany, 24.0 percent of men have a low education, 56.9 percent have a medium education, and 19.1 percent have a high education out of a total of 32,317 men. Of 36,397 women in Western Germany, 25.2 percent have a low education, 55.5 percent have a medium education, and 19.3 percent have a high education. The distribution of education is statistically different between men and women in Western Germany. In Eastern Germany, 17.7 percent of men have a low education, 60.6 percent have a medium education, and 21.8 percent have a high education out of a total of 12,681 men. Of 13,985 women in Eastern Germany, 17.5 percent have a low education, 55.9 percent have a medium education, and 26.6

percent have a high education. Like in Western Germany, the distribution of

education is statistically different between men and women. Importantly, we can say

that for Eastern Germany, the education distributions of women and men are unequal

such that unpartnered Eastern German women are more educated than are

unpartnered Eastern German men. In Western Germany, the opposite is true, there are

more unpartnered low educated women than the unpartnered West German men.

Between West and East Germany, West German men's educational

distribution is statistically different than East German men's distribution. More men

in the East are in the medium education group and fewer are in the low education

category. West German women's education distribution is statistically significantly

different than East German women. Fewer women in the East are in the lower

educated group and more women are in the medium and higher educated group than

in the West.

Table 2.2 Sex Ratios in Germany for Men and Women at Risk of Partnering 1992-2016

	Germany	West Germany	East Germany	Chi-Square
Women	52.5	52.5	52.5	0.0091
Men	47.5	47.5	47.5	p=0.981
Sample N	95,380	68,714	26,666	

Notes: Ch-square is a test for gender differences between East and West Germany.
Source: German Socio-Economic Panel Study 1992-2016

Also of importance are the sex ratios in Western Germany and in Eastern

Germany. In table 2.2, the proportion female in Western Germany in this age group

of unpartnered individuals is virtually identical to the Eastern German proportion

female with no statistical difference (p=0.981). In all of Germany, there are more

women at risk of partnering (52.5 percent) than men at risk of partnering (47.5

percent).

Table 2.3: Annual Distribution of Hypergamy, Homogamy, and Hypogamy for Women Among New Partnerships in Western and Eastern Germany, ages 18-59, 1993-2016 Weighted

	West	East	
All			*
Hypergamy	0.232	0.182	
Homogamy	0.566	0.640	
Hypogamy	0.201	0.178	
Low Education			
Hypergamy	0.750	0.659	
Homogamy	0.250	0.341	
Hypogamy	-	-	
Medium Education			
Hypergamy	0.204	0.187	
Homogamy	0.695	0.729	
Hypogamy	0.103	0.084	
High Education			
Hypergamy	-	-	
Homogamy	0.479	0.544	
Hypogamy	0.521	0.465	

Source: German Socio-Economic Panel Study 1992-2016, N=4,210 West Germany
and N=1,494 East Germany
Notes: Group differences from chi-squared (West vs. East), * $p < 0.05$

Table 2.3 presents the distributions of women who are newly partnered by

whether the partnership is educationally hypergamous, homogamous, or hypogamous,

both overall and for each educational level of newly partnered women. Overall, in the

East, more women are likely to choose a partner of equal education (homogamous)

than in the West. The rest of the women's new partnerships are approximately equally

dispersed between hypergamy and hypogamy in both Western and Eastern Germany. In Western Germany, 23.2 percent of partnerships are hypergamous, 56.6 percent are homogamous, and 20.1 percent are hypogamous. In the East, 18.2 percent are hypergamous, 64.0 percent are homogamous, and 17.8 percent are hypogamous. The differences in distributions between East and West are statistically significant when looking at all education groups. Referring back to the overall male and female education distributions from Table 2.1, in the West the educational distribution between men and women is more similar than in the East, which has more low and medium educated men than women and fewer highly educated men than women. It is therefore somewhat surprising to see homogamous partnering being less common in the West than in the East. However, there is also the option to remain single each year. These results support the findings by Grave and Schmidt (2012) who similarly find homogamy persistently higher in the East versus the West over time. The unbalanced educational distributions by gender in the East, for example, could result in women in the East who are in the medium education category, having fewer options to partner with someone of higher education, choosing either to partner someone of their own education or stay single. Moving these data into the RPM, however, will allow me to address further aspects of the relationship between preferences and availability that a one-sided logistic regression may not.

To better understand which group may be driving the overall differences in homogamy versus hypergamy or hypogamy, I also used chi-squared analysis to test within individual education groups. None of the within education differences were statistically significant, however remain substantially interesting. Among women who

are in the medium education group, in the East, women are more likely to choose a partner of their own education than in the West (72.9 versus 69.5 percent, respectively, p>0.05). In both East and West, hypergamy is more common than hypogamy among those women not partnering homogamously.

Among newly-partnered women who are in the high education group, women in the East are again more likely than are women in the West to partner homogamously (54.4 versus 47.9 percent, respectively, p>0.05). This may be restated by saying that newly-partnered high educated women in the West are more likely to partner hypogamously than in the East (52.1 versus 46.5 percent, respectively).

Tables 2.4 and 2.5 present the predicted distributions of women and men available for partnering by both whether they partnered in the year and with what educational level of partners as estimated by the RPM. The proportions in each table sum to 1, distributing the full population of both available women and men by partnering outcome. Each number in the table is therefore a proportion of all partnering outcomes, including women remaining unpartnered and men remaining unpartnered. These outcomes are functions of both availability and preferences, respectively within Eastern Germany and within Western Germany. They are presented as descriptive findings that I subsequently elaborate on with analyses of similarities and differences in preferences between the East and West.

Table 2.4: Western Germany New Partnerships by Education of the Woman and the Man, ages 18-59, 1993-2016 Weighted

| | | Men's Education | | |
	Low	Medium	High	Remained Single
Women Low	0.0015	0.0036	0.0005	0.1171

Medium	0.0019	0.0127	0.0045	0.2543
High	0.0003	0.0031	0.0044	0.0878
Remained Single	0.1242	0.2889	0.0956

Source: German Socio-Economic Panel Study 1992-2016 N=68,714.

Table 2.4 represents the weighted partnering matrix for Western Germany as it is predicted by the RPM model. The sample includes 30,212 single men, 34,292 single women and 4,210 people entering a new partnership. Unweighted, this represents an annual partnering rate of 0.062. Using weights as a result of the RPM calculations, the partnering annual rate is 0.032. As noted above, in table 2.1, there are more men than women in Germany. As a consequence, there are estimated to be more single men than women (50.8 versus 45.9 percent, respectively). The most common new partnership overall is a homogamous relationship between a medium educated woman and a medium educated man (1.27 percent). Next is a hypergamous relationship between a medium educated woman and a highly educated man (0.45 percent) followed closely by a homogamous high educated relationship (0.44 percent). By far the least common new partnerships were amongst a highly educated woman and a low educated man (0.03 percent) and amongst a highly educated man and a low educated woman (0.05 percent). Looking at the adjacent off-diagonal proportions, hypergamy is seen to be much more common than hypogamy both in low and medium educated pairings and in medium and high educated pairings. Hypergamous low and medium educated pairings accounted for 0.36 percent whereas hypogamous low and medium educated pairings accounted for only 0.19 percent of all partnering outcomes. Hypergamous medium and high educated pairings accounted

for 0.45 percent whereas hypogamous low and medium educated pairings accounted

for only 0.31 percent of all partnering outcomes. Given the relatively balanced

education distributions by gender and given the greater overall scarcity of women

than men available for partnering in West Germany, this result favoring hypergamy

over hypogamy in the realized pairings is surprising from an availability perspective.

We see below that it may be explained by a preference for hypergamy over

hypogamy in West Germany that is found in the estimated RPM parameters.

Table 2.5: Eastern Germany New Partnerships by Education of the Woman and the Man ages 18-59, 1993-2016 Unweighted

		Men's Education		
		Low	Medium	High	Remained Single
Women's Education	Low	0.0009	0.0023	0.0001	0.0816
	Medium	0.0014	0.0138	0.0032	0.2564
	High	0.0000[a]	0.0032	0.0045	0.1224
	Remained Single	0.0917	0.3083	0.1103	

Source: German Socio-Economic Panel Study 1992-2016. N=26,666
[a] rounded from 0.00003

Table 2.5 represents the weighted partnering matrix for Eastern German as it

is predicted by the RPM model. The sample includes 11,934 single men, 13,238

single women and 1,494 people entering a new partnership. Unweighted, this

represents an annual partnering rate of 0.032. Using weights as a result of the RPM

calculations, the annual partnering rate is 0.029. The percentage of the population in

the East that are single men and single women are similar to the Western German

distribution (51.0 and 46.0 percent respectively). However, in Eastern Germany there

are more single highly educated women than in Western Germany (12.2 percent

versus 8.8 percent). The most common new partnership is a homogamous medium educated relationship (1.4 percent), followed by a homogamous highly educated relationship (0.45 percent). The least common new partnerships are similar to Western Germany, those between low and high educated partners, with 0.01 percent of the population entering a new partnership between a highly educated man and a low educated woman and with less than 0.01 percent of the population entering a new partnership between a highly educated woman and a low educated man.

Looking again at the adjacent off-diagonal proportions, hypergamy is seen to be more common than hypogamy in low and medium educated pairings, whereas hypergamy and hypogamy are equally common in medium and high educated pairings. Hypergamous low and medium educated pairings accounted for 0.23 percent whereas hypogamous low and medium educated pairings accounted for only 0.14 percent of all partnering outcomes. Hypergamous medium and high educated pairings and hypogamous high and medium educated pairings each accounted for 0.32 percent. This identical fraction of hypergamous and hypogamous medium and high educated pairings occurs in a context of substantially greater fractions of East German women with high educational attainment than for East German men, and so is again surprising from an availability perspective. We see immediately below that it may again be explained by a preference for hypergamy over hypogamy, this time in East Germany, as shown in the estimated RPM parameters.

