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Institute of Public Policy and Administration

# Forced Marriage and Birth Outcomes

Charles M. Becker,  
Bakhrom Mirkasimov,  
Susan Steiner

WORKING PAPER NO.35, 2016



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## Abstract

We study the impact of bride kidnapping, a peculiar form of marriage practiced in Central Asia, on child birth weight. The search for a suitable mate in a kidnapped marriage is initiated by the groom, and there is typically non-coerced consent only by the male. We expect adverse consequences from such marriages, working through poor spousal matching quality and subsequent psychosocial stress. We analyze survey data from rural Kyrgyzstan. We apply several estimation models, including an IV estimation in which we instrument kidnapping among young women with the district-level prevalence of kidnapping among older women. Our findings indicate that children born to kidnapped mothers are of a substantially lower birth weight than children born to mothers who are not kidnapped. This has important implications for children's long-term development; it also discredits the ritualized-kidnapping-as-elopement view.

## Key words

Forced Marriage, Bride Kidnapping, Birth weight, Stress, Kyrgyzstan

JEL codes: I12, J12

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## 1. INTRODUCTION

Economists have addressed many questions about love marriages in which both spouses of a couple select one another after a period of courtship and arranged marriages in which other parties are primarily responsible for the spousal search (Fafchamps and Quisumbing, 2008; Weiss, 1997). In contrast, forced marriages have not received much attention by the economic literature. This is surprising given the radically different nature of such marriages in terms of spousal search and expected marriage outcomes. The latter point is the topic of this paper. We investigate whether spouses that are forced into marriage are subject to measurable adversities.

We study the practice of bride abduction, which is a particular type of forced marriage. According to ethnographic reports, various forms of bride abduction existed in societies across Europe, Asia, Africa, Australia and the Americas (Ayres, 1974; Barnes, 1999; Bates, 1974; McLaren, 2001; Stross, 1974). Empirical evidence today suggests that abduction is no longer a common phenomenon; it disappeared in most countries with the development of modern laws and social norms (McLaren, 2001; Stross, 1974). Yet, it is still practiced in Central Asia, particularly in Kyrgyzstan, the focus of this paper.

We explore what appears to be a conundrum, at least at a superficial level. Kyrgyzstan has a reputation for being reformist, pluralistic, and as placing far fewer constraints on women than some of its former Soviet neighbors, to say nothing of countries further south such as Afghanistan, Iran, or Pakistan. Women hold high positions in society and politics; recently, a woman, Roza Otunbayeva, served as President of Kyrgyzstan. At the same time, this apparent outpost of liberal values is also a society in which a significant percentage of women are forcibly married following abduction. We call these abductions and subsequent marriages – somewhat prejudicially – “kidnapping” for brevity.

The extent of force involved in kidnapping appears to vary widely (Amsler and Kleinbach, 1999; Kleinbach et al., 2005). One extreme is fully non-consensual abduction in which the bride is kidnapped by the groom through physical force. Another extreme is elopement or staged abduction, where the groom and the bride agree on the kidnapping beforehand; for example, when their parents do not approve of a marriage. We make the crucial assumption that the degree of force is negatively related with the quality of the spousal match. The Life in Kyrgyzstan survey (Brück et al., 2014) data used in our empirical analysis does not distinguish between different degrees of force. Consequently, we seek to infer whether or not bride kidnapping is mainly consensual by exploring whether outcomes differ for kidnapped and apparently identical women who were not kidnapped.

Specifically, we compare birth outcomes for the infant children of women who were kidnapped to those of women who were not kidnapped. If we are able to determine significantly worse birth outcomes among infants of kidnapped mothers, this will be an indication that 1) kidnappings in Kyrgyzstan include force to a considerable extent, and 2) kidnappings, as a specific form of forced marriage, have adverse consequences – not only for the women involved but also for their children.

We measure birth outcomes by birth weight. The influence of forced marriage on birth weight is relevant because birth weight is a primary marker of infant health; it also has been shown

to affect long-run outcomes such as adult height, completed education, and earnings (Behrman and Rosenzweig, 2004; Black et al., 2007).

As is documented below, birth outcomes are clearly worse among children born to kidnapped mothers compared with children born to non-kidnapped mothers. The loss in birth weight is consistently negative across different estimation models and robustness tests. It appears to be in the area of 100-200 grams, which is sizable, and comparable to losses generated by other traumatic events or self-destructive behaviors. We interpret this as a sign that kidnapping in Kyrgyzstan is a form of marriage that, on average, lacks the consent of the bride and is based on some degree of force, possibly including physical force. We suggest that the most plausible channels through which kidnapping affects birth weight are psychosocial stress and poor nutrition during pregnancy.

The remainder of this paper starts by exploring the nature of bride kidnapping in Section 2. We then sketch the economic approach to marriage formation and formulate our main hypothesis in Section 3. Data are discussed in Section 4, and the empirical strategy is considered in Section 5. Section 6 presents descriptive statistics. We then turn to our empirical analysis of the consequences of kidnapping in Section 7 and address the question of the channels in Section 8. Section 9 concludes.

## 2. BACKGROUND: KIDNAPPING OF BRIDES IN KYRGYZSTAN

Bride kidnapping, called *ala kachuu* in Kyrgyz (literally: “to take and run away”), is the act of abducting a woman to marry her. Kidnapping is illegal, with a maximum prison sentence of three to seven years, or up to ten years if the kidnapped bride is below the minimum legal age for marriage of 17 years.<sup>1</sup> However, few people report cases of kidnapping to the authorities; and hence, prosecutions are very rare. In general, law enforcement and legal protection for women are rather weak in Kyrgyzstan (Human Rights Watch, 2006).

*Ala kachuu* usually involves a potential groom and his male friends taking a young woman into a car, and then transporting her to his home. The woman might be kidnapped from her house or another location, such as a school or her workplace. In the groom’s home, she is pressured by the groom’s female relatives to write a letter of “consent” to her family and put on a marriage scarf. Once she puts the marriage scarf over her hair, she accepts the marriage. This process could last from a few hours to several days. Eventually, the groom’s family goes to visit the bride’s parents to “apologize”, to hand over their daughter’s letter, and, traditionally, to offer sheep and other gifts. Such offers are considered the bride price (*kalym*). It is in principle possible for the woman to resist the kidnapping. Amsler and Kleinbach (1999) estimate that 17 percent of kidnappings do not result in marriage, either because the woman herself or her family resisted. Kleinbach et al. (2005) provide an estimate of only 8 percent.

A few scholars have attempted to explain why most kidnapped women stay with their kidnapper and why the women’s parents agree to this practice. Werner (2009) argues that the

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<sup>1</sup> These penalties are determined in a new bride kidnapping bill that came into law in January 2013. Bride kidnapping had been illegal before, and in fact, since the 1920s when the Soviet Union established laws for banning it (Werner, 2009).



act of kidnapping damages the reputation of the women, and the acceptance of marriage helps to restore that reputation. This is because, after being abducted, the women will be assumed to no longer be virgins. In addition, they may be perceived as stubborn and belligerent if they resisted the kidnapping. Taken together, this makes them unattractive for other potential marriage partners. A related explanation is provided by Borbieva (2012) who emphasizes the role of marriage as a social institution. She notes that women, as well as men, in Kyrgyzstan are expected to marry young and without long courtships, for a number of reasons: the lack of social acceptance of premarital sexual activity, the expectation on women to have many children, but most importantly, the function of marriage as transition to full adult status. Families of women with relatively poor perspectives on the marriage market (for example, because their daughter is already relatively old according to local standards) may therefore be particularly inclined to give in to kidnapping. Finally, Handrahan (2004) makes the point that kidnapping is often used as an act of ethnic definition. A “woman who rejects kidnapping is seen to be rejecting not only a Kyrgyz tradition but also Kyrgyz ethnicity” (Handrahan, 2004). This in turn may create conflict within the community, since it implies a denunciation of a widely accepted practice, especially where kidnapping is very prevalent.

Data on the prevalence of kidnappings are rare. Nedoluzhko and Agadjanian (2015) conducted a nationally representative survey in 2011/12 among slightly more than 2,000 households. The authors report that one third of marriages among Kyrgyz were the result of kidnappings; half of these marriages were of a non-consensual nature. The authors point out that the risk of kidnapping has declined since the collapse of the Soviet Union, and particularly within the most recent marriage cohort. According to a survey among all households in a village in the north-eastern region of Kyrgyzstan in 2004, 80 percent of Kyrgyz marriages were the result of kidnapping (Kleinbach et al., 2005). Only 34 percent of the kidnappings took place with the woman’s consent, 46 percent of the women were kidnapped through deception and 18 percent by physical force. One fifth of the kidnapped women reported that they had not known their kidnappers. These figures are remarkably consistent with a study of kidnapping in Syunik Province in southern Armenia (Edling, 2012). A slightly lower prevalence is reported in a study of roughly 1,600 Kyrgyzstani women for the International Crime Victims Unit Survey conducted by the local NGO *Za Reformy i Rezul’tat* (2015). This survey, which covers all Kyrgyzstani women without ethnic distinction, finds that 16 percent of married women had been abducted by their husbands for the purpose of marriage. Of these, 34 percent had not agreed in advance to their abduction.

There is limited information on the characteristics of the kidnappers and the kidnapped women. Handrahan (2004) conducted a survey among men across Kyrgyzstan. Her most striking result was that there was no relationship between a man’s education as well as profession and his likelihood to kidnap. Kleinbach *et al.* (2005) interviewed the women of one predominantly Kyrgyz village and found that both kidnappers and kidnapped women had reasonable levels of education. Only 10 percent of the men and 12 percent of the women had less than secondary schooling. In contrast, 14 percent of the men and 21 percent of the women had a university degree. Nedoluzhko and Agadjanian (2015) study the relative risks of kidnapping among a representative sample of men and women. They show that being employed does not make kidnapping any more or less likely than not being employed. People with only basic secondary education are far less likely to kidnap or to be kidnapped than people with higher education. Importantly, being enrolled in education makes kidnapping less likely than having finished education. Father’s occupation, as a proxy of family background, only matters in the

case of forced kidnapping: If the own father worked in agriculture, men and women are more likely to be involved in kidnapping than if the father had a different occupation.