Table 2.6: Revealed Preference Model Output for All of Germany, Western Germany, and Eastern Germany

		Germany		Western Germany		Eastern Germany	
Education		Estimate	Standard Error	Estimate	Standard Error	Estimate	Standard Error
Woman	**Man**						
Low	Low	-2.974	0.086 **	-2.959	0.104 **	-2.832	0.214 **
Medium	Low	-3.505	0.078 **	-3.513	0.067 **	-3.532	0.164 **
High	Low	-4.557	0.23 **	-4.193	0.252 **	-6.494	1.799 **
Low	Medium	-2.97	0.065 **	-2.94	0.07 **	-3.073	0.119 **
Medium	Medium	-2.446	0.027 **	-2.446	0.033 **	-2.438	0.056 **
High	Medium	-2.896	0.072 **	-2.799	0.064 **	-3.158	0.108 **
Low	High	-3.942	0.165 **	-3.756	0.195 **	-5.373	1.516 **
Medium	High	-2.509	0.057 **	-2.373	0.063 **	-2.899	0.11 **
High	High	-1.462	0.058 **	-1.375	0.062 **	-1.771	0.105 **
Log Odds of Remaining Single							
Low		4.69	0.055 **	4.65	0.06 **	4.791	0.113 **
Medium		4.216	0.025 **	4.21	0.024 **	4.229	0.052 **
High		4.125	0.05 **	4.051	0.042 **	4.336	0.074 **
	Low	4.722	0.064 **	4.665	0.053 **	4.9	0.141 **
	Medium	3.88	0.026 **	3.857	0.032 **	3.955	0.046 **
	High	3.576	0.036 **	3.492	0.045 **	3.847	0.072 **
Sample N		95,380		68,714		26,666	

Source: German Socio-Economic Panel Study 1992-2016
Notes: Significance level represents difference between partnering and remaining single** $p<0.01$ and * $p<0.05$

Table 2.6 presents the results estimated by the RPM for all of Germany, West Germany alone, and East Germany alone. The first nine rows represent the estimated utilities of those couples relative to each partner remaining single. As mentioned in the methods, the RPM is a model that evaluates the preferences in parameter estimates for each pairing, and outputs also the log odds of remaining unpartnered relative to partnering for women and men by each educational level. The parameter estimates for each pairing are interpreted as utilities representing the sum of the woman's preference for the specific pairing and the man's preference for the specific pairing. More specifically, the unit of measurement is the couple rather than the

individual man or woman. For example, for a partnership between a low educated man and a low educated woman in Germany (East and West Germany combined) has a coefficient of -3.294. The coefficient represents the sum of the preferences for that partnership for the man relative to his remaining single in that year and for the woman relative to her remaining single in that year. Jointly, the sum of their preference is negative and thus on average they would prefer to remain single rather than partner with each other in that year. As with a one-sided logit, however, depending on the value of the unobserved disturbance terms, some will nevertheless become partnered, while the others will remain single. The choice to remain single in that year, of course, leaves open the possibility to form a partnership in each of the subsequent years within the age range of the model.

All the utilities are negative, this means that to remain single is on average preferable relative to partnering in any of the partnering categories and across both East and West Germany. In East and West Germany, the coefficient when partnering is significantly different than that of remaining single. The lower the utility (that is, the more negative the estimated coefficient), the less desired that partnership is relative to remaining single. A single coefficient alone can only go as far as to tell the reader its relation to being single but comparing the coefficients can identify more nuanced relationships. Of particular interest are the educational gradient and the preferences for educational homogamy, hypergamy, and hypogamy. In the West and in the East the lowest utility is between a highly educated woman and a low educated man, or vice a versa. The most preferred coupling, next to each partner remaining single, is a homogamous relationship between two highly educated people, both

within East and West Germany (-1.771 and -1.375, respectively). The preference for

these homogamous partnerships has a monotonically negative relationship with

education, the lower the education, the lower the preferability relative to remaining

single. That is, in both East and West Germany a positive educational gradient in

preferences with respect to homogamous relationships is seen, with homogamous

relationships between medium educated and low educated women and men being

successively less preferred (-1.771 and -1.375 high educated, -2.438 and -2.446

medium educated, and -2.832 and -2.959 low educated, respectively).

The log odds of remaining single are presented separately for women and men

in Table 2.6. Unlike the preference coefficients, they represent a combination of

availability and preferences. In this context, the log odds show that the preference and

the composition of the population are more favorable to remaining single in the East

than in the West, especially for higher educated woman (4.336 versus 4.051,

respectively).

Figure 2.1

Partnering Preference Parameters in Western Germany resulting from the RPM

Hypergamy			Homogamy			Hypogamy		
Woman Low; Man Medium	Woman Low; Man High	Woman Medium; Man High	Woman Low; Man Low	Woman Medium; Man Medium	Woman High; Man High	Woman Medium; Man Low	Woman High; Man Low	Woman High; Man Medium
-2.940	-3.756	-2.373	-2.959	-2.446	-1.375	-3.513	-4.193	-2.799
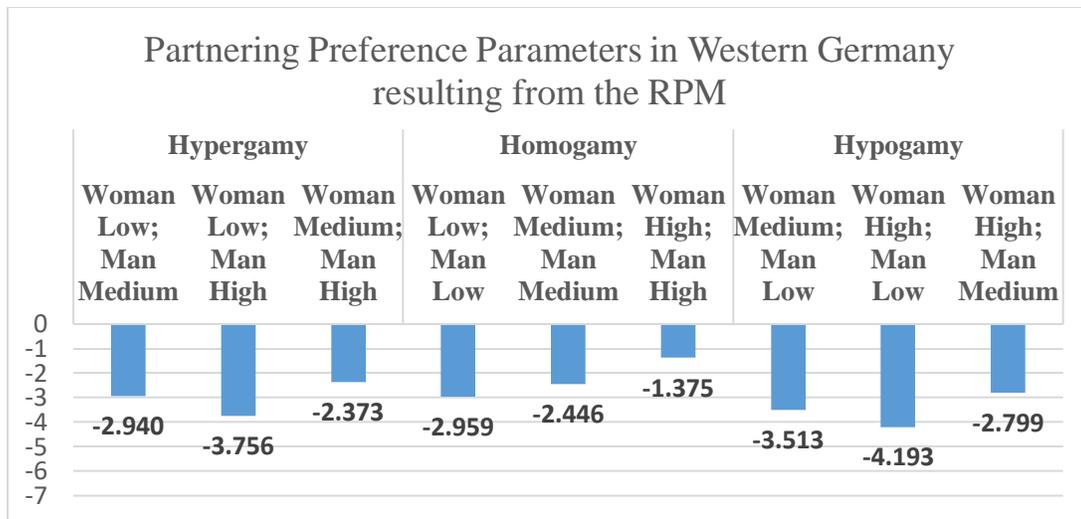
Source: Germany Socio-Economic Panel Study 1992-2016

Figure 2.1 organizes the preference parameters in the West into hypergamous, homogamous, and hypogamous relationships. This is useful especially for comparing hypergamous to hypogamous relationships between the same two education categories. Overall, hypergamous relationships are slightly preferable to hypogamous relationships in every inverse category. Focusing first on relationships between adjacent educational categories, the joint preference of a low educated woman partnering with a medium educated man is -2.940 while for a low educated man partnering with a medium educated woman the coefficient is -3.513, a difference that is statistically significant ($p<0.05$). The joint preference of a medium educated woman partnering with a high educated man is -2.373 while for a medium educated man partnering with a high educated woman the coefficient is -2.799, a difference that is statistically significant at $p<0.05$.

Within the hypogamous group, the least preferable partnership is between a highly educated woman and low educated man, followed by a medium educated woman and a low educated man, and a highly educated woman partnered with a

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medium educated man, all statistically significantly different from each other. Hypergamous partnering follows a similar pattern to hypogamous partnering, with the pairing of a low educated woman and a highly educated man having the lowest utility (-3.756).

Figure 2.2

Partnering Preference Parameters for High Education in Eastern Germany resulting from the RPM

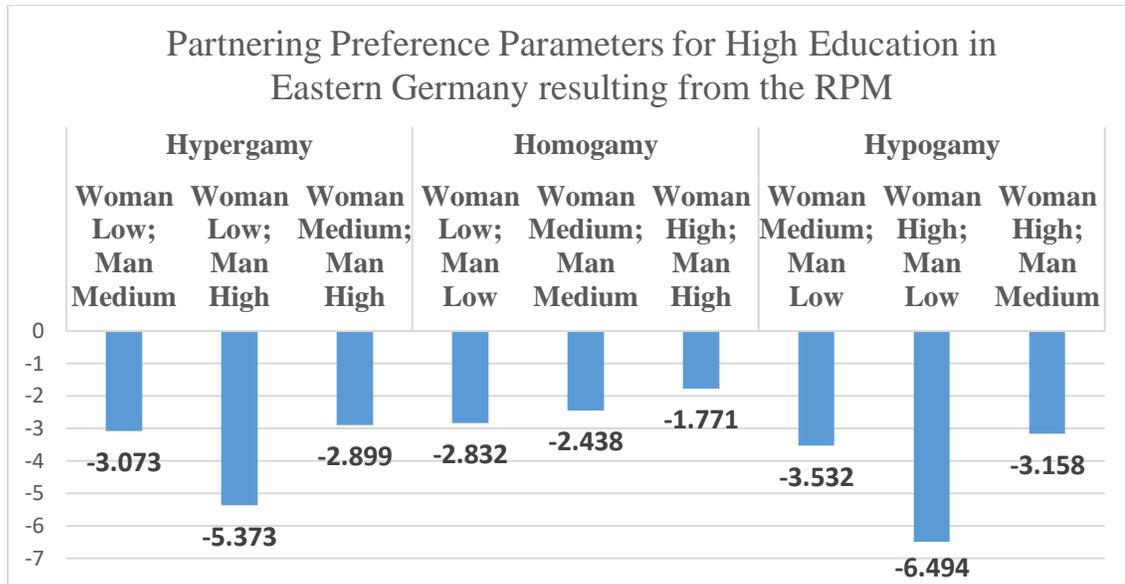| Hypergamy			Homogamy			Hypogamy		
Woman Low; Man Medium	Woman Low; Man High	Woman Medium; Man High	Woman Low; Man Low	Woman Medium; Man Medium	Woman High; Man High	Woman Medium; Man Low	Woman High; Man Low	Woman High; Man Medium
-3.073	-5.373	-2.899	-2.832	-2.438	-1.771	-3.532	-6.494	-3.158

Source: Germany Socio-Economic Panel Study 1992-2016

Like Figure 2.1, Figure 2.2 organized the preference parameters in the East into hypergamous, homogamous, and hypogamous relationships. The patterns in the East follow closely the patters in the West. East Germany has a much lower population than the West and therefore a smaller partnering population, so some significance testing is lost to a smaller sample size. Homogamous unions are the most preferable out of all nine unions with a highly educated homogamous union losing the least amount of utility from partnering. There is also a statistically significant difference between the joint preferences of a homogamous low educated and medium educated couple (-2.832 vs -2.438). Like in the West, hypergamous partnerships have

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a higher coefficient than their inverse hypogamous relationship. In particular, a partnership between low educated woman partnered with a medium educated man has a coefficient of -3.073 versus the inverse, a medium educated woman partnered with a low educated man has a coefficient of -3.939 (p>0.05). A partnership between medium educated woman partnered with a high educated man has a coefficient of -2.899 versus the inverse, a high educated woman partnered with a medium educated man has a coefficient of -3.158. However, this difference between the hypergamous and hypogamous version of the pairing is not statistically significant. Partnerships between a low educated and high educated person are similarly different between the hypergamous and hypogamous version (the former magnitude less negative, however this is again not statistically significant in Eastern Germany.

Conclusion

The use of the RPM to examine East and West German differences in partnering behavior joins the vast amount of literature that explores the longstanding effect of communism in East Germany. The RPM is a two-sided logistic model which gives us the partnering probability as a function of both preferences and availability yet allows us to extract preference parameters estimates independent of availability. In this paper I used data from the SOEP to evaluate partnerships in a unique way that has not been used in the family sociological literature. From the SOEP, I find that among the population of 18-59 year old adults at risk of partnering, most are in the medium education level in both regions. The market for at risk of partnering men and women in the East versus the West is not different in sex ratio, but there is an

educational distributional difference. In the East, there are a higher proportion of lower educated men relative to lower educated women, therefore giving higher educated women fewer choices to partner homogamously. The people who are partnering are doing so mostly homogamously, partnering with a person with the same education level as themselves, this is especially evident in the East with over 10 percent more of the new partnerships being homogamous. Despite having fewer highly educated men to choose from in the East than the West, highly educated women in the East are still less likely to partner somebody of a lower education status. In the West, there are more lower educated women than men, therefore it is not surprising to see increased hypergamy in the West.

Using the Revealed Preference Model, I estimate partnering matrices for the East and the West. In both regions homogamous relationships remained to be the most prevalent, followed by hypergamous then hypogamous. The preference for these homogamous partnerships has a monotonically negative relationship with education, the lower the education, the lower the preferability relative to remaining single. That is, in both East and West Germany a positive educational gradient in preferences with respect to homogamous relationships is seen, with homogamous relationships between medium educated and low educated women and men being successively less preferred. Partnerships between adjacent education levels were the next most common after homogamous and low-high education partnerships were the scarcest. The RPM estimated parameters then showed the chosen partnerships independent of availability at the partnership level rather than individual. In West Germany and East Germany alike, educationally hypergamous partnerships were most preferable.

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Though the availability of higher educated partners in East and West Germany are different, with more medium and highly educated women in the East as shown in the bivariate analysis, the preference for hypergamy remains. These results join past research which identifies convergence in ideology between the East and the West (Ebner et al. 2020, Baurenschuster and Helmut 2012). In the most recent data, Zoch 2021 finds that several dimensions of gender ideology have converged like attitudes toward housework and female employment. However, attitudes on *maternal* employment remain different between the two regions. Future research can explore couples after they partner and have children, it may be that ideological differences come in to play after childbearing and therefore more evident in divorce patterns. Bivariate and one-sided logistic statistical analysis on education level assortative mating have been, and remain to be, informative in identifying patterns of hypergamy, homogamy, and hypogamy in populations globally. However, with this paper I engage with an innovative statistical method that has the potential to allow demographers to further in differentiating mechanisms that drive two people to partner. The RPM has capabilities beyond what I have shown here, and future research should lean toward this method to confirm or challenge existing sociological literature.

Relative Education and Divorce in the United States 1996-2017

Abstract

Studies of divorce in the United States have yielded mixed results about the statistical

significance the direction of association with education over the last several decades.

The present study uses the Survey of Income and Program Participation (SIPP) 1996,

2001, 2004, 2008, and 2014 Panels. The use of the SIPP allows nearly two decades

worth of data with frequent newly-sampled panels, providing an accurate

representation of the contemporary United States. This paper evaluates recent

associations between education and divorce, using not only a women's own

education, but also the education of her ex-partner and their relative education. A

model estimating divorce risk using women's own education, men's own education,

and their relative education levels reveal several persistent patterns. Women's divorce

risk decreases monotonically as education increases, so highly educated women have

the lowest rate of divorce. Men's education, however, is less of a determinant on the

risk of divorce. Relative to hypergamy and homogamy, hypogamous unions (woman

marrying a man of a lower education status than herself) were more likely to divorce.

This study supports past research that finds the female breadwinner model the most

volatile when it comes to likelihood of divorce and continued support for this trend

into the 2010s.

Introduction

The individual-level likelihood of divorce has been a topic not only explored

by social scientists concerned with the growing inequality for future generations. The

marriages of low-income women did not so much need to learn more about healthy relationships, but rather needed concrete support such as job security and childcare (Sawhill 2002, Lichter et al. 2004, Cohen 2015, Cohen and Pepin 2018). Education is a major indicator of socioeconomic status and advantage, playing a role not only in partnership dissolution, but also family formation and fertility. In particular, highly educated women are less likely to have a child outside of marriage, more likely to get married later, and more likely to have children later (Cherlin 2005, McLanahan 2004, Lundberg and Pollak 2015, McLanahan and Jacobsen 2015). Studies of divorce in the United States have yielded mixed results about the statistical significance and the direction of association with education over the last several decades. The last half century saw several important trends that affect divorce, two of which are: an increase of married women in the workplace and women reaching higher education levels than men (DiPrete and Buchmann 2006).

To estimate differences in divorce risks, demographers have used both smaller-scale specialist surveys such as the National Survey of Family Growth (NSFG) and large-scale surveys such as the American Community Survey (ACS), the Current Population Survey, and the Survey of Income and Program Participation (SIPP). I will discuss the current literature and the authors consensus on how education is associated with marriage outcomes and how this research has evolved in the last several decades. This study will use the SIPP to explore recent associations between education and divorce that considers not only a women's own education, but the education of her partner/ex-partner and their relative education.

Literature Review

Several studies have explored the educational gradient in divorce for women in the United States. These studies vary in outcome and data sources used. Most agree that a negative educational gradient in divorce first emerged in the 1980s (Smock and Schwartz 2020). Moreover, earlier studies (e.g., Lundberg et al. 2016, Aughinbaugh et al. 2013, Martin 2006; Härkönen and Dronkers 2006, and Raley and Bumpass 2003) have looked at divorce from a "one-gender" perspective that attends only to the woman's educational level. Using older marriage cohorts in the National Survey of Family Growth, the relationship between education and marital dissolution was weak and nearly nonexistent for marriages starting between 1950-1984 (Teachman 2002). Similarly, Heaton 2002 found no significant relationship between the education of the woman and divorce outcomes for marriages in 1975-1995, but they concluded that the education of one partner alone is not enough to predict divorce. Martin (2006) was one of the earliest studies to show a strongly negative educational gradient with marital dissolution. He estimated the educational gradient of marital dissolution using the 1996 and 2001 SIPP Wave 2 Topical Module. The topical module asks more specific questions about a respondent's marital history than the rest of the core SIPP survey. However, the topical module is only asked once for each respondent, during wave 2 of the panel, therefore not capturing divorces that may occur in the subsequent waves. While the topical module does offer good insight on past marriages, it does not identify characteristics of the partner in a prior marriage. Martin finds that over the last several decades, higher educated women's rates of divorce remained relatively low, while lower educated women rates of divorce increased substantially. In Martin's calculations, a quarter of low educated women

and 15 percent of high educated women entering a first marriage in 1960-1964

experienced a marital dissolution within 10 years of the beginning of the marriage.

However, as many as 45 percent of low educated women, but still only 15 percent of

high educated women, entering a first marriage in 1990-1994 experienced a marital

dissolution within this duration. There was no evidence to suggest that these trends

were driven by the changes in composition of marriages by women's educational

attainment or by their age at marriage.

More recent studies have both used more recent data and have employed a

two-gender approach, in which both the woman's and the man's characteristics are

considered. While the increase in women's educational attainment over men in the

U.S. continues to grow (DiPrete and Buchmann 2006, Bavel, Schwartz and Esteve

2018), the association between women's educational advantage (hypogamy) and

marital stability has not always been clear (Lyngstad and Jalovaara 2010). Since the

1970s there has been a shift in the likelihood of divorce for women who had a higher

education than their husbands (Schwartz and Han 2014, Esteve et al. 2012, 2016). A

study by Schwartz and Han uses two surveys, the National Survey of Family Growth

and the Panel Study of Income Dynamics to strengthen confidence in results on

educational attainment and on educational homogamy and divorce during years 1950

through 2004. Using Cox proportional hazard models on the two data sets separately

and pooled, they first found trends in divorce more favorable to higher educated

women than in years past, and additionally found that educationally homogamous

couples are less likely to divorce than hypergamous couples, in which husbands have

more education (Schwartz and Han 2014, Raley and Sweeney 2020). Results have

been less clear with respect to hypogamous marriages as results remain not statistically significant.

A negative educational gradient in divorce is also observed in Europe, though more recently and highly dependent on country context. The studies that used a one-gender approach, only looking at the end education of the woman, were the studies that were able to find a negative educational gradient in divorce (Hoem 1997, de Graff and Kalmijn 2006). de Graff and Kalmijn (2006) find that in the Netherlands for marriages beginning in 1942-1964, highly educated women had the highest rates of divorce, but that more recent marriages show a reversal of that trend. In the last four decades, the positive association between high education and divorce has weakened when looking at all countries in Europe together, but is highly country dependent (Härkönen and Dronkers 2006, Matsyiak et al. 2014, Perelli-Harris and Lyons-Amon 2016, Grow et al. 2017, Theunis et al. 2017). In a meta-analysis of European research findings, Matsyiak et al. (2014, p.197) found "a weakening of the positive educational gradient in marital disruption over time and even to a reversal in the direction of this gradient in some countries." European studies have used the two-gender approach in many studies. More recently, the positive educational gradient is only observed when considering the relative education of the husband, in a two-gender approach, and is highly dependent on the social and economic atmosphere in the country (van Damme 2020).

Several theories have been used to explain the increased negative educational gradient in divorce seen especially in the United States (Raley and Sweeney 2020). First is the focus on economic determinants, such as high education leading to higher

wages. With higher education, comes high economic stability and therefore higher marital quality (Conger et al. 2010). With more resources to mitigate familial stress, couples have less to argue about and more income to contribute to higher marital quality. A recent study has hypothesized that high educated people have more to lose financially (i.e. wealth and financial investments) in a divorce and therefore less likely risk those loses with a divorce (Boertien and Härkönen 2018). Also, higher educated couples tend to be able to invest more time and money into their children which increases relationship stability (Lundberg et al. 2016).