In Kyrgyzstan, the practice of kidnapping is essentially limited to ethnic Kyrgyz. Other ethnic groups do not engage in kidnapping, with very few exceptions, but marry either through love or arranged marriages (Handrahan, 2004). That Kyrgyz (and southern Kazakhs, in Kazakhstan) tolerate kidnapping while more conservative Uzbeks and Tajiks do not is one of the puzzles that remain to be explained. Religion does not serve as an explanation, since the vast majority of Kyrgyzstan, including Kyrgyz, Uzbeks, and Tajiks, are Muslims. Moreover, as Werner (2009) states: “bride abduction is not an Islamic practice [...] people in Kazakhstan and Kyrgyzstan do not link bride abduction and religious custom.” The widespread presence of kidnapping in Christian Armenia documented by Edling (2012) and its apparent similarity to that in Kyrgyzstan also make it clear that there is no link to a particular religion. The glib explanation tends to be that Kyrgyz and Kazakhs were historically nomadic while Uzbeks and Tajiks were traders or settled agriculturalists.

### 3. CONCEPTUAL FRAMEWORK

#### 3.1 The economics of marriage formation

Marriage markets are characterized by uncertainty of outcomes and search costs because of scarce information about potential mates. In most societies, and restricting focus to heterosexual, monogamous arrangements, marriage can be the outcome of (1) an own search process in which a couple identifies one another following search activity and, usually, the groom proposes to the bride, who accepts, or (2) a delegated search with negotiated activity by third parties on behalf of the bride and groom, who in effect cede some of their selection power. They may do this voluntarily, in recognition of the superior selection ability of the third party, or less enthusiastically in recognition of local custom. In the Kyrgyz setting, (3) a limited, one-sided search involving unilateral, possibly coercive action by the groom is a third option.

From the groom’s perspective, search and courtship costs for a love marriage are high in terms of time and money and the marital outcome is not certain. The potential bride can choose to select his offer or refuse to marry but continue the search. Both partners compare each other’s characteristics and evaluate their potential gains from forming this union. If the gains to both partners from marriage are greater than their expected gains from continued search for a potential mate, then they marry (Becker, 1973, 1974, 1991). This is the fundamental logic behind the economic analysis of marriage formation. Individual consent is central to love marriages because with individual consent comes individual bargaining power (Edlund and Lagerlöf, 2006).

The search for a potential spouse in an arranged marriage is not undertaken by the groom directly but by his parents, relatives, or a contracted external party. The process may be longer or shorter than the own-search depending on market conditions, relative bargaining skills of the various parties, and attractiveness of the groom. In arranged marriages, there is substantial variation in the extent of external involvement. But, similar to love marriages, both mates generally have a choice and evaluate their gains from marriage (Batabyal, 2001, 1999, 1998).

A formal model that incorporates preferences for “marrying up” is presented in Banerjee *et al.* (2013).

The search for a suitable mate in a kidnapped marriage is initiated by the groom, but there is non-coerced consent only by the male.<sup>2</sup> In a kidnapping, the groom collects limited information about the woman he targets and evaluates his potential gain from marriage to her. Once kidnapped, the potential bride lacks choice over her potential groom. She cannot select from her prospective options and signal interest to the groom that gives her the highest expected gains from marriage. Relative to own search and arranged marriages, her expected gains and the quality of the marriage match are thus lower in kidnapped marriages.

In principle, there is also a fourth option facing prospective grooms and brides: abstention from marriage. In reality, this option is empirically unimportant in Kyrgyzstan, and indeed is an easily dominated option for all but a tiny number of people with unusually wretched choices. A potential groom seeks to maximize his reputation gain in the community and the number of offspring by getting married subject to the following constraints: the bride price and wedding expenses, family and community peer pressure, and search costs. If men live in smaller and poorer villages, and in regions where labor migration to Russia is uncommon, the social pressure to get married is even stronger due to the feeling of being left out and not being able to join the village discussions as an adult (Borbieva, 2012). These men are also pressured to marry young because bringing a daughter-in-law represents a source of pride for the husband’s family. More importantly, daughters-in-law represent additional labor in the household (housework, farming) and are future mothers (high value on fecundity). Pressure to marry is equally great for young women. A woman’s self-worth is largely defined by successful marriage and mothering of children. Status and power rise with age, but particularly for mothers, and most of all for mothers who bear sons who remain in the community. They and their wives and offspring become beholden to her; in many cases, the extended family matriarch will become the most powerful person in the household (for a formal model explaining this process, see Turaeva (2016)). In contrast, never-married, childless women rarely if ever attain high social status in rural areas.

### 3.2 The measurable consequences of being kidnapped

Bride kidnapping, if not pre-arranged, is likely to be traumatic for the brides. The resulting marriage is expected to be of poorer quality, relative to other types of marriage, because of the sub-optimal spousal match. It is not difficult to imagine that marriage resulting from kidnapping implies psychological and emotional, possibly even physical, costs to the wives.<sup>3</sup> To capture these costs, we measure the consequences of kidnapping on birth outcomes, specifically birth weight, which is a function of gestation duration and intra-uterine growth of the fetus (Kramer, 1987).

<sup>2</sup> *Kidnapping for show – staged elopement – with the prior agreement of both parties is a form of own search marriage. The empirical question is whether virtually all kidnappings are mutually pre-arranged, making them in fact a subset of own search marriages.*

<sup>3</sup> *Even though it is extremely difficult to obtain reliable numbers, a certain proportion of kidnappings seem to involve rape (Za Reformy i Rezul'tat, 2015).*

When a marriage is founded on force, women are likely to experience psycho-social stress and anxiety during gestation, which may in turn result in poor birth outcomes (Hobel et al., 2008). The medical explanation is that psycho-social stress activates the neuroendocrine stress response, which results in maternal endocrine changes, accelerated fetal maturation and, consequently, pre-term birth and low birth weight. Many recent studies have examined the effect of stress on birth outcomes using an exogenous source of acute stress (Bozzoli and Quintana-Domeque, 2014; Camacho, 2008; Foureaux Koppensteiner and Manacorda, 2016; Glynn et al., 2001; Mansour and Rees, 2012; Torche, 2011). For instance, Torche (2011) finds a significant decline in mean birth weight among the population exposed to a high-intensity earthquake in Chile. Mansour and Rees (2012) find a positive association between fatalities caused by Israeli security forces in the first trimester of pregnancy and low birth weight. They argue that psychological stress is a plausible mechanism for this relationship.

Being kidnapped may potentially affect birth weight through other channels as well. First, kidnapped women might be obliged to do more strenuous household work during pregnancy. Physical exertion has been associated with low birth weight (Bonzini et al., 2007). Second, kidnapped women might receive poorer nutrition compared with other women. Not only has it been shown that dramatic reductions in maternal nutrition, such as during famines, induce lower birth weight (Stein and Lumey, 2000); this is also the case for mild prenatal nutritional deprivation (Almond and Currie, 2011). Third, kidnapped women might enjoy less prenatal care. Grossman and Joyce (1990) and Wehby *et al.* (2009) show that less frequent prenatal visits decrease birth weight significantly. And fourth, kidnapped women may have shorter birth intervals which may lead to lower birth weight due to nutritional depletion (Kramer, 1987).

Our main hypothesis is that forced marriages have an adverse impact on children's birth weight. This may be triggered by psycho-social stress, strenuous physical work, poor nutrition, insufficient prenatal care, or very short birth intervals. The hypothesis is a reduced form assertion, as we do not model the particular channels through which the outcomes occur. If a negative relationship between bride kidnapping and birth weight is found, it implies – weakly, in that the exact mechanism is not identified, but strongly in the sense that no equally plausible hypothesis leaps to mind – that kidnapping is largely involuntary and involves adverse consequences for the affected women and their children.

#### 4. DATA

Our data are from the Life in Kyrgyzstan (LIK) survey (Brück et al., 2014). This survey was part of the research project “Economic Transformation, Household Behavior and Well-Being in Central Asia – The Case of Kyrgyzstan” which was funded by the Volkswagen Foundation. The project was implemented by the German Institute for Economic Research (DIW Berlin) in collaboration with Humboldt-University of Berlin, the Center for Social and Economic Research (CASE-Kyrgyzstan) and the American University of Central Asia.

The survey data were collected annually between 2010 and 2012. The sampling technique was stratified, two-stage random sampling based on the 2009 Population Census with probabilities proportional to population size. The strata were formed by Bishkek (capital city),

Osh city (the major city in southern Kyrgyzstan), and the rural and urban areas of the seven provinces. The data are representative at the national, urban/rural and North/South levels.

This paper uses data from the 2011 LIK wave, which is the one that provides the most information on marriage and fertility of the respondents. The 2011 wave contains information on 8,066 adults (*i.e.*, aged 18 and above) in 2,863 households in 120 urban and rural communities. Female respondents were asked whether they have ever been married. If yes, they were then asked about the evolution of this marriage. The exact wording for this question was: *How did this marriage come about?* The answer options were: a) *love marriage*, b) *arranged marriage*, and c) *bride kidnapping*.<sup>4</sup> As noted above, we are unable to distinguish between different degrees of force involved in kidnapping. For the below estimations, this implies that we may underestimate the effect of non-consensual abductions on birth weight. However, our primary interest is in determining whether there is any negative impact of kidnapping on birth weight, placing less importance on the exact magnitude of this impact, and for this purpose the proposed test works well.