The change in the effect of relative education of the spouses on divorce is important because it follows other changes in gender dynamics in the United States. When women first entered the workforce in large numbers, it was still believed that the most successful marriage would be between a low-wage woman and a high-wage man due to their specializations in market versus house work (Becker 1974, 1985). The adjustment period in the later decades of the 1900s show that to be the case, women with more education and wages than their husbands were more likely to divorce (Teachman 2010). Feminist scholars believe this adjustment period was due to the non-normative nature of relationships where a woman out-earns the man or has a higher education than the man. Sayer and Bianchi (2000) find that much of this relationship can be explained away by measures of gender ideology. Therefore, it is not necessarily the educational or wage difference that causes marital issues, but rather the gender dynamics of the relationship going against the established societal norms (Tichenor 1999). The causal trail of predictors of divorce is a quantitatively and theoretically difficult topic to disentangle. Killewald (2016) addresses three

separate theories and includes them in one analysis: on the economic independence of the woman, financial strain of the couple, and gender dynamics within the couple. Using data from the Panel Survey of Income Dynamics between 1968 and 2013, Killewald does not find support for the economic determinants of divorce. Killewald does find evidence to support that the risk of divorce is highest when the man does not have a full-time job, therefore deviation of the traditional male breadwinner model is predictive of marital instability. Studies from the early 21st century show that in general, when the status between a man and a woman in a marriage was not that of a male bread-winner model, the roles and relationships have to be redefined and renegotiated (Evertsson and Nermo 2004, Tichenor 2005). The link between the breaking of traditional gender roles (women entering the labor force or women out-earning their partners) and divorce is weakening due to high prevalence of family diversity, expectations of female employment, and changing gender relationships (Goldscheider et al. 2015). In general, Killewald finds that the marriages of today are not like the economic based marriages on the mid 20th century, but we are also not yet in a post-gender time. In this study I will purely be focusing on educational determinants of divorce, which is closely intertwined with economic outcomes and gendered familial expectations. My hypotheses are the following:

H1: Highly educated women are least likely to divorce relative to their lower educated counterparts even when controlling for husband's education.

H2: When considering the relative education between the man and woman, homogamous marriages will be least likely to divorce relative to hypergamous and

hypogamous unions. Hypogamous unions will be the most likely to divorce as those disrupt the traditional gender roles for men and women.

Data and Methods

Data for this study come from SIPP observations of U.S. women between the ages of 20 and 59 at risk of divorce from 1996 to 2017. Data using the 1996, 2001, 2004, 2008, and 2014 panels of the SIPP are used in the estimation of the annual incidence of divorce. Studies have previously used the SIPP Wave 2 topical module on relationship history. In a comparative analysis, Kennedy and Ruggles (2006) analyzed the quality of divorce data from large U.S. population surveys, including the SIPP and ACS. The SIPP has been known to underestimate divorce, but the studies were all of the SIPP wave 2 topical module with retrospective marital histories. The topical module does not, however, allow for a couple-level educational analysis of divorce. I instead will rely on the panel data to observe a divorce as it happens between waves. This use of the SIPP panel waves to identify divorces follows Manning, Brown, and Stykes (2016), who used SIPP panel data to code both cohabitation dissolutions and marital dissolutions.

The SIPP is a household-based nationally representative sample panel survey run by the United State Census Bureau. The sample is a multistage stratified sample of the United States civilian non-institutionalized population. Each panel covers approximately four years and respondents are interviewed every four months. SIPP collects information primarily on income and program participation, but with its detailed demographic questions we can use the survey to observe population trends. The 1996, 2001, 2004, and 2008 SIPP Panel respondents were interviewed every four

months. The 2014 panel was administered every 12 months starting in February 2014

and ending in 2017. Unlike the use of the PSID in Schwartz and Han (2014) and

Killewald (2016), the SIPP is a survey with frequent newly-sampled panels,

providing a more accurate representation of the contemporary U.S. population.

Initial Sample and Years of Observation

For all years of the SIPP, I restrict the sample initially to those couples who are

married, spouse present at wave 1, with the woman aged 20-59 and U.S. born. I

exclude foreign born women from my analysis, approximately 16.3 percent of the

total sample, because the experience of foreign-born women in the U.S. is uniquely

different and warrants a separate analysis that is beyond the scope of this project.[2] In

the SIPP 1996-2008 panels, respondents are interviewed every four months and

therefore three waves of a panel are equal to 12 months. In 1996 and 2004 I use

waves 1-10 (there are 12 possible waves), in 2001 I use waves 1-7 (there are 9

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[2] Among U.S. born women, there is a clear distinction between the percent of women

divorcing who have a bachelor's degree or more and the other education groups (see

figure A3-1 in the appendix). The bachelor's degree or more women are noticeably

less likely to have divorced in the last 12 months according to the ACS, while there is

little discernable difference in the other education groups. The foreign-born women

(see figure A3-2 in the appendix) tell a different story. For non-U.S. born women,

those who have less than high school education have the lowest percentages of

women divorcing in the last year, followed by bachelor's degree or more, high

school, and some college at the highest percentage.

possible waves), and in 2008 we use waves 1-13 (there are 16 possible waves) which

correspond to the years 1996-1999, 2001-2003, 2004-2007 and 2008-2012. In 2014,

respondents were interviewed every 12 months (see appendix table A3-1 for more

details on SIPP wave cycle). Attrition is an important consideration when using panel

data, from 1996 to 2008, analyses by the Census Bureau show that from the first to

last wave the SIPP experiences attrition rates between 31.9 to 53.0 percent

(Sundukchi and Yang 2016). To retain as much data as possible, I rely on at least one

partner to be present at the time of divorce (see appendix table A3-2 and

accompanying text). For example, if a woman goes from married to divorced between

wave 1 and 4, but the man is not present in wave 4, that couple is retained in the

sample.

In the present study, I first code the data into a couple year-pair format. I

focus on heterosexual couples only (see Manning et al 2016 for comparisons of

couple dissolution between opposite-gender and same-gender couples), meaning that

every observation includes the identification of the man and woman in the couple

observed as married in the first year of the year pairs. The education of both spouses

may be observed in this first year, although as we note below, we use education at its

value observed always in the panel's Wave 1.

In the 1996-2008 panels I observe the changes in relationship status between

waves 1 and 4, 4 and 7, 7 and 10, and 10 and 13. At wave 1, the sample is restricted

to only those who are married and a partner in the household (see Table A in

appendix for more details). Therefore, I do not use any newcomers into the sample

(i.e. people who move into an already sampled household). In the 2014 panel, I

observe the changes in relationship status between waves 1 and 2, 2 and 3, and 3 and 4.

Education

The SIPP asks respondents to identify the highest degree received or grade completed. Respondents may choose between a grade level between 1 and 12th grade, high school, some college, vocational degree, associate degree, bachelor's degree, and other professional degrees. To avoid any error due to SIPP imputation (done at the U.S. Census Bureau), I use the education of the participant at wave 1 for every one of their observations in the sample. There were participants who changed education across the panel waves. On closer examination I found that 60 percent of those who changed education across panel waves increased education and 40 percent decreased education. While it is impossible to decrease the highest education achieved, respondent misreporting or imputation error can cause education decreases in the data. I therefore chose to use a stable education level, at its value in wave 1. Keeping education at wave 1 is also useful to track education of partners who have left the household due to divorce or separation. Using the wave 1 education levels, I code whether a relationship is educationally *hypergamous* (woman married to a man of higher education), *hypogamous* (woman married to a man of lower education), or *homogamous* (woman married to a man of equal education.

Marital Status and Divorce

To identify a divorce in the SIPP, I start with the all married, spouse-present sample of wave 1. The year (for the 1996-2008 panels) between wave 1 and wave 4 is used here as an example to explain how divorces are coded between the first and

second year of the couple year-pair. If a respondent A is married at wave 1 to their

partner, person B, and married at wave 4 to the same person B, they were at risk of

divorce between those waves but remained married. A couple would be identified as

getting a divorce between wave 1 and 4 if in wave 4 their status is identified as

"divorced". A divorce can be observed several ways: first, the partners could both

still be in the survey with the status of "divorced" in their marital status indicator.

Another way is only one of the partners remains in the survey with the label of

"divorced" while the partner from the previous year has left the survey.

In 2014, participants have less wave-by-wave opportunity to leave the survey

as they are interviewed only once every 12 months, but the process of identifying

divorce is the same as for the previous panels. A significant reason for attrition is

family dissolution, so it is not surprising to find a higher percentage of divorced

partners leaving the survey. For this reason, it is especially important that we require

only one member of the couple to be still in the interviewed sample for a divorce to

be coded. Nevertheless, the attrition of both individuals in the couple leads to a

substantial fraction of missing data in the SIPP (see Appendix table A3-2 for a more

detailed description of attrition of couples in SIPP in the first 12 months).

Marital Characteristics

In the 1996-2008 SIPP Panels, respondents are asked a topical module at

wave 2 that includes questions about their marital history. Through the topical

module, I link their current marriage to the answers provided in their marital history. I

create an indicator for a second marriage or more. Additionally, using the date of the

start of the current marriage, I determine the women's age at current marriage and the

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duration of marriage relative to the year of interview. Age at marriage is negatively

associated with divorce (Kuperberg 2014, Cohen 2019), therefore controlling for it is

important to accurately identify whether the educational gradient in divorce is a

product of people with holding marriage until they complete their education, and

therefore less likely to divorce and be older. Age is included as a quadratic.

Analysis

First, using weighed bivariate statistics I explore the differences in divorce rates for

couples while holding one education level constant to illustrate which type of

partnership is optimal for minimizing risk of divorce. Using the conclusions from my

bivariate results, I proceed to run a logistic regression with main-effect education

levels of both partners, and with a hypogamy variable relative to 'hypergamy and

homogamy' as the reference category, to predict divorce. This specification was

chosen after preliminary analyses revealed no statistically-significant difference

between hypergamous and homogamous, and that only when combining these two

categories was the hypogamous category statistically-significantly different from the

other couple education combinations. That is, I had insufficient statistical power to

distinguish divorce likelihood of hypogamous couples against the divorce likelihood

of either homogamous or hypergamous couple types when compared as individual

couple-type categories. The second regression is adjusted for race, marital parity

(remarriage versus first marriage), age at current marriage, duration of marriage, and

year. I incorporate a within-couple clustering to account for multiple observations of

exposure to divorce for the same couple within a panel.

In the descriptive statistics I adjust for the survey's sampling weight which is first

normalized to have a mean of 1 for each panel year in the SIPP separately (following

Rendall et al. 2008).

Equation A:

$$\log\left(\frac{P_{divorce}}{1 - P_{divorce}}\right)$$

$$= \beta_0 + \beta_1 Hypogamy + \beta_2 Women's\ Education$$

$$+ \beta_3 Men's\ Education$$

The first model uses hypogamy, women's education, and men's education to

predict divorce. Women's and men's education is split into four levels: high school or

less, high school, some college, and bachelor's degree or more.

Equation B:

$$\log\left(\frac{P_{divorce}}{1 - P_{divorce}}\right)$$

$$= \beta_0 + \beta_1 Hypogamy + \beta_2 Women's\ Education$$

$$+ \beta_3 Men's\ Education + \beta_4 Race + \beta_5 Marital\ Parity$$

$$+ \beta_6 Age\ at\ Current\ Marriage$$

$$+ \beta_7 (Age\ at\ Current\ Marriage)^2 + \beta_8 Duration\ of\ Marriage$$

$$+ \beta_9 Year$$

The second model, illustrated by equation B, shows the preferred model, including race, marital parity, age at start of current marriage, age at start of current marriage squared, duration of marriage, and year as important indicators of divorce.

Results

In total, the SIPP captures 110,000 married couple-year-pairs, 1,038 of those ending in divorce. The annual divorce rate in the SIPP from 1996 to 2017 overall is 9 divorces per 1,000 marriages. This is lower than rates calculated using the ACS (Cohen 2019). A lower annual divorce rate in the SIPP is to be expected considering the sample is restricted to those married in wave 1. Unlike the ACS, the SIPP faces the issue of attrition, especially considering that a major life event such as a divorce can result in leaving a longitudinal study, and a positive correlation between attrition and divorce is likely to be responsible for lower estimated divorce rates in the SIPP panel coded data than in the ACS's retrospectively coded divorces. However, a lower divorce rate in the SIPP also matches previous findings, even though other studies have used the SIPP's marital topical module rather than the approach in this paper (Raley 2011, Kennedy and Ruggles 2014).

Table 3.1 presents the descriptives of the population at risk for divorce annually. Overall, two thirds of women at risk of divorce in 1996-2017 have some college education (33.9 percent) or a bachelor's degree or more (33.5 percent). Of those remaining married, 33.6 percent have a bachelor's degree or more, while for those women divorced in the last year 25.4 percent have a bachelor's degree or more. The husband's education distribution difference between those divorcing and remaining married mirrors that of the wives. Overall, the husband is more likely to be

in high school or less than the wife. Over 80 percent of women are Non-Hispanic

White, with little differences between women who are divorcing and remaining

married. Of those women divorcing, 29.2 percent are on their second marriage, while

20.9 percent of those remaining married are on their second marriage. On average,

women were approximately 26 years old when they married with little difference

between those divorcing and remaining married. Approximately a third of marriages

have a duration of under ten years. Of those divorcing, nearly half are marriages that

have lasted under ten years.

**Table 3.1 Descriptives of Those at Risk for Divorce Annually during 1996-2017
in the United States, ages 20-59.**

	All	Divorcing	Remaining Married
Wife's Education			
Less than HS	0.061	0.06	0.061
High School	0.265	0.296	0.264
Some College	0.339	0.39	0.338
BA+	0.335	0.254	0.336
Husband's Education			
Less than HS	0.081	0.09	0.081
High School	0.271	0.319	0.27
Some College	0.314	0.362	0.314
BA+	0.334	0.23	0.335
Wife's Race and Ethnicity			
Non-Hispanic White	0.844	0.831	0.845
Non-Hispanic Black	0.072	0.066	0.072
Hispanic	0.069	0.076	0.069
Non-Hispanic Other	0.015	0.027	0.015
Wife's Second Marriage or More	0.21	0.292	0.209
Wife's Age at Current Marriage (SD)	26.0 (0.04)	26.4 (0.25)	26.0 (0.04)
Duration of Marriage (Years)			
1-9	0.318	0.486	0.317
10-19	0.32	0.314	0.32
20-29	0.212	0.153	0.212
30+	0.15	0.047	0.151
Year (SD)	2005.6 (0.4)	2006.3 (0.2)	2005.6 (0.4)
Sample N	110,000	1,038	108,962

Notes: All proportions are weighted
Sources: Survey of Income and Program Participation 1996, 2001, 2004, 2008, and 2014 panels.

Table 3.2 displays the distribution of couples based on the education of the wife and the husband. The group with the largest proportion of couples is where both the wife and the husband have a bachelor's degree or more, 22.6 percent of couples. The least populated categories are those where one partner has a less than high school education and the other a bachelor's degree or more, less than 1 percent. Over half (54.5 percent) are in a homogamous marriage, 21.3 percent are in a hypergamous marriage, and 24.3 percent are in a hypogamous marriage.

Table 3.2: Distribution of Educational Pairing for Couples at Risk of Divorce, United States, 1997-2017, aged 20-59

		Husband's Education			
		Less than High School	High School	Some College	Bachelor's Degree +
Wife's Education	Less than High School	0.031	0.020	0.010	0.001
	High School	0.030	0.131	0.076	0.028
	Some College	0.017	0.087	0.157	0.078
	Bachelor's Degree +	0.003	0.034	0.072	0.226

Notes: N=110,000

All proportions are weighted

Sources: Survey of Income and Program Participation 1996, 2001, 2004, 2008, and 2014 panels.

While the homogamous bachelor's degree or more couples are the most populous, table 3.3 shows that their annual probability of divorce is among the lowest out of all the categories (0.0056). There does not appear to be a clear negative gradient between divorce and education for homogamous couples, but rather an inverted-U relationship, with some-college marriages most at risk for divorce (0.0109). The highest probability of divorce is for a couple where the wife has a less than high school education and the husband has a some college education (0.0170). However, the higher rates are most concentrated among hypogamous marriages.

Table 3.3: Probability of Divorce for Couples of Each Educational Pairing, United States, 1997-2017, aged 20-59

|	Husband's Education			
Wife's Education	Less than High School	High School	Some College	Bachelor's Degree +
Less than High School	0.0061	0.0094	0.0170	0.0015
High School	0.0119	0.0095	0.0105	0.0096
Some College	0.0141	0.0120	0.0109	0.0067
Bachelor's Degree +	0.0068	0.0118	0.0082	0.0056

Notes: N=110,000
All probabilities are weighted
Source: Survey of Income and Program Participation 1996, 2001, 2004, 2008, and 2014 panels.

To further illustrate the different divorce rates in terms of homogamy, hypergamy, and hypogamy I present three figures that each keep the total education of the couple constant. For example, in figure 3.1, the homogamy bar includes both men and women who have less than a high school education. The next bar, hypogamy, allows the woman to increase education while the man remains in less than high school. The third bar, hypergamy, allows the man to increase education while the woman remains in less than high school. Lastly, the last bar represents what would happen if both the man and then woman were in the next higher level of education, high school graduates. The most advantageous category for a couple to be in for divorce avoidance is for both partners to be less than high school educated. The magnitude of divorce probability is higher for a hypogamous couple, when a woman of a high school education or more marries a less than high school educated man, is higher than the hypergamous alternative. If both partners were of one education level higher, both have a high school education, their divorce rate would increase from their homogamous less than high school pairing. The lines over the bars represent 95

percent confidence intervals, therefore while hypogamy is largest in magnitude, the CIs overlap. The less than high school category has some of the largest confidence intervals because it is the numerically smallest group (see appendix table A3-3 for the sample sizes for each group represented in figure 1, 2, and 3).

Figure 3.1
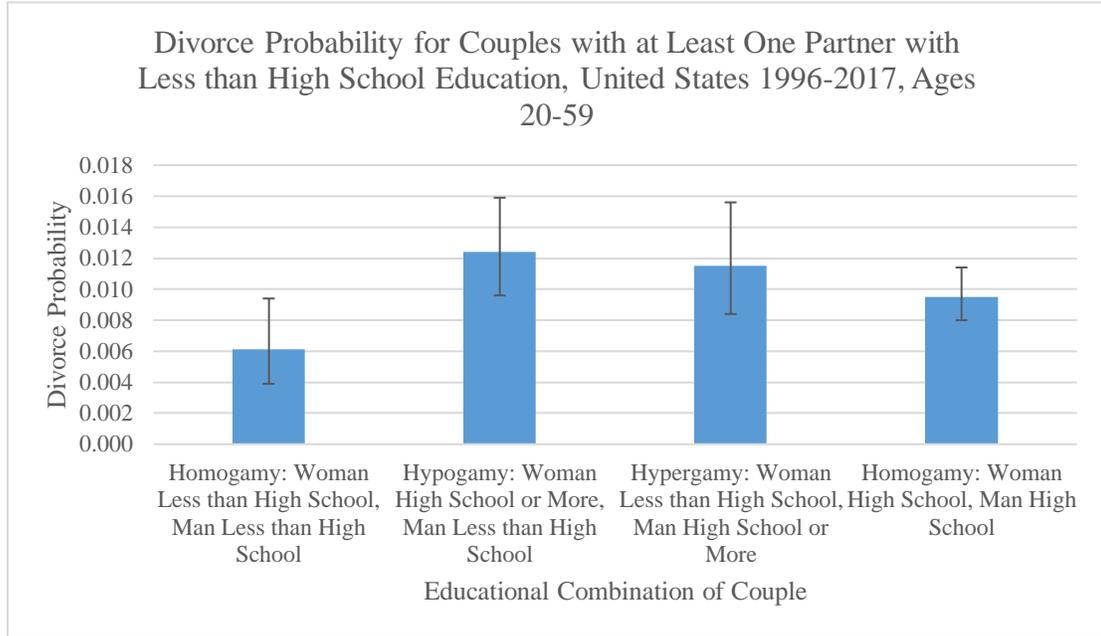
Divorce Probability for Couples with at Least One Partner with Less than High School Education, United States 1996-2017, Ages 20-59

Notes: All probabilities are weighted
Bars represent 95% confidence intervals
Sources: Survey of Income and Program Participation 1996, 2001, 2004, 2008, and 2014 panels.

I repeat a similar exercise for the high school educated group in figure 3.2, meaning I observe the divorce probabilities for couples where at least one partner has a high school education only. When I keep high school education as the constant, hypogamous couples (man has a high school education and woman has a more than high school education) have the highest risk of divorce. However, there is little difference in substantive magnitude of the divorce probability.