Female respondents were also asked about their and their husband's age at marriage, whether their parents received a bride price, whether they ever gave birth, and detailed information on the children, if any. Children's birth weight was recorded based on the mother's recall. During the Soviet Union and also in today's Kyrgyzstan, birth weight is recorded on a so-called health card for each child. This health card is used to document all medical information during a child's development. Health cards used to be kept at hospitals or health centers but increasingly are stored at home. We expect that younger women will more accurately recall their children's birth weight. For this reason, we split our sample of women at median age (43 years) and conduct the analysis only for children born to what we call the young generation sample (18-43 years). We also expect women with fewer children to better recall their children's birth weight. We will take this into consideration in the robustness tests.

The empirical analysis below employs a sample restricted to Kyrgyz women who were ever married and gave birth to at least one child. We also exclude women living in the two major cities of Kyrgyzstan, namely Bishkek and Osh, for several reasons. First, kidnapping should be much less attractive in settings in which there is a steady arrival of prospective marriage partners, and indeed this appears to be the case empirically (Handrahan, 2000). Second, living conditions differ dramatically: the cities are far wealthier. They are also culturally more Soviet/European, and Russian remains the dominant language, especially in Bishkek.<sup>5</sup>

<sup>4</sup> *It may seem awkward to ask such a question in a survey since it refers to seemingly sensitive information. When drafting the questionnaire, we (two of the authors were involved in designing and implementing the survey) were concerned about this and almost dropped the idea of including the question. However, when consulting with an anthropologist who has been working on the marriage market in Kyrgyzstan (Nathan Light), he assured us that Kyrgyz people do not regard this information to be sensitive and talk a lot about kidnappings. He encouraged us to ask the question as bluntly as we did. We know from conversations with Victor Agadjanian that questions about kidnapping were not problematic in their study (Nedoluzhko and Agadjanian, 2015) either. We have also spoken with many Kyrgyz friends, colleagues, and professionals and can affirm that kidnapping is regarded as a fact of life that one can talk about openly – and, in consequence, we have collected many stories of kidnappings.*

<sup>5</sup> *In addition, we believe that to some degree kidnapping is an affront to the bride's family. No one can kidnap the local akim's (mayor, or most senior government official) daughter; no one should kidnap a woman from a markedly higher social stratum. In such cases, retaliation – legal or extra-legal from the woman's family – would be severe. These constraints make it less attractive to kidnap a woman of whose background the*

## 5. EMPIRICAL METHODOLOGY

In line with the hypothesis derived above, we focus on estimating the effect of bride kidnapping on birth outcomes, and specifically on the birth weight of children. The birth weight (measured in grams) of child  $i$  born to mother  $j$  in community  $k$  is considered to be a linear function of whether the marriage of that child's parents was a kidnapped marriage ( $K_{jk}$ ), a set of child ( $X_{ijk}$ ) and mother ( $M_{jk}$ ) characteristics at the time of giving birth, district fixed effects ( $\tau_k$ ), and birth date dummies ( $T_i$ ). The empirical model is given in equation (1):

$$\text{Birth Weight}_{ijk} = a + \beta_1 K_{jk} + \beta_2 X_{ijk} + \beta_3 M_{jk} + \tau_k + \gamma_i + \varepsilon_{ijk} \quad (1)$$

Child characteristics ( $X_{ijk}$ ) capture the gender and the birth order of child  $i$ . They additionally capture whether child  $i$  is a twin (no other multiple births were observed). Clearly, we would like to control for gestation duration but, as in Mansour and Rees (2012), we do not have this information. Mother characteristics ( $M_{jk}$ ) include her age at child  $i$ 's birth and her educational attainment.<sup>6</sup> A squared term for her age at birth is also included to control for a non-linear relationship between mother's age at birth and birth weight. As a second indicator of education, we control for whether or not a mother speaks both Kyrgyz and Russian. We control for the mother's body height, which has been found to be an important determinant of birth weight (Kramer, 1987).<sup>7</sup>

The LIK survey contains labor market information going back to the year 1989. For women who gave birth after 1989, we thus know their employment status in the year before giving birth. Specifically, we can distinguish between working in agriculture, working in non-agriculture, being in education, and being inactive outside the household (for example, working as a housewife or being on maternity leave). We do not use this information in our basic regressions, because we would lose about 5 percent of the observations due to the non-availability of the data before 1989, but we include it in robustness checks for the subset of observations for which this information is available.<sup>8</sup>

We would like to control for the use of prenatal care during child  $i$ 's time in uterus but the LIK dataset does not include this information. The Demographic and Health Survey conducted in Kyrgyzstan revealed that both in 1997 and 2012, 97 percent of women received prenatal care from a skilled provider; moreover, 98-99 percent of births were delivered by a skilled provider (NSC, 2013). We assume that the health care system in the Soviet Union was not much worse than this - and likely was even better, and we are therefore unconcerned about the lack of exact information on prenatal care.

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*prospective groom is uncertain, which reduces the incentives to kidnap in populous settings where many people do not know one another.*

<sup>6</sup> We also considered including the father's educational attainment as a control variable. This turns out to be unfeasible because we have this information only for a subset of our sample women.

<sup>7</sup> Another important determinant is smoking during pregnancy. Very few women smoke in Kyrgyzstan; only 2.5 percent of all adult women in the LIK sample. We therefore do not control for smoking although we know whether women smoked at the time of the survey, yet not at the time of pregnancy.

<sup>8</sup> As explained above, we divide the sample of women in half according to age, resulting in young generation being born between 1968 and 1992. The oldest child of a mother in this young generation sample was born in 1986.

We include district fixed effects ( $\tau_k$ ) and thereby only compare women within the same district to each other. This helps to control for heterogeneity between districts, such as different poverty rates or the availability of medical facilities.<sup>9</sup> The medical literature has found that birth weight is reduced at high altitudes, presumably due to the lower levels of oxygen (Giusani et al., 2001; Jensen and Moore, 1997; Unger et al., 1988). It appears to be unresolved, though, at which levels of altitude this phenomenon sets in. In our standard regressions, we exclude all observations residing above 2500 metres of altitude, but define a different threshold in the robustness section.

$\gamma_i$  is a set of fixed effects for child  $i$ 's birth month and birth year, to control for seasonal variations in birth weight and time trends over the years.  $\varepsilon_{ijk}$  is the error term assumed to be orthogonal to birth weight. We cluster the standard errors of this estimation at the mother level. We are interested in the coefficient  $\beta_1$ . If  $\beta_1$  is negative, mothers married through kidnapping give birth to lighter children. We would interpret such a result as reflecting worsened circumstances for these mothers during pregnancy. We intend to shed light on the specific mechanisms, through which kidnapping works, below.

Kidnapping is most unlikely a random event. Therefore, equation (1) potentially suffers from endogeneity due to omitted variable bias. Estimates of  $\beta_1$  are biased if women are kidnapped based on unobserved characteristics that also affect child health. For example, if women who appear particularly healthy and who are therefore presumably more fertile are most likely to be kidnapped, our estimates may be subject to a bias towards zero. If, on the other hand, particularly young women, whose physical development has not been finalized, are kidnapped, the results may be biased upwards. Therefore, we estimate a two-stage least-squares (2SLS) estimation, using an instrument for kidnapping status.

An instrument is statistically valid if it is significantly correlated with kidnapping and unrelated to birth weight through unobserved factors. The anthropological literature explains that the family of the groom plays a crucial role for his decision to kidnap. Indeed, it is likely that the groom's parents and siblings even actively support the planning of the kidnapping, as noted in Amsler and Kleinbach (1999) and Borbieva (2012). When the family is not informed ahead of the kidnapping, it gets engaged at the point when the kidnapped woman enters the groom's house. As noted above, the female relatives of the groom (often his mother) are then expected to persuade the prospective bride to place the marriage scarf on her head. We argue that in areas with a high prevalence of past kidnappings, individual families are more likely to be supportive of this practice and may pressure prospective grooms to kidnap. This, in turn, means that a woman living in such an area is more likely to be kidnapped than a woman in an area with a low prevalence of past kidnappings; the former woman is also more likely to acquiesce.

We calculate the share of kidnapped women among all marriages per district and use this district-level share as the instrument. Specifically, we use the sample split into two generations, the old generation being above median age of 43 years and the young generation being between 18 and 43 years. We calculate the district-level share of kidnapping for the old generation, which is the set of potential mothers-in-law, and use this information as an instru-

<sup>9</sup> According to the 2009 Census (NSC, 2009), the minimum and maximum population size in a district is 21,154 and 321,915 people, respectively. The mean is 96,202.

ment for the young generation.<sup>10</sup> In other words, our IV estimates below are produced on the basis of the young generation only. Information about the old generation is only exploited to produce the district-level share of kidnapping.

The district-level proportions of marriages due to kidnapping range between zero and 0.9 (see histogram in Appendix Figure A1). In some districts, there is a low number of observations in the old generation group, which makes the calculation of district-level shares for kidnapping among all marriages unreliable. We therefore exclude observations with less than 9 observations per district. We lose information from five out of a total of 46 districts by doing so. While all observed districts in Naryn province indicate a high prevalence of kidnapping, there is almost no kidnapping reported in Batken province.<sup>11</sup> All other provinces have a wider distribution of district-level shares. In our sample of the young generation, the mean of this district-level share is 0.29 (with a standard deviation of 0.22) and the median is 0.30.

We assume that the district-level share of kidnapping among older women provides an exogenous source of variation for the individual young generation woman. We argue that this is the case because the old generation does not choose to live in a particular location because of the marriage market that their children would face. Rural Kyrgyz people are not very mobile and marriage markets (at least for kidnappings and arranged marriages) are rather local. In our total sample of adult women (*i.e.*, including the young and old generation but excluding observations from Bishkek and Osh city), 89 percent were born in the same province where they lived at the time of the survey. Hence, the geographical circumstances that a Kyrgyz woman is born into are highly likely to pre-determine her individual probability of being kidnapped.

Our identifying assumption is that the district-level share affects the likelihood of kidnapping of any single woman but does not have an independent influence on her children's birth weight once kidnapping is controlled for. This may seem questionable if the prevalence of kidnapping was correlated with other district-level characteristics, such as the level of poverty, which also affected children's birth weight. We can eliminate this concern in the following way. As noted earlier, the Kyrgyz are the only major ethnic group in Kyrgyzstan that practices kidnapping. This allows us to test for a relationship between the district-level share of kidnapping and birth weight using data from other ethnic groups only. If the district-level share captured other information than simply the prevalence of kidnappings, this should then show up for the non-Kyrgyz ethnic groups. Appendix Figure A2 illustrates the frequency of non-Kyrgyz observations (*i.e.*, children) living in districts with varying kidnapping prevalence. Even though the non-Kyrgyz in our sample do not reside in the districts with the highest kidnapping prevalence, there is quite some variation in the district-level share for this group. As Table 1 illustrates, there is no association between the district-level share and children's birth weight for the non-Kyrgyz, regardless of whether we control for child and mother characteristics or not.<sup>12</sup>

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<sup>10</sup> We are grateful to Priscilla Hermida of Universidad Pontificia Catolica del Ecuador for this suggestion.

<sup>11</sup> Batken province is adjacent to Tajikistan and Uzbekistan, and has large minority Tajik and Uzbek populations. Both Kyrgyz (several) and Tajik (Mavzuna Turaeva) colleagues confirmed that the observed low prevalence is likely to reflect reality, as local Kyrgyz have modified their customs somewhat.

<sup>12</sup> We here combine all non-Kyrgyz ethnic groups. The same result emerges when we restrict consideration to Uzbeks, the largest minority group.



The identifying assumption could still be violated if the kidnapping husbands were in any way different from the husbands involved in non-kidnapped marriages. If, for example, the least educated or the unemployed were more likely to kidnap than to engage in arranged or love marriages, this could have consequences on children's birth weight through the level of health care or the quality of nutrition that the pregnant women enjoy. As indicated above, earlier studies have not found any relationship between the level of education or the economic activity of the husband and his likelihood to kidnap (Handrahan, 2004; Nedoluzhko and Agadjanian, 2015).<sup>13</sup>

In addition to OLS and IV estimation, we also turn to propensity score matching (PSM), which matches on observable characteristics. We calculate the kidnapping propensity for the young generation with the help of variables that relate to the time of marriage or before: woman's and man's age at marriage, woman's level of education, woman's proficiency in both Kyrgyz and Russian (as an alternative proxy for education), the number of siblings she has, her economic activity in the year of marriage, and whether her father worked in agriculture. Following the literature, these variables may help to explain whether a woman was kidnapped or not (Handrahan, 2004; Kleinbach et al., 2005; Nedoluzhko and Agadjanian, 2015). In addition to these individual-level characteristics, we include the instrument, namely the district-level share of kidnapping among the old generation.

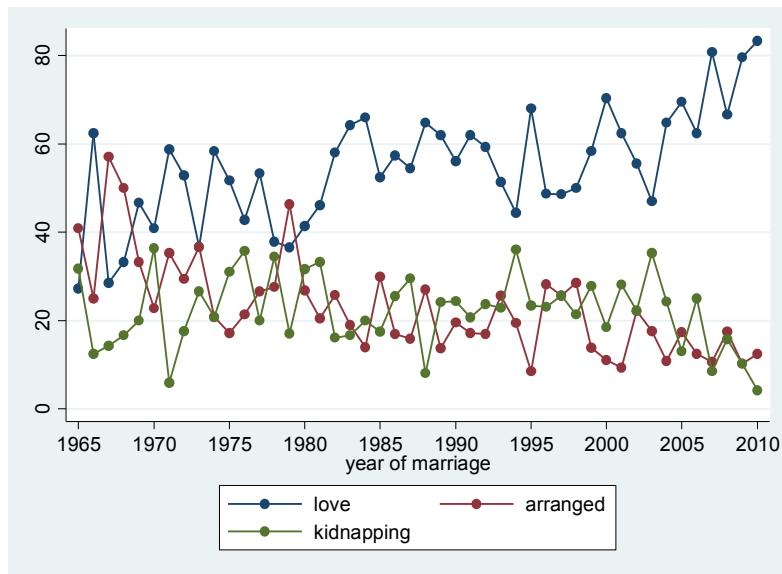
We calculate the propensity scores through kernel matching for our young generation women. The kernel function takes the weighted averages of the observations in the group of non-kidnapped women as the counterfactual outcome for each observation in the group of kidnapped women. We use this approach to trim our sample to similar women by dropping those that are off common support. We then re-estimate equation (1) by considering the weight given by the kernel matching to each woman. This produces another set of estimation results by only relying on information from kidnapped and non-kidnapped women that were similar to each other at the time of marriage.

## 6. DESCRIPTIVE STATISTICS

In what follows, we only include ever-married Kyrgyz mothers who do not reside in Bishkek or Osh city for the empirical analysis. After dropping those observations that do not contain full information on the variables defined above, there are 1,701 women living in 1,337 distinct households. In this sample of women, 23.8 percent reported that they got married through the process of kidnapping, 53.4 percent reported love marriage, and 22.8 percent arranged marriage. Among the old generation (as defined above), the respective shares are 25.8 percent, 45.7 percent and 28.5 percent; among the young generation, 21.8 percent, 61.2 percent and 17.0 percent, respectively.<sup>14</sup>

<sup>13</sup> The results by Nedoluzhko and Agadjanian (2015) may seem confusing in this regard. The authors conduct event-history analysis to estimate the risks of entry into marriage. They report that men with a higher educational level face a higher risk of kidnapping, especially forced kidnapping, than men with a lower educational level. Yet, better educated people are generally more likely to be married, either through kidnapping, arranged marriage or otherwise. There is no indication that education matters for the choice of marriage type.

<sup>14</sup> We only consider information about the first marriage. The women in our sample are not necessarily married to their first marriage husbands any more at the time of data collection. A small share, namely 2.6 percent of

**Figure 1: Incidence of marriage types by year of marriage**

Source: Authors' illustration based on 2011 LIK data.

Figure 1 shows the incidence of the different marriage types by year of marriage. We only include the marriage period 1965-2010 in this figure because we have too few (*i.e.*, less than ten) observations for the years before 1965 and for the year 2011 in our dataset. While the share of love marriages has clearly increased over this period, the share of both kidnappings and arranged marriages has decreased, especially in the most recent years. This is in line with Nedoluzhko and Agadjanian (2015).

Appendix Figure A3 illustrates the distribution of age at marriage across the three marriage types. This figure is based on the total sample in panel a) and the young generation sample in panel b). As the histograms show, marriage is unlikely at very young ages (*i.e.*, below 16 among the total sample or below 17 among the young generation) and above age 30. Most marriages occur between 17 and 25. This implies that kidnapping, as well as other types of marriage, is not targeted at very young girls but rather at young women who have finished most if not all of their education.<sup>15</sup>

The bar graphs make clear that during the marriage peak years (17-25) kidnapping dominates among the younger women and is uncommon for women over age 22. Arranged marriages become important at around age 18 and peak in importance around age 20, but remain important throughout a woman's 20s. The fact that love marriages have the highest mean age suggests to us that many and quite likely the vast majority of women who marry for love were actually at low risk of being kidnapped involuntarily, since otherwise the kidnapping hazard would motivate them to marry sooner. The greatest kidnapping risk thus occurs for women whose dominant alternative is arranged marriage. This becomes a key point

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*the women, got married a second time; 6 percent are divorced, and 2 percent are widowed. We ignore the type of second marriage as well as children born during second marriages throughout this paper.*

<sup>15</sup> We have been told (by Aliya Ibragimova and Christopher Edling) that secondary school and university graduation ceremonies are a popular time for kidnapping. Families of the groom often promise to pay for the bride's education, so marrying after graduation reduces the costs for the groom's family. The results presented in Nedoluzhko and Agadjanian (2015) are consistent with this claim: being in school more than halves one's risk of incurring either a forced or staged kidnapping.

in our empirical work, as we hypothesize that the competing alternative to being kidnapped is to enter into an arranged marriage (which also may explain the modest resistance to being kidnapped).

As it turns out, the Life in Kyrgyzstan survey asks both spouses a large battery of relevant questions that allows us to distinguish among different types of marriage. Because of incomplete responses and our focus on younger households, sample sizes are not huge, so that, the power of tests is fairly low and it is not possible to estimate responses conditioned on a range of socio-economic factors. We therefore focus on simple comparisons of husband and wife responses, for different marriage arrangements.

Details appear in Appendix Table A1. Briefly, we find that those products of love marriages have lower age gaps and are much more likely to speak both Kyrgyz and Russian than the products of other marriages, thereby strengthening the decision to compare arranged and kidnapped marriage outcomes. Second, while marriage is consistent with positive assortative mating (PAM) for education for all groups (not surprising, given that education combines social values (+) and earnings potential (-); see Becker, 1973), there are different patterns by type of marriage. Specifically, among men there is some “marrying up” with kidnapping, and a substantial amount of “marrying down” that occurs in love marriages. Third, the correlation between spouses in kidnapped marriages is far lower for level of trust and for degree of perceived stress than is the correlations in other marriages.