Figure 3.2

Divorce Probability for Couples with at Least One Partner with a High
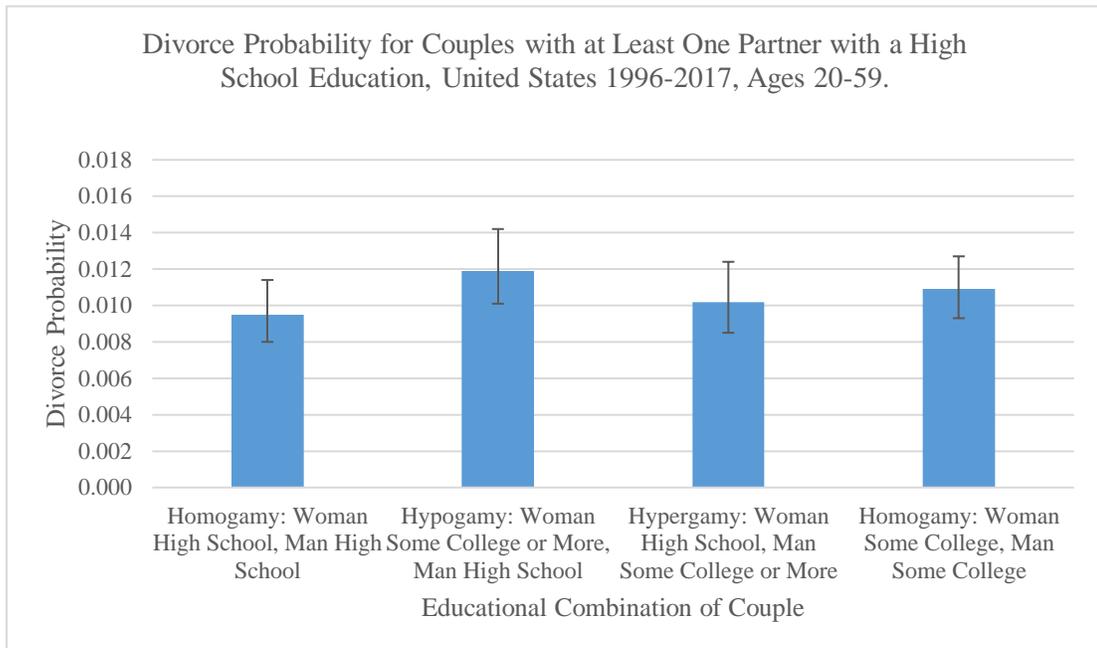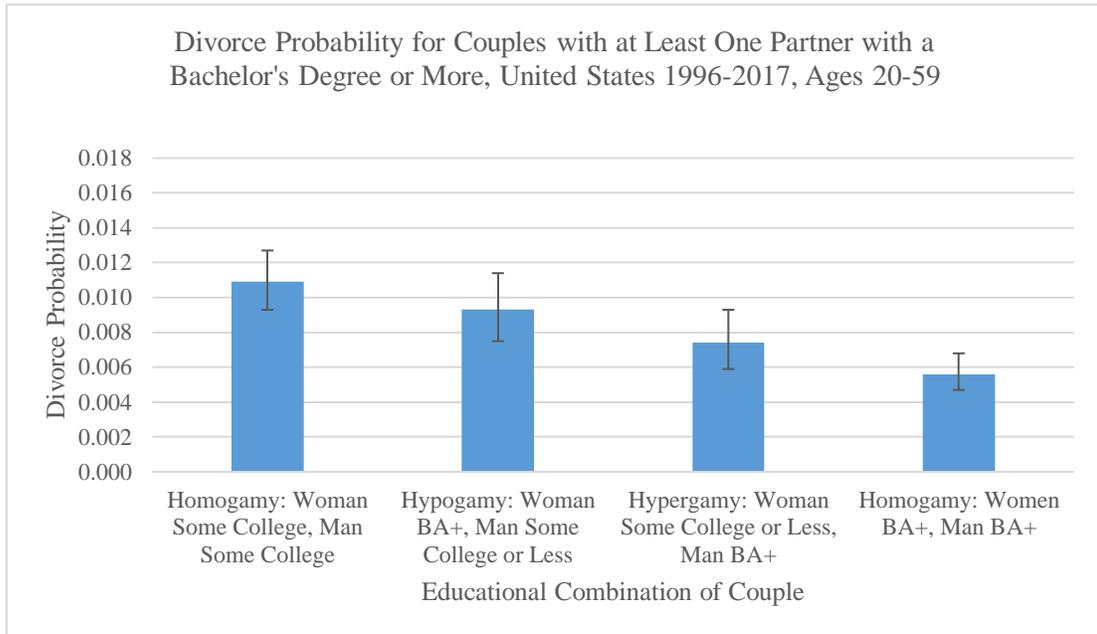School Education, United States 1996-2017, Ages 20-59.

Notes: All probabilities are weighted
Bars represent 95% confidence intervals
Sources: Survey of Income and Program Participation 1996, 2001, 2004, 2008, and 2014 panels.

Lastly, for couples where at least one partner has a bachelor's degree or more, I present figure 3.3. Of all the homogamous couples, some-college couples have the highest risk of divorce while bachelor's degree or more have the lowest. Like other education categories, shows that hypogamous unions have a higher risk of divorce versus hypergamy and homogamy for couples where at least one partner has a bachelor's degree or more. Consistent across education categories (Figures 3.1-3.3), women married to a man of a lower education than themselves are more likely to experience a divorce.

Figure 3.3:

Divorce Probability for Couples with at Least One Partner with a Bachelor's Degree or More, United States 1996-2017, Ages 20-59

Table 3.3 and figures 3.1-3.3 allow me to see that when looking at the weighted bivariate results, hypogamous unions have the highest probability of divorce for all education groups, but these differences are not obviously statistically significant when viewing the overlapping CIs in each of the figures. In order to test the hypothesis of highest divorce likelihood of hypogamous unions statistically, I use two logistic regressions. First, Model 1 in table 3.4 predicts divorce using hypogamy (reference is hypergamy and homogamy), wife's education, and husbands' education. I find that hypogamous unions (OR= 1.33 CI 95% 1.07-1.87) are significantly more likely to divorce versus hypergamous and homogamous unions when controlling for the education of the husband and the wife as main effects. Women of all education levels lower than a bachelor's degree are significantly more likely to experience a

divorce than a woman with a bachelor's degree or more. There is no significant difference within the lower education levels (analysis not shown). However, in this regression specification, the education relationship is seen to be a monotonic negative gradient. The husband's education is only predictive of divorce when comparing some college educated men to those with a bachelor's degree or more (OR=1.30, CI 95% 0.45, 0.76). Model 2 incorporates several important predictors of divorce such as race, marital parity, age at current marriage, and marriage duration. With the addition of these specifications, there is little difference in the magnitude or power of hypogamous unions being more likely do divorce (OR=1.32, CI 95% 1.06, 1.65). Women with lower than high school, high school, or some college education continue to have higher odds of divorce than woman with a bachelor's degree or more. Husband's education is no longer a significant predictor of divorce.

Women in the other race category are the only women out of non-Hispanic Black and Hispanic women to have higher odds of divorce versus non-Hispanic White women (OR=1.65 CI 95% 1.12, 2.44). If a woman is on her second or higher marriage, she is more likely to experience divorce than a woman on her first marriage (OR=1.72 CI 95% 1.24, 2.04). The marriages that are at the highest risk of divorce are those which have lasted between one and nine years.

Table 3.4: Logistic Regression of Divorce on Homogamy Status, ages 20-59 1996-2017, U.S. Born

	Model 1		Model 2	
	Odds Ratio	95% C.I.	Odds Ratio	95% C.I.
Relationship Type (ref= Homogamy and Hypergamy)				
Hypogamy	1.33 *	[1.07, 1.67]	1.32 *	[1.06, 1.65]
Wife's Education (ref= BA+)				
Less than HS	1.66 *	[1.11, 2.48]	1.69 *	[1.12, 2.54]
High School	1.50 **	[1.15, 1.94]	1.61 **	[1.23, 2.10]
Some College	1.39 **	[1.15, 1.67]	1.36 **	[1.12, 1.65]
Husband's Education (ref= BA+)				
Less than HS	1.00	[0.68, 1.48]	0.94	[0.63, 1.39]
High School	1.23	[0.94, 1.62]	1.10	[0.84, 1.45]
Some College	1.30 *	[1.06, 1.59]	1.18	[0.96, 1.45]
Wife's Race and Ethnicity (ref=Non-Hispanic White)				
Non-Hispanic Black			0.94	[0.73, 1.20]
Hispanic			0.93	[0.72, 1.20]
Other			1.65 *	[1.12, 2.44]
Wife's Second Marriage or More			1.72 **	[1.24, 2.04]
Wife's Age at Current Marriage			0.96 **	[0.94, 0.97]
Wife's Age at Current Marriage Squared			1.00	[1.00, 1.00]
Duration of Marriage (ref=1-9 Years)				
10-19			0.60 **	[0.52, 0.69]
20-29			0.36 **	[0.30, 0.44]
30+			0.15 **	[0.11, 0.20]
Year			1.03 **	[1.02, 1.04]
Constant	0.006 **	[0.005, 0.007]	0.011 **	[0.002, 0.028]
Sample N	110,000		110,000	

Conclusion

The study used data from the SIPP 1996, 2001, 2004, 2008, and 2014 panels

to investigate the effect of partners own education and partners relative education in

predicting divorce. This research produces several key findings. First, bivariate

results show that homogamous unions are most prevalent, especially those between a

man and a woman with a bachelor's degree or more. The bivariate relationship

between divorce risk and education with the homogamous group is non-linear, with

less than high school homogamous couples having a similarly low divorce probability

as bachelor's degree or more homogamous couples. In contrast, when controlling for

partners education and relative education, divorce risk decreases monotonically with

increasing women's education. Women who have a bachelor's degree or more are

least likely to experience a divorce. Among the three lower education levels, there are

no significant differences for divorce risk, but each is higher than that for college-

educated women, and the pattern of coefficients magnitudes is decreasing with more

education for the three non-college-graduate levels. That is, our regression results are

interpretable as being consistent with a negative education gradient, and support our

first hypothesis of lowest divorce risk for the highest-educated women, controlling for

their husband's education level. Highly educated women are not only the least likely

to divorce, as shown here, but are also more likely to marry relative to low educated

women (Cherlin 2004, 2005, 2020). Lower-educated women tend to choose other

forms of partnership and family formation other than traditional marriage. Controlling

for the husband's education creates an accurately specified model and with increased

confidence we now see that the men's education is less of a determinant than the women's education, and women's educational gradient of divorce is indeed found to be negative.

Second, relative to hypergamy and homogamy, hypogamous unions were more likely to divorce, providing support for my second hypothesis. Economically speaking, higher education is correlated with higher earnings and women on average earn less than men. A higher education for a woman may not have as large or a return as it would for a man, therefore a partnership where the woman has more of an education does not necessarily bring the same type of financial security as an educationally hypergamous relationship would. Qian (2018), however, finds that while women in educationally hypogamous marriages start out with lower income than women in hypergamous or homogamous marriages, their earnings quickly catch up. Therefore, it is likely the reasoning for hypogamous marriages being more sensitive to divorce is not related necessarily to economic outcomes but rather to gendered dynamics within the marriage.