Finally, there are also much lower correlations for measures of depression and curiosity among kidnapped marriage than other families. While we cannot formally identify causal relationships, an obvious explanation would be that kidnapped women are more likely than other women to be stunned and depressed – not patterns that would emerge if kidnapping was a benign ceremonial event, and such marriages were similar to other forms.

Compared to the numbers in Nedoluzhko and Agadjanian (2015), the prevalence of kidnappings observed in our data seems too low. They report that one third of all marriages of Kyrgyz women were kidnappings, while we measure slightly less than one quarter. It seems unlikely to us that unreported kidnappings are categorized as arranged marriages in the LIK data because arranged marriages are a particular, well-defined type of marriage. We expect them instead to be categorized as love marriages, which is especially probable the more kidnappings were consensual. This means that while reported kidnappings are likely to be true kidnappings (with varying degrees of force) and reported arranged marriages are likely to be true arranged marriages, reported love marriages are likely to contain non-consensual and, especially, consensual kidnappings. This fact reinforces our decision to contrast kidnapped mothers’ outcomes with those women who had arranged marriages. To reiterate, hereafter we ignore those women who report love marriages and only compare the birth weight of children born to kidnapped mothers to those born to mothers in arranged marriages.<sup>16</sup>

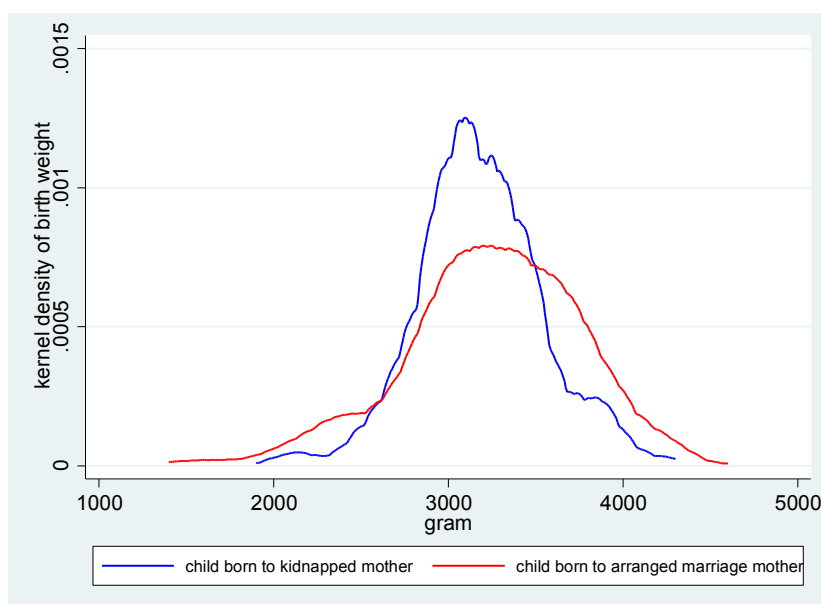
Table 2 provides summary statistics on all variables included in equation (1), distinguished by kidnapping and arranged marriage of the mother. These statistics are for the total sample

<sup>16</sup> We expected a relationship between the prevalence of kidnapped marriages and the prevalence of arranged marriages within districts. We calculated, in analogy to our instrument, district-level shares of kidnapping and arranged marriages for the young generation. The correlation is -0.22, but this is not statistically significant ( $p=0.17$ ). Among the old generation, the correlation is much higher at -0.42 ( $p=0.01$ ).

in columns (1) and (2) as well as for the young generation only in columns (3) and (4). In the upper panel of the table, we report summary statistics for the children born to the mothers in our sample. Among both marriage types, some children seem to be born out of wedlock; *i.e.*, the year of birth lies reportedly before the year of marriage. We exclude the children born out of wedlock to kidnapped mothers (there are 19 such children among the young generation sample of mothers) because it is unclear whether their mothers were subject to poor pregnancy circumstances. It seems likely that the kidnapping of women who already had children is a form of consensual kidnapping; *i.e.*, where potential spouses (who may or may not be the parents of the children) agree on the kidnapping. This form of kidnapping is not interesting to our research question because it is unlikely to involve adverse circumstances for the women compared with other forms of marriage. In the below robustness section, we also exclude all children born out of wedlock for arranged marriage mothers, not only those of kidnapped mothers.

The total sample comprises of 670 women who gave birth to 2,526 children. Among the young generation, 282 women gave birth to 807 children. For both the total sample and the young generation, mean birth weight is significantly lower by 111 grams and 90 grams, respectively, for children from kidnapped mothers than for children from arranged marriage mothers. Figure 2 displays the full distribution of birth weight for children born to the young generation mothers. Mean birth weight is slightly higher for arranged marriage mothers, as is clear from Table 2, but the standard deviation is also higher.<sup>17</sup> There are differences neither in terms of the share of male and female children across the marriage types nor in the share of children who are the firstborn. This indicates that the average number of children is comparable across the marriage types; namely, 2.9 for kidnapped mothers and 3.0 for arranged marriage mothers among the young generation.

**Figure 2: Birth weight distribution**



**Source:** Authors' illustration based on 2011 LIK data.

<sup>17</sup> In fact, whereas only 2.3 percent of children born to kidnapped mothers were born with low birth weight, defined as weight below 2,500 grams, 6.6 percent of children born to arranged marriage mothers had low birth weight.

In the lower panel of the table, it becomes clear that kidnapped mothers differ from arranged marriage mothers on several counts. Kidnapped mothers are slightly younger at the time of giving birth. This is true for both average age at birth (for all children) as well as for age at birth of the first child. This may reflect the fact that kidnapped women are also a bit younger at the time of marriage than arranged marriage women. Regardless of the marriage type, however, the first child is born 1.6 years after marriage among the young generation sample.<sup>18</sup> There is a larger share among kidnapped mothers than among arranged marriage mothers with only basic education (among the young generation), and there is a smaller share among kidnapped mothers than among arranged marriage mothers with a secondary school degree. Kidnapped mothers seem to be significantly less likely to work in agriculture and more likely to be students before giving birth.

## 7. ESTIMATION RESULTS

Table 3 provides three different results for estimating equation (1): the OLS estimates in column (1), the IV estimates in column (2), and the OLS estimates using the sample obtained through PSM in column (3). The number of observations is lower in column (2) than in column (1) because we cannot produce reliable numbers for the district-level share of kidnapping (*i.e.*, the instrument) for all districts. This is the case when the number of observations is too low within the district, as explained above. The number of observations is again lower in column (3) because we lose observations due to missing information for some of the determinants of kidnapping. In addition, further observations are lost that lack common support.<sup>19</sup>

Results for the control variables provide a consistent, plausible picture of the determinants of birth weight in Kyrgyzstan. Male children are born with significantly higher weight (72-138 grams) than female children and twins have significantly lower weight (737-863 grams) than singletons. Firstborns tend to be born with lower weight compared with children of higher birth order but this finding is not statistically significant.<sup>20</sup> Mother's age does not seem to matter. We believe this is due to the fact that women give birth at an average age of 24-26 years; or 21-22 years for the first child. This is neither very young nor very old and therefore does not imply age-related risks of short gestation duration and low birth weight. First births are also clumped (standard deviation of mother's age at first birth is 3 years) relative to many other countries. Furthermore, we find that while formal schooling degrees are unrelated with birth weight; speaking two languages, which we regard as an alternative indicator of education, increases birth weight by 98-184 grams. However, this finding disappears in the IV estimation. Mother's body height is positively but insignificantly related with birth weight.

<sup>18</sup> Please note that this time between marriage and giving birth is not exact, as we do not have information about the month in which people married.

<sup>19</sup> Appendix Table A2 provides OLS estimates for the smaller samples, illustrating that reducing the sample size does not modify the basic results by much.

<sup>20</sup> It is a standard finding that firstborn children are lighter (Kramer, 1987). We also differentiated between children of higher birth order but this did not increase the explanatory power of the estimation.

*Ceteris paribus*, kidnapped mothers give birth to significantly lower birth weight children compared with arranged marriage mothers. The birth weight loss is of the magnitude of 96 grams in the OLS estimation, 227 grams in the IV estimation, and 200 grams in the matched sample OLS estimation.<sup>21</sup> The difference between the simple OLS estimate and the other two estimates suggests that there is some unobserved variable, for example physical attractiveness or healthy appearance of the woman, which is positively related with both kidnapping and birth weight. Such a variable would be included in the error term in the simple OLS estimation, resulting in biased estimates. The matched sample OLS and the IV estimates are, however, very close. By reducing the sample to similar kidnapped and arranged marriage women through PSM, we seem to have reduced the selection bias greatly.

Table A3 in the Appendix reports the first-stage results related to the IV estimation. The district-level share of old generation kidnappings is a strong predictor of a woman's likelihood of being kidnapped. A 10 percentage point increase in the district-level share increases the likelihood of kidnapping of an individual woman by 15 percentage points. Testing for the relevance of the instrument reveals that the instrument is not weak: The *F*-statistic of the test for the significance of the excluded instrument (*i.e.*, the district-level share of kidnapping) is 127 at a *p*-value of 0.00. The partial  $R^2$  is 0.277 compared to an adjusted  $R^2$  of 0.334.

The results of the probit model, computing the propensity to be kidnapped in the PSM model, are reported in Table A4. As we also saw in Table A3, the district-level share of kidnapping is shown here to be a strong predictor of the individual propensity to be kidnapped. The likelihood of being kidnapped also varies with the woman's age as well as her economic activity in the year of marriage. Younger women are more likely to be kidnapped, which is reflected in the younger age at marriage among kidnapped women in Table 2. Women who had a non-agricultural job in the year of marriage are more likely to be kidnapped compared with women who were economically inactive. This is an interesting and new insight and potentially points toward an unknown form of selection. Possibly, this finding can be interpreted in terms of safety or exposure. Compared to inactive women, women in non-agricultural jobs are not spending most of their time at home and so expose themselves to potential grooms.

The number of observations is reduced to 220 women (from a total of 282 women), due to the unavailability of information about the father's occupation as well as the woman's own economic activity status in the year of marriage for a number of women. According to the propensity scores calculated, the average probability of being kidnapped is 51.4 percent in our sample; it is 71.0 percent among kidnapped women and 29.5 percent among arranged marriage women. Thirty-five kidnapped mothers are off common support and thus not further considered in the matched sample estimation.

As a next step, we run a number of robustness tests in which we follow the same approach as in Table 3: we report simple OLS, IV and matched sample OLS estimation results in Table 4. First, we exclude all children born out of wedlock; *i.e.*, not only those of kidnapped mothers but also those of mothers in arranged marriages (columns (1)-(3)). This leaves the results essentially unchanged. Second, we exclude all observations residing above an altitude of 2,000 meters (columns (4)-(6)). This is because we cannot be sure that the threshold, above which

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<sup>21</sup> Including information about the economic activity in the year before giving birth changes the magnitude of these results only marginally.

birth weight decreases with altitude, is indeed 2,500 meters as assumed so far. It becomes clear that the threshold matters for the magnitude of the coefficients but the direction of the effect as well as the statistical significance remain unchanged.

Third, we define the cutoff between the young and the old generation differently (columns (7)-(9)). So far, we used the median age in our total sample of women as the cutoff; we now draw the limit at marriage in 1992, *i.e.*, the first year of Kyrgyzstan's independence from the Soviet Union. This is to account for the fact that marriage formation may have changed from 1992 onwards. Specifically, we could imagine that greater socialization that occurred in the Soviet Union meant a far lower incidence of non-consensual kidnapping. Schooling was nearly universal in Soviet times, as was participation in youth organizations like the Young Pioneers, and so essentially all young men and women were exposed to many people of the opposite sex, and in an environment that did not discourage romantic entanglements. With the dissolution of the Soviet Union, such institutionalized interaction among the youth disappeared. It is possible that the extent of force involved in kidnappings has subsequently increased. For the IV analysis, we now calculate the district-level share of kidnapping on the basis of information from women who were married in 1991 or earlier and run the estimation with the sample of women who were married in 1992 or later. The OLS result in column (7) is no longer statistically significant (t-value = -1.54) but the IV estimate as well as the matched sample OLS estimate remain in the area of a birth weight loss of around 100 to 200 grams.

As a last robustness test, we move back to our original definition of the young generation (18-43 years old) and only consider children born to women who gave a maximum of two births (columns (10)-(12)). As explained above, we believe that younger women as well as women with fewer children are better able to recall the birth weight of their children correctly. This reduces the sample size considerably but it also explains the variation in the birth weight variable to a much larger extent than any previous estimation model. The interesting finding is that the kidnapping coefficients of the OLS and the IV estimation are now of a similar magnitude. Kidnapping seems to result in a loss in birth weight of about 200 grams. The result of the matched sample OLS are statistically insignificant, which we do not find surprising keeping in mind the very small sample size. The number of observations in this case is only 120 children born to 83 mothers.

Overall, our findings indicate a strongly negative impact of kidnapping on the birth weight of children. The magnitude of the impact appears to be between 100 and 200 grams, which is sizable and implies detrimental consequences for the long-run development of children born to kidnapped mothers (Almond and Currie, 2011). To put it into perspective, smoking is known to reduce birth weight and numerous studies have measured the negative effect of being a smoker to be in the area of 150 grams (Kramer, 1987). More recent studies argue, however, that this effect is likely to be biased because mothers select into smoking, possibly based on unobservable characteristics. Currie *et al.* (2009) therefore make use of comparisons of sibling birth weight when the mother smoked during one pregnancy but not the other. The loss in birth weight from being a smoker then amounts to about 40 grams.

Obviously, our estimated birth weight reductions are quite large. However, they are in line with the very limited empirical evidence that exists on violence against women and newborn health. Most critically, Aizer (2011) finds that admission to a hospital for assault during

pregnancy reduces birth weight by 163 grams among Californian women. A plausible lower bound is provided by Almond and Mazumder (2011), who estimate a 50 gram birth weight reduction for children born to Arab-American women from Michigan whose first month of gestation overlapped with Ramadan. They also find large disability risk effects for children born to Muslim women in Uganda who were conceived during Ramadan.

To make sure that we do not still capture unobserved differences between kidnapped and non-kidnapped mothers, and their respective children, in terms of health endowments, we also implement a number of placebo tests. These regress the mother's height and, alternatively, a number of chronic health conditions on kidnapping status as well as the control variables in equation (1), excluding mother's height as a control. The assumption is that maternal height and (most) chronic illnesses are determined before marriage age and are therefore unaffected by own marriage type. Results can be found in Table 5. Kidnapping does not appear to be related with height or chronic illness (except for kidney disease, at a marginal level of significance).<sup>22</sup>

## 8. IDENTIFYING THE CHANNELS

We now look into the channels of how kidnapping may affect birth weight. As noted above, psycho-social stress, poor nutrition, strenuous physical work and short birth intervals are plausible explanations. Insufficient prenatal care can be excluded as a channel because of close to universal care. Given that the LIK dataset contains information about time use, we can compare how kidnapped and non-kidnapped women spend their days. This gives an insight into whether kidnapped women are doing more strenuous physical work, get less sleep, and less leisure. This information refers to the time of the survey, not the time of pregnancy. It therefore does not allow for any causal explanations between time use and birth weight. Yet, the time use data can nevertheless give an indication about how different women spend their days on average.

Appendix Table A5 reports average hours spent per day on different activities, separately for kidnapped women and women in arranged marriages. There is no evidence of kidnapped women being disadvantaged in terms of time use. Kidnapped women spend slightly more time for personal care and less time for elderly care. The latter result is not surprising given the fact that the divorce rate is higher among kidnapped women than among arranged marriage women.<sup>23</sup> Hence, kidnapped women are less likely to reside with their parents-in-law at the time of the survey. But even if we compare time use of only kidnapped and arranged marriage women who live with their mother-in-law in the same household (unreported), there are no significant differences. We thus conclude that strenuous physical work does not seem to be the main channel between kidnapping and birth weight.<sup>24</sup>

<sup>22</sup> We also run these regressions at the mother level, not controlling for any child characteristics. The results are the same: Kidnapping is unrelated with maternal height and chronic illness, including kidney disease.

<sup>23</sup> The divorce rate is 12.2 percent among kidnapped women and 4.8 percent among women in arranged marriages in our young generation sample.

<sup>24</sup> Of course, this information only refers to the amount of time spent in a specific activity and tells nothing about the intensity of doing it. For example, five hours of housework alone may be more strenuous than doing five hours of housework jointly with another person. Still, the overall picture that we get from the time use information does not lead us to believe that kidnapped women suffer from more strenuous work.



Given that we know the birth months and years of the children born to our sample women, we can also compare birth intervals. We do not know the day of birth and assume it is the first of each month. Doing so, we can calculate the number of days between the first and the second child, the second and the third child, and so on. Given that the number of women decreases as we increase the birth order, we only show the average number of days between births up to the fourth child. The results are shown in Table A6. There is no difference in birth intervals between kidnapped and arranged marriage women, which makes us confident that this is also not the channel through which kidnapping affects birth weight.<sup>25</sup>

This leaves us with psycho-social stress and poor nutrition during pregnancy as potential channels. Unfortunately, the LIK does not include any information that helps to disentangle these two. We think it is unlikely that husbands provide poor nutrition to their kidnapped wives when they are pregnant because, as argued above, being married and having children is socially so important. However, we lack the data to prove that this is not the case.

## 9. CONCLUSION

We consider the effects of bride kidnapping, a specific form of forced marriage practiced in Kyrgyzstan, on birth outcomes. We show that marriages resulting from kidnapping have a negative effect on the birth weight of infants. This finding is consistent across a number of estimations: we run an OLS model with district fixed effects, an IV estimation in which we instrument kidnapping with the district-level prevalence of kidnapping among the old generation, and an OLS model for which the sample was trimmed through propensity score matching. The magnitude of the effect is in the range of 100 to 200 grams.

We interpret this as evidence that kidnapping involves some degree of force, on average. As noted in the Introduction, kidnapping can take very different forms and in many cases may be fully consensual between the groom and the bride. However, if this was true for all kidnappings, we would not be able to obtain the results shown here. This is important news for Kyrgyzstan. Many human rights organizations have been trying to raise awareness about the practice of kidnapping and to encourage Kyrgyz women and their families to report kidnappings to the authorities, with limited success. We now know that kidnapping does not only have adverse consequences for the women but also for their children. Lower birth weight, even if only of the magnitude of 100 to 200 grams, almost surely has long-term consequences for child development.

These findings are bolstered by a final piece of evidence. Our point of departure lies in standard marriage models (and, specifically, Becker, 1973), which imply that in mutually voluntary marriage, there should be positive assortative mating (PAM) on complementary characteristics such as outlook on life, value placed on children's human capital, and willingness to accept risks. Conversely, there should be negative assortative mating (NAM) on substitute characteristics, the most important of which is earnings potential. If kidnapping is merely

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<sup>25</sup> We need to make one important qualification to this conclusion. We only know the birth dates of live-born children, as the LIK did not collect information about stillborn children. Hence, the conclusion only holds under the assumption that kidnapped women do not have more stillborn children than arranged marriage women on average. We do not have any evidence that this would be the case.

a form of ceremonial elopement, then patterns of assortative mating should not differ for those kidnapped and those whose marriages were arranged or the outcome of romances. However, it is apparent from Appendix Table A1 that the extent of PAM is much lower for many psychological traits. Clearly, these questions are highly imperfect, which is not surprising given the sensitivity of the topic and the fact that the LiK survey was not aimed primarily at uncovering the true nature of bride kidnapping. However, as with our other robustness checks, it contributes to building a story that is difficult to refute.