This research addresses the two concepts of predicting divorce: economic and gender related theories. Echoing Schwartz and Han (2014) and Martin (2006), we see a negative educational gradient in divorce in our regression model estimates, although college-graduate women stand out as being statistically-significantly different from the other education categories in their divorce risks. Additionally, we find that hypogamous unions stand out as having higher divorce risks than hypergamous or homogamous unions. These results support Killewald's (2016) findings that the female breadwinner model (whether that be through employment as Killewald finds,

or education as this study finds) is the most volatile when it comes to likelihood for divorce. Unlike Schwartz and Han, who find that hypogamous unions are not statistically significantly more likely to result in divorce in recent years, the present study finds continued support for higher divorce odds for hypogamous marriages through the 2017 data. Future research building on this project can further disentangle these somewhat disparate findings by including gender role ideology, household labor practices, and other variables to address the intersection of economic and ideological predictors of divorce.

Summary

The research question that sparked my interest in a cross-county perspective was: how do cultural, historical and political contexts affect socioeconomic correlates and consequences of women's family formation and dissolution in recent decades? While this question is not novel, the approach to this question in this dissertation has been unique.

I start my dissertation in Russia, a country that has a deep-rooted history of communist rule but has lived under a free market for the last three decades. The decision to study mothers in Russia has challenged the traditional assertion that market capitalism (specifically, a means-tested welfare system) will increase unmarried mothers poverty risk relative to married mothers for all women. While the model confirms that unmarried mothers are consistently at a higher risk, the risk gets closer to the risk of married mothers as the economy and society adapts to the new market. When we break it down and look at the most disadvantaged groups, we see a significantly higher probability of being in poverty in the later 2000s for 30-year-old unmarried women compared to married women. There is more work to be done to pin down the mechanisms of what is driving unmarried mothers to not fall into poverty as intensely.

Next, I move the story over a couple of countries to the west. East Germany lived under Soviet rule and seemingly the same policies and expectations as the Soviet Union did in the twentieth century. In Eastern Germany there has been a persistent pattern of more egalitarian practices such as more women in the workforce, more utilization of childcare, and less dependency on a male breadwinner model

(Schober 2015, Zoch 2020, and Boelmann et al 2020). To explore how the history of these policies have affected partnering patterns, I use the German Socio-Economic Panel (SOEP). I first looked at bivariate analyses to understand the market of men and women at risk of partnering, this includes a sex ratio and educational distribution. I then use a Revealed Preference Model. The RPM is useful in this context because a partnership is a two-sided process and both partners need to decide to partner and because the SOEP has individual panel data to observe participants before and during a new partnership. The market for at risk of partnering men and women in the East versus the West is not different in sex ratio, but there is an educational distributional difference. In the East, here are a higher proportion of lower educated men relative to lower educated women, therefore giving higher educated women fewer choices to partner homogamously. The people who are partnering are doing so mostly homogamously, partnering with a person with the same education level as themselves, this is especially evident in the East with over 10 percent more of the new partnerships being homogamous. In the West, there are more lower educated women than there are low educated men, therefore it is not surprising to see more hypergamy in the West. Using the Revealed Preference Model, I estimate partnering matrices for the East and the West. In both regions homogamous relationships remained to be the most prevalent, followed by hypergamous then hypogamous. In West Germany and East Germany alike, educationally hypergamous partnerships were most preferable. Though the availability of higher educated partners in East and West Germany are different, with more medium and highly educated women in the East as shown in the bivariate analysis, the preference for hypergamy remains.

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The last paper is based in the United States, a setting with liberal economic and social system that offers less public support, and where support is characterized as means-tested. Like in the last two papers, demographic trends have been highly influenced by the female labor force participation. In this context, I estimated divorce rates based on educational homogamy using the most up to date panel data. The study used data from the SIPP 1996, 2001, 2004, 2008, and 2014 panels to investigate the effect of partners own education and partners relative education in predicting divorce. This research produces several key findings. First, bivariate result show that homogamous unions are most prevalent, especially those between a man and a woman with a bachelor's degree or more. The bivariate relationship between divorce risk and education with the homogamous group is non-linear, with less than high school homogamous couples having a similarly low divorce probability as bachelor's degree or more homogamous couples. In contrast, when controlling for partners education and relative education, divorce risk decreases monotonically with increasing women's education. Women who have a bachelor's degree or more are least likely to experience a divorce. Among the three lower education levels, there are no significant differences for divorce risk, but each is higher than that for college-educated women, and the pattern of coefficients magnitudes is decreasing with more education for the three non-college-graduate levels. That is, our regression results are interpretable as being consistent with a negative education gradient, and support our first hypothesis of lowest divorce risk for the highest-educated women, controlling for their husband's education level. Highly educated women are not only the least likely to divorce, as shown here, but are also more likely to marry relative to low educated

women (Cherlin 2004, 2005, 2020). Lower-educated women tend to choose other forms of partnership and family formation other than traditional marriage. Controlling for the husband's education creates an accurately specified model and with increased confidence we now see that the men's education is less determinant than the women's education.

Second, relative to hypergamy and homogamy, hypogamous unions were more likely to divorce, providing support for my second hypothesis. Economically speaking, higher education is correlated to higher earnings and women on average earn less than men. A higher education for a woman may not have as large or a return as it would for a man, therefore a partnership where the woman has more of an education does not necessarily bring the same type of financial security as an educationally hypergamous relationship would. Though Qian (2018) finds that while women in educationally hypogamous marriages start out with lower income than women in hypergamous or homogamous marriages, their earnings quickly catch up. Therefore, it is likely the reasoning for hypogamous marriages being more sensitive to divorce is not related necessarily to economic outcomes but rather gendered dynamics within the marriage.

In their pivotal review of the last decades of family demographic literature, Goldscheider et al. (2015) said: "Contextual factors play an important role in the spread of egalitarian value characteristic of a gender revolution". In this dissertation I have used three distinct contexts to evaluate a small part of the gender revolution: single motherhood poverty rates, assortative educational mating, and divorce by education level. While all three papers are in relatively different contexts with

differing political and social histories, the theme remains that we have yet to reach the pinnacle of the gender revolution. In Russia, despite their strong history of women actively participating in the labor market, women remain dependent on a male earner to lessen their risk of poverty. In Russia the gap between unmarried and married mother's poverty risk remains, however decreases over time despite decrease in social support. In East and West Germany, after homogamy, hypergamy remains to be the preferred partnership. In the United States, hypogamous unions are more likely to divorce. In Germany and the United States, homogamy is still the most prevalent and preferred, however hypogamy persists to be the least desired, the least likely to partner, and most likely to divorce. Due to the pay gap between genders, educationally hypogamous couples do not necessarily signal that the more educated woman is making more money. Therefore, the economic portion of these relationships cannot be the sole determinant of partnering or divorce. These findings challenge current work such as Esteve et al (2016), Esteve and coauthors find that hypergamy is becoming rare and homogamy is increasing. Future studies should use a longitudinal framework on these data presented in this project to discern whether what I show here is a snapshot of an egalitarian-nearing trend, or a stalling. Traditional gender roles remain and persist in places with policies either currently, or at some point, supported egalitarian work and gender roles.

Work by Knight and Brinton (2017) have continued to challenge social scientists' definition of egalitarianism. Authors find that through the Second Demographic Transition, Europe is not converting to a single form of egalitarianism. My work here presents three supporting examples. Russia's rates of poverty between

single and married mothers are decreasing, despite the increase in conservative social policies. While single mothers are faring better than they did in years before, their roles and expectations have also shifted in a conservative direction. In Germany, despite the same historical context as Russia and high levels of high educated women, hypergamy remains to be preferred. West Germany and the United States show a similar pattern of preferred homogamy and a preference for hypergamy over hypogamy, all while increasingly egalitarian gender roles. Continuing work in this field will help us answer whether it would be beneficial for us as sociologists to widen our definition of a gender revolution as suggested by Knight and Brinton from a straight line with a final destination, to a spectrum of continuing redefinition and adaptation.

Appendices

Figure A1-1: Distribution of Mothers by Partnership Status, Russia 1994-2016
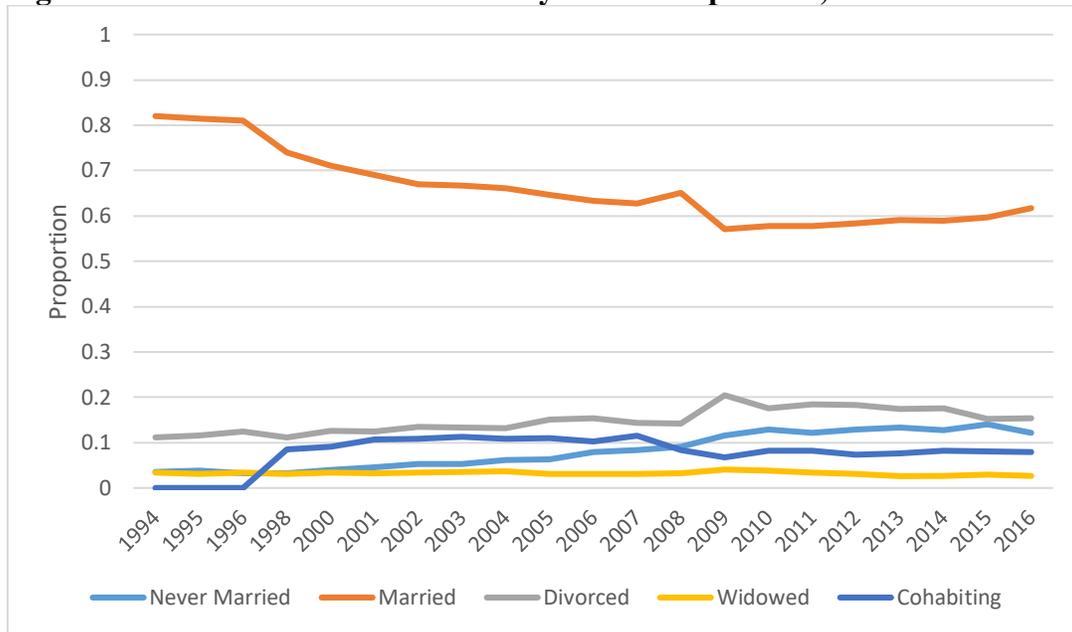
Note: N=30,312
All results are weighted.
Cohabitation was measured as "married" until 1998