We see scope for further related research. Since we know only little about men and women's choice of the type of marriage, more insights may be obtained from large-scale surveys such as the LIK. It would be interesting to also investigate the question of when and why some kidnappings do *not* end in marriage. In addition, it is important to attempt to determine whether nonconsensual kidnapping is expanding into social settings in which *ala kachuu* was not traditionally practiced; data permitting in the future it would be particularly important to link involuntary kidnapping to village characteristics.

A simple search for the phrase "bride abduction in Kyrgyzstan" (in Russian) yields over 200,000 hits on [www.google.ru](http://www.google.ru) as of January 2016. The many English-language news stories on Eurasianet site tell a similar story, though perhaps none as telling as the October 2, 2012 commentary *Kyrgyzstan: courts tackle sheep theft, ignore bride kidnapping* (<http://www.eurasianet.org/node/65989>) that notes that 666 cases of livestock theft brought criminal charges during the period January-August 2012, as against only 10 cases of bride kidnapping. While social condemnation of the practice appears to be rising, at least in urban areas, there also remains a considerable explicit and still more tacit support for the "traditional custom." It is now incumbent on these supporters to come up with an alternative, plausible explanation for the highly robust findings above.

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**Table 1: Determinants of birth weight for non-Kyrgyz women**

	Dependent variable: birth weight		
District-level share	78.09 (138.2)	31.34 (139.9)	14.20 (139.9)
Child male	.	27.08 (29.81)	33.81 (29.68)
Child firstborn	.	94.96** (38.80)	-52.81 (41.92)
Twin	.	.	.
Age at birth	.	.	30.61 (35.84)
Age at birth squared	.	.	-0.314 (0.662)
Basic education	.	.	-178.6 (112.9)
Secondary education	.	.	-131.3 (110.8)
Technical education	.	.	-212.9* (126.3)
Kyrgyz and Russian	.	.	-21.61 (74.30)
Mother's height	.	.	1.699 (4.159)
Constant	3,208*** (29.70)	3,328*** (119.0)	2,644*** (850.5)
Birth month & year FE	NO	YES	YES
Observations	630	630	630
R-squared	0.001	0.072	0.109

**Note:** The sample consists of non-Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Clustered standard errors in brackets.

\*\*\* significant at 1%, \*\* at 5%, \* at 10%.

**Source:** Authors' illustration based on 2011 LIK data.

**Table 2: Descriptive statistics, by marriage type**

	Total sample		Young generation only	
	(1) Kidnapping	(2) Arranged	(3) Kidnapping	(4) Arranged
<b>CHILD CHARACTERISTICS</b>				
Birth weight	3151 (411)	3262* (436)	3173 (368)	3263* (490)
Child male	0.518 (0.500)	0.528 (0.499)	0.507 (0.501)	0.525 (0.500)
Child firstborn	0.215 (0.411)	0.217 (0.413)	0.223 (0.417)	0.215 (0.411)
Twin	0.012 (0.109)	0.020 (0.138)	0.005 (0.068)	0.032* (0.176)
Mother's age at birth	26.8 (6.08)	27.7* (6.34)	24.2 (4.49)	25.5* (4.97)
<i>Number of observations</i>	1248	1278	430	377
<b>MOTHER CHARACTERISTICS</b>				
Age at first birth	22.3 (4.22)	22.8 (4.85)	21.0 (2.72)	22.3* (3.57)
Age at marriage	19.7 (4.36)	20.7* (5.08)	19.4 (2.64)	20.7* (3.44)
Basic education	0.142 (0.350)	0.147 (0.354)	0.090 (0.267)	0.024* (0.152)
Secondary education	0.584 (0.493)	0.688* (0.464)	0.628 (0.485)	0.803* (0.399)
Technical education	0.183 (0.387)	0.086* (0.280)	0.192 (0.395)	0.110 (0.314)
University education	0.073 (0.260)	0.067 (0.251)	0.090 (0.287)	0.063 (0.244)
Kyrgyz and Russian	0.471 (0.500)	0.419 (0.494)	0.538 (0.500)	0.559 (0.498)
Mother's height	1.62 (0.061)	1.63 (0.068)	1.62 (0.056)	1.63 (0.70)
Agriculture before birth <sup>a)</sup>	0.044 (0.206)	0.153* (0.361)	0.028 (0.166)	0.129* (0.337)
Non-agriculture before birth <sup>a)</sup>	0.152 (0.360)	0.092 (0.290)	0.113 (0.317)	0.069 (0.254)
Education before birth <sup>a)</sup>	0.171 (0.378)	0.092* (0.290)	0.190 (0.394)	0.103 (0.306)
Inactive before birth <sup>a)</sup>	0.608 (0.490)	0.656 (0.477)	0.648 (0.479)	0.698 (0.461)
<i>Number of observations</i>	344	326	156	126

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Cell entries are means; standard deviation in brackets.

\* indicates that the mean in the arranged marriage group is statistically different at the 5% level from the mean of the kidnapping group. <sup>a)</sup> The number of observations is smaller for these variables than noted in the table. This is because the LIK dataset only collected information on activity status since 1989.

**Source:** Authors' illustration based on 2011 LIK data.

**Table 3: Estimates of birth weight**

	(1) OLS	(2) IV	(3) OLS, matched sample
Kidnap	-96.49** (44.50)	-227.1*** (83.96)	-200.3*** (61.43)
Child male	96.67*** (23.98)	71.71*** (27.53)	138.2*** (42.93)
Child firstborn	-15.45 (37.22)	-47.13 (41.82)	-22.23 (64.84)
Twin	-798.1*** (221.1)	-862.7*** (251.5)	-737.2*** (230.6)
Age at birth	43.45 (32.00)	26.95 (35.40)	75.63 (51.93)
Age at birth squared	-0.790 (0.581)	-0.624 (0.653)	-1.801* (0.971)
Basic education	-36.72 (79.66)	36.27 (122.3)	63.35 (158.5)
Secondary education	-1.990 (60.94)	20.56 (80.25)	44.77 (59.70)
Technical education	60.97 (73.52)	96.63 (89.91)	68.76 (88.99)
Kyrgyz and Russian	98.28** (44.11)	-5.897 (46.35)	184.1** (75.29)
Mother's height	3.840 (3.028)	2.865 (4.586)	2.418 (6.327)
Constant	1,694** (713.4)	2,525*** (924.6)	643.7 (1,384)
Birth month & year FE	YES	YES	YES
District FE	YES	NO	YES
Observations	807	773	492
R-squared	0.410	0.127	0.623

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Clustered standard errors in brackets.

\*\*\* significant at 1%, \*\* at 5%, \* at 10%.

**Source:** Authors' illustration based on 2011 LIK data.



**Table 4: Robustness tests**

<i>Exclude all children born out of wedlock</i>			
	(1) OLS	(2) IV	(3) OLS, matched sample
Kidnapped	-112.7** (44.63)	-234.6*** (85.92)	-205.0*** (62.46)
District FE	YES	NO	YES
Observations	792	759	479
R-squared	0.410	0.125	0.629
F-statistic (first stage)	.	123.6	.
<i>Observations below 2000m of altitude</i>			
	(4) OLS	(5) IV	(6) OLS, matched sample
Kidnapped	-97.05** (45.75)	-253.2*** (95.77)	-149.2** (60.21)
District FE	YES	NO	YES
Observations	728	694	445
R-squared	0.429	0.116	0.640
F-statistic (first stage)	.	106.3	.
<i>New definition for old generation (cutoff: marriage before 1992)</i>			
	(7) OLS	(8) IV	(9) OLS, matched sample
Kidnapped	-72.96 (47.36)	-226.9** (94.05)	-109.3* (62.16)
District FE	YES	NO	YES
Observations	649	630	433
R-squared	0.397	0.113	0.541
F-statistic (first stage)	.	106.6	.
<i>Only women with maximum two children</i>			
	(10) OLS	(11) IV	(12) OLS, matched sample
Kidnapped	-198.3** (100.1)	-209.0* (114.6)	-67.58 (163.1)
District FE	YES	NO	YES
Observations	190	175	120
R-squared	0.564	0.337	0.814
F-statistic (first stage)	.	54.7	.

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43 (except in columns (7)-(9)), do not live in cities, and live below 2500 meters of altitude (except in columns (4)-(6)). All estimations include the control variables as well as birth and month fixed effects as defined in equation (1). Clustered standard errors in brackets.

\*\*\* significant at 1%, \*\* at 5%, \* at 10%.

**Source:** Authors' illustration based on 2011 LIK data.

**Table 5: Placebo test - OLS estimates: the effect of kidnapping on mother's height and chronic illness**

	(1) Maternal height	(2) Heart disease	(3) Lung disease	(4) Liver disease	(5) Gastrointestinal disease
Kidnapped	0.149 (0.845)	0.011 (0.010)	-0.004 (0.024)	-0.016 (0.030)	0.002 (0.019)
Observations	807	807	807	807	807
R-squared	0.382	0.335	0.214	0.308	0.389
	(6) Kidney disease	(7) High blood pressure	(8) Low blood pressure	(9) Spinal problems	(10) Diabetes
Kidnapped	0.071* (0.039)	0.022 (0.023)	0.005 (0.004)	-0.005 (0.021)	0.008 (0.006)
Observations	807	807	807	807	807
R-squared	0.195	0.197	0.230	0.400	0.314

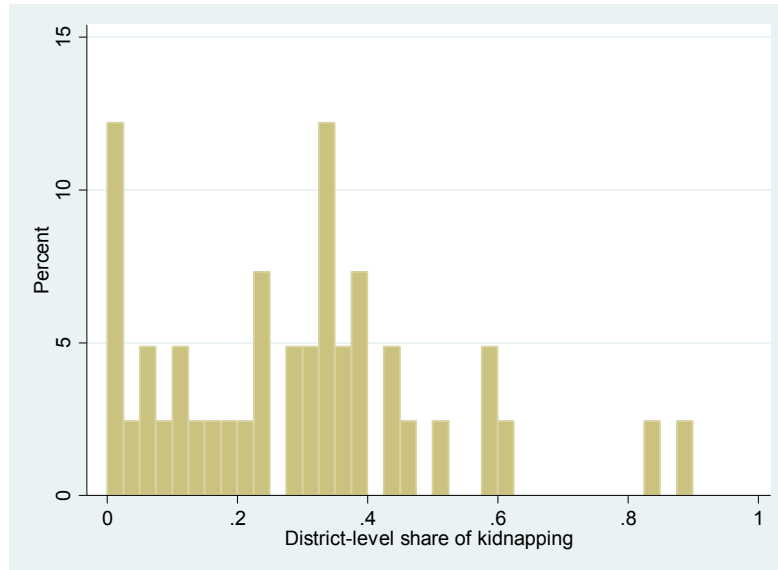
**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. All estimations include the control variables, birth, month and district fixed effects as defined in equation (1). Clustered standard errors in brackets.

\*\*\* significant at 1%, \*\* at 5%, \* at 10%.

**Source:** Authors' illustration based on 2011 LIK data.

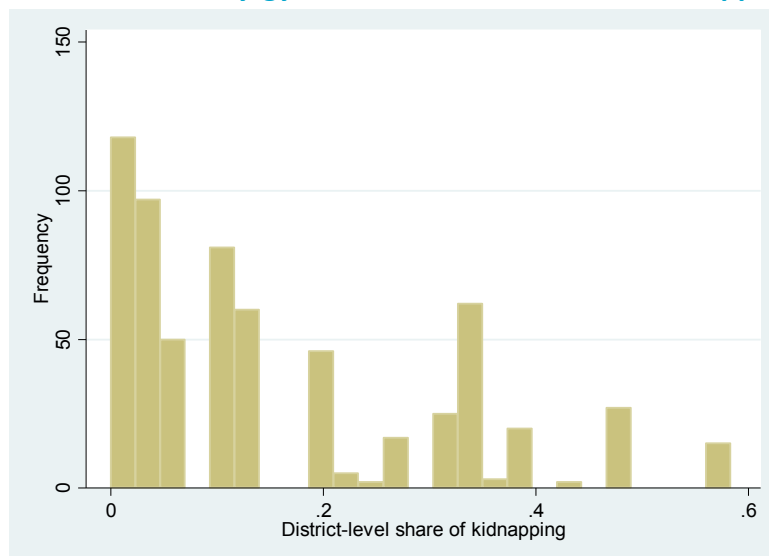
## APPENDIX

Figure A1: Histogram of district-level share of kidnappings



Source: Authors' illustration based on 2011 LIK data.

Figure A2: Residence of non-Kyrgyz in districts with different kidnapping prevalence



Source: Authors' illustration based on 2011 LIK data.

**Table A1: Differences between husbands and wives, by marriage type**

	(1) Love marriage	(2) Arranged marriage	(3) Kidnapping
Age gap between husband and wife (years)	3.36 (2.81)	4.79 (3.49)	4.87 (3.64)
Husband's education (%)			
a) If wife has basic education			
Basic	41.2	66.7	55.6
Secondary	41.2	33.3	33.3
Technical	0	0	11.1
University	17.6	0	0
b) If wife has secondary education			
Basic	3.7	2.4	5.6
Secondary	67.4	86.6	81.9
Technical	17.4	8.5	9.7
University	11.5	2.4	2.8
c) If wife has technical education			
Basic	4.9	7.7	8.3
Secondary	54.1	38.4	50.0
Technical	27.9	30.8	33.4
University	13.1	23.1	8.3
d) If wife has university education			
Basic	3.1	0	0
Secondary	29.2	33.3	54.5
Technical	14.6	50.0	27.3
University	53.1	16.7	18.2

**Table A1: Differences between husbands and wives, by marriage type**

	(1) Love marriage	(2) Arranged marriage	(3) Kidnapping
Husband's proficiency of Kyrgyz and Russian (%)	68.9	61.7	51.7
Wife's proficiency of Kyrgyz and Russian (%)	66.7	55.6	52.5
Correlation between husbands and wives' evaluation of the below statements			
a) I see myself as someone who is depressed (5-point Likert scale)	0.40	0.50	0.40
b) I see myself as someone who is curious about many different things (5-point Likert scale)	0.48	0.61	0.34
c) I see myself as someone who generally trusts other people (5-point Likert scale)	0.55	0.53	0.42
d) I see myself as someone who is relaxed and handles stress well (5-point Likert scale)	0.50	0.32	0.18

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude.

**Source:** Authors' illustration based on 2011 LIK data.

**Table A2: OLS estimation, different sample sizes**

	(1) IV sample	(2) Matched sample
Kidnap	-103.9** (45.95)	-133.0** (57.09)
Child male	94.37*** (24.90)	105.9*** (35.32)
Child firstborn	-16.52 (38.43)	-34.84 (48.31)
Twin	-801.4*** (221.7)	-614.9*** (230.7)
Age at birth	48.04 (34.28)	36.89 (48.44)
Age at birth squared	-0.864 (0.623)	-0.837 (0.892)
Basic education	-34.62 (81.31)	-111.3 (188.5)
Secondary education	-3.539 (63.56)	41.14 (66.18)
Technical education	69.50 (76.23)	137.4 (107.6)
Kyrgyz and Russian	99.47** (43.83)	129.7** (64.81)
Mother's height	4.193 (3.245)	4.649 (4.899)
Constant	1,582** (761.5)	1,091 (1,029)
Birth month & year FE	YES	YES
District FE	YES	YES
Observations	773	492
R-squared	0.409	0.448

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Clustered standard errors in brackets.

\*\*\* significant at 1%, \*\* at 5%, \* at 10%.

**Source:** Authors' illustration based on 2011 LIK data.

**Table A3: First-stage estimate**

	Dependent variable: Kidnapping
District-level share of kidnappings	1.148*** (0.105)
Child male	0.004 (0.032)
Child firstborn	-0.069 (0.041)
Twin	-0.269* (0.139)
Age at birth	-0.009 (0.034)
Age at birth squared	0.000 (0.001)
Basic education	-0.072 (0.156)
Secondary education	-0.234** (0.107)
Technical education	-0.100 (0.126)
Kyrgyz and Russian	0.069 (0.059)
Mother's height	-0.003 (0.005)
Constant	1.033 (0.947)
Birth month & year FE	YES
Observations	773
R-squared	0.375
Adjusted R-squared	0.334
Partial R-squared	0.277
F-stat of instrument	127.01

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Clustered standard errors in brackets.

\*\*\* significant at 1%, \*\* at 5%, \* at 10%.

**Source:** Authors' illustration based on 2011 LIK data.

**Table A4: Propensity score estimation: probit estimates for kidnapping**

	Dependent variable: kidnapping
Wife's age at marriage	-0.0847* (0.0456)
Husband's age at marriage	-0.0644 (0.0422)
Basic education	-0.101 (0.804)
Secondary education	-0.445 (0.436)
Technical education	-0.290 (0.577)
Kyrgyz and Russian	0.176 (0.239)
Number of siblings	0.0410 (0.0454)
Worked in agriculture in year of marriage	-0.313 (0.407)
Worked in non-agriculture in year of marriage	1.119** (0.476)
Was in education in year of marriage	0.0510 (0.247)
Father worked in agriculture	0.105 (0.293)
District-level share of kidnapping	4.934*** (1.022)
Constant	1.979* (1.073)
Observations	220
Pseudo R-squared	0.379

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Standard errors (in brackets) are clustered at the community level.

\*\*\* significant at 1%, \*\* at 5%, \* at 10%.

**Source:** Authors' illustration based on 2011 LIK data.



**Table A5: Time use (number of hours per day), by type of marriage**

	Kidnapping	Arranged marriage
Sleep	7.87 (1.49)	7.79 (1.15)
Personal care and eating	3.51 (0.88)	3.29* (0.83)
Child care	1.53 (1.72)	1.78 (1.60)
Elderly care	0.03 (0.16)	0.16* (0.51)
Housework	5.82 (2.80)	5.77 (2.35)
Leisure	3.25 (2.57)	3.51 (2.35)
Travel	0.26 (0.88)	0.16 (0.44)
Education	0.09 (0.82)	0.01 (0.09)
Work	1.62 (3.25)	1.53 (2.82)
Number of observations	156	126

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Cell entries are mean number of hours per day per activity; standard deviation in brackets.

\* indicates that the mean of arranged marriage is statistically different at the 5% level from the mean of kidnapping.

**Source:** Authors' illustration based on 2011 LIK data.

**Table A6: Birth intervals (number of days), by type of marriage**

	Kidnapping	Arranged marriage
Child 2 – Child 1 (Obs. = 230 women)	898 (698)	956 (678)
Child 3 – Child 2 (Obs. = 154 women)	1,451 (904)	1,382 (991)
Child 4 – Child 3 (Obs. = 91 women)	1,084 (1,382)	1,288 (1,228)

**Note:** The sample consists of ever-married Kyrgyz women, who have given birth to at least one child, are of the age group 18-43, do not live in cities, and live below 2500 meters of altitude. Cell entries are mean number of days between births; standard deviation in brackets.

\* indicates that the mean of arranged marriage is statistically different at the 5% level from the mean of kidnapping.

**Source:** Authors' illustration based on 2011 LIK data.