Figure A1-2: Percentage of Mothers Living with Female Pensioner in the Household, Russia 1994-2016
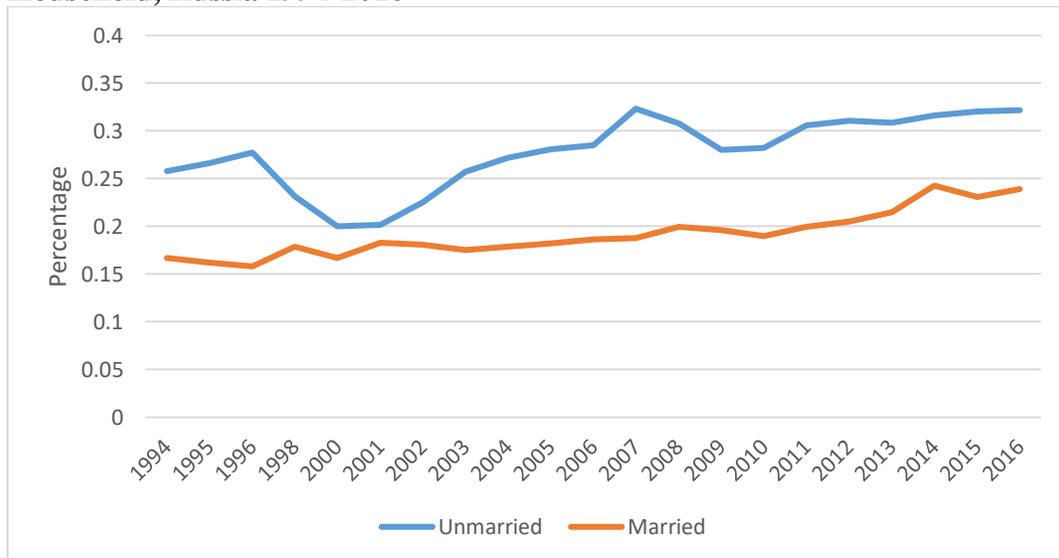
Table A2-1: Educational Classification from ISCED 1997 and 2011 to Low, Medium, and High as used in SOEP 1992-2016

	ISCED 1997 (1992-2009)	ISCED 2011 (2011-2016)
Low Education	Early childhood, Primary, Lower Secondary	Early childhood, Primary, Lower Secondary
Medium Education	Upper Secondary, Post-Secondary Non-Tertiary	Upper Secondary, Post-Secondary Non-Tertiary
High Education	First stage of Tertiary, Second stage of Tertiary	Short-Cycle Tertiary, Bachelor's, Master's, Doctoral

Table A3-1: Distribution of Waves versus Years Observed in the Survey of Income and Program Participation

| 1996 SIPP Panel Wave	1	2	3	4	5	6	7	8	9	10			
		1996-1997			1997-1998			1998-1999					
2001 SIPP Panel Wave	1	2	3	4	5	6	7						
		2001-2002			2002-2003								
2004 SIPP Panel Wave	1	2	3	4	5	6	7	8	9	10			
		2004-2005			2005-2006			2006-2007					
2008 SIPP Panel Wave	1	2	3	4	5	6	7	8	9	10	11	12	13
		2008-2009			2009-2010			2010-2011			2011-2012		
2014 SIPP Panel Wave	1				2			3			4		
	2014				2015			2016			2017		

Table A3-1 illustrates the way that I identify annual time periods using the waves in the SIPP. For example, for the 2004 sample, I consider that between the interview at wave 1 and wave 4 approximately 12 months have passed. Therefore, results at wave 4 identify divorces occurring between the year 2004 and 2005. Similarly, using the marital status at wave 4 and wave 7 will measure the marital status change between 2005 and 2006. The first interview date for SIPP 2014 was February 2014 and annually until the beginning on 2017. The SIPP asks the current level of education and the current marital status at the time of interview. Therefore, for this project the reference point is all of 2014, 2015, and 2016.

Figure A3-1 Educational Distribution of Women Divorced in the Last Year 2008-2019, Aged 20-59, U.S. Born
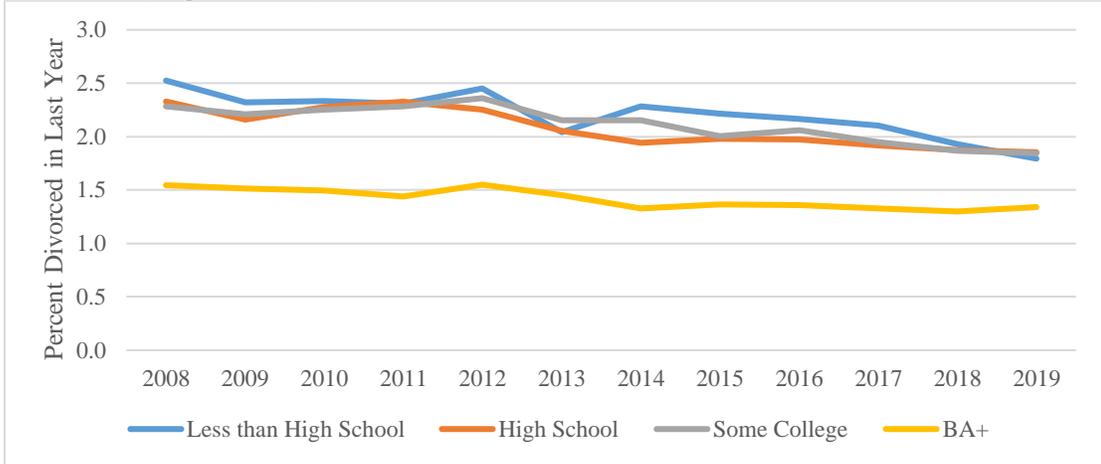
Notes: Authors calculations
Percents are weighted
Source: American Community Survey 2008-2019

Figure A3-2 Educational Distribution of Women Divorced in the Last Year 2008-2019, Aged 20-59, Foreign Born
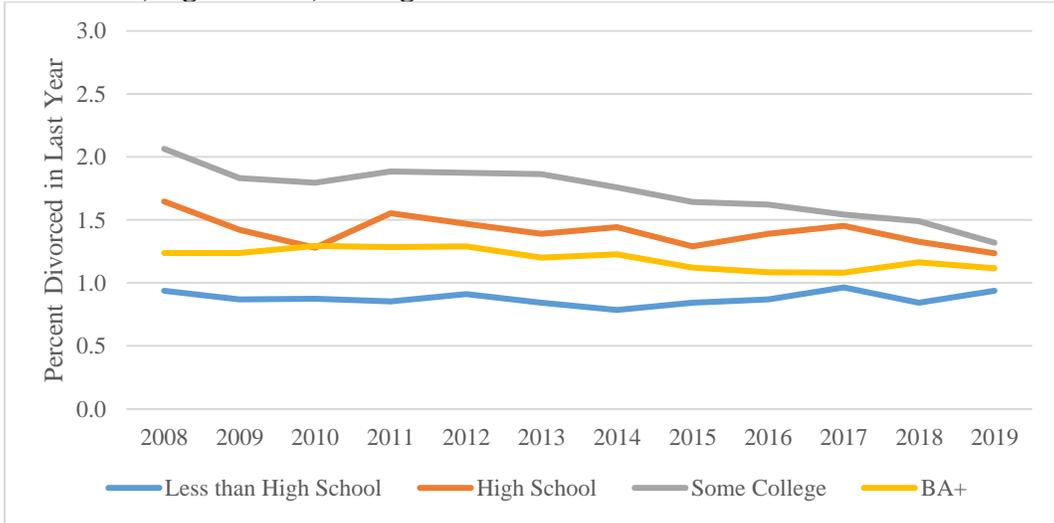
Notes: Authors calculations
Percents are weighted
Source: American Community Survey 2008-2019

Table A3-2: Attrition Patterns in the Survey of Income and Program Participation for those Married at Wave 1, ages 20-39.

Status			SIPP Panel				
$t\text{-}1$		t	**1996**	**2001**	**2004**	**2008**	**2014**
	Woman	**Man**					
	Married	Married	11,256	8,868	12,515	10,779	5,162
	Divorced	Divorced	38	21	42	22	27
Married	Divorced	Not in Survey	36	16	33	27	29
	Not in Survey	Divorced	7	12	15	19	14
	Not in Survey	Not in Survey	1,081	796	2,008	2,009	2,078
	Messy Cases		0	0	12	17	25
Total			12,418	9,713	14,625	12,873	7,335

Note: This table includes respondents between wave 1 and wave 4 for 1996, 2001, 2004 and 2008. For 2014, table represents attrition between wave 1 and wave 2.

In the SIPP, while some divorced individuals are able to remain in the survey, most divorces are identified when one person leaves the survey. To illustrate, in the 2004 Panel, there were 12,515 people who were married at wave 1 and remained married 12 months later at wave 4, 42 people were married at time $t\text{-}1$ and both in the survey identified as divorced in time t, 33 people were in the situation where the man attrited and the woman stayed in the survey and 15 were in the opposite scenario, 2,008 where both the participants attrited after being married in the previous wave, and 12 cases are considered messy cases. An example of a messy case is when an individual might identify themselves as going from married to never married or if an individual is missing a wave. For attrition resulting in no identification of whether a divorce occurred: In 1996, 8.7 percent of participants who were married at wave 1 both left the survey in the first calendar year, 8.2 percent in 2001, 13.7 percent in 2004, 15.6 percent in 2008, and 28.3 percent in 2014. There are some assumptions

that can be made in the messy cases to identify those staying married or divorcing,

but for this iteration of the project these individuals are left out of the sample.

I do not have the education of the individual at time t if they have left the

survey, therefore I have taken the education level at wave 1 for all those eligible for

the sample.

Table A3-3: Educational Pairing Distribution for those at Risk of Divorce Annually during 1996-2017 in the United States, ages 20-59.

	N
Less than High School	
Hypogamy: Woman High School or More, Man Less than High School	5,921
Homogamy: Woman Less than High School, Man Less than High School	3,617
Hypergamy: Woman Less than High School, Man High School or More	3,609
High School	
Hypogamy: Woman Some College or More, Man High School	13,361
Homogamy: Woman High School, Man High School	14,923
Hypergamy: Woman High School, Man Some College or More	11,675
Some College	
Hypogamy: Woman BA+, Man Some College	11,763
Homogamy: Woman Some College, Man Some College	17,133
Hypergamy: Woman Some College, Man BA+	9,664
Bachelor's Degree or More	
Hypogamy: Woman BA+, Man Some College or Less	11,711
Homogamy: Women BA+, Man BA+	23,718
Hypergamy: Woman Some College or Less, Man BA+	11,602
Sample N	110,000

Notes: All proportions are weighted

Categories are not mutually exclusive; therefore, N's do not add up to total sample N

Sources: Survey of Income and Program Participation 1996, 2001, 2004, 2008, and 2014 panels.

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