FORCED MARRIAGE AND BIRTH WEIGHT: THE CONSEQUENCES OF BRIDE KIDNAPPING IN KYRGYZSTAN

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Abstract:
We study the impact of bride kidnapping, a form of forced marriage practiced in Central Asia, on child birth weight. We expect adverse consequences from the psychosocial stress often involved in forced marriages. Birth weight is an observable outcome realized soon after marriage. We analyze survey data from rural Kyrgyzstan and use population density as an instrument to address the endogeneity of bride kidnapping. 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 potentially strong implications for children's long-term development.

Keywords: Forced Marriage, Bride Kidnapping, Birth weight, Kyrgyzstan
JEL classification:

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1. INTRODUCTION

Economists have addressed many questions about the choice between "love" marriages in which both members of a couple select one other after a period of courtship, and "arranged" marriages in which other parties are primarily responsible for the decision (Weiss 1997; Fafchamps and Quisumbing 2008). In contrast, the economic literature on forced marriages is very thin. Anthropologists have extensively studied the practice of bride abduction. Ethnographic reports of various forms of marriage by capture were written about societies across Europe, Asia, Africa, Australia and the Americas (Ayres 1974; Barnes 1999; McLaren 2001; Stross 1974; Bates 1974). Empirical evidence today suggests that the practice of bride abduction is no longer a common phenomenon; it disappeared in most countries with the development of modern laws and social norms (Stross 1974; McLaren 2001). Yet, it is still practiced in Central Asia, particularly in the Kyrgyz Republic.

This paper explores what appears to be a conundrum, at least at a superficial level. Kyrgyzstan is a relatively poor backwater of the former Soviet Union, yet it has a reputation for being relaxed, democratic, pluralistic, and as placing far fewer constraints on women than most 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 the Kyrgyz Republic.

Yet, this apparent outpost of liberal values is also a society in which a substantial percentage of women appear to be forcibly married following abduction. These abductions and subsequent marriages – which, somewhat prejudicially, we term "kidnapping" for brevity – are now the subject of heated debate within Kyrgyzstan and elsewhere. Kidnapping is rare (but not non-existent) in cities, which are far more Sovietized and "westernized" than rural areas. Urban areas tend also to be the setting for women's rights organizations that combat kidnapping, and that have pushed for stricter laws against kidnapping, and enforcement of existing laws. Yet, even in cities there is substantial support for the claims that kidnapping is (a) an important social tradition, (b) for the most part a voluntary, pre-arranged play that (c) curbs wedding costs.

To our knowledge, there is virtually no empirical evidence on what is now a vehement social debate (see, for example, http://www.bbc.com/news/world-asia-20675101). Human rights activists claim that up to 2000 women, or about one-sixth of those abducted, are raped in the process (http://ohrh.law.ox.ac.uk/stealing-brides-in-kyrgyzstan-why-multiculturalism-and-womens-rights-make-such-uneasy-bedfellows/). Others dismiss these claims out of hand.

The debate is all the more sensitive because the only major ethnic group to engage in kidnapping –and there is virtually no inter-ethnic kidnapping – is the titular nationality, the Kyrgyz. That Moslem Kyrgyz (and southern Kazakh, in Kazakhstan) should tolerate kidnapping while more conservative Moslem Uzbeks or Tajiks do not is one of the puzzles that remains to be explained. The glib explanation tends to be that Kyrgyz and Kazakhs were historically nomadic while Uzbeks and Tajiks were traders or settled agriculturists. Below, we offer an alternative though not inconsistent explanation based on search costs.

As it turns out, the extent and nature of bride kidnapping is an issue that can be addressed empirically, and it is the intention of this paper to do so. Using the Life in Kyrgyzstan survey, we explore the extent to which outcomes differ for women who are kidnapped, and for their infant children. As we document below, life outcomes are clearly worse, but kidnapping is not a random event. However, when we use an instrumental variable to more clearly identify causality, and when we restrict the sample to women we believe to be at risk of being kidnapped, the effect – at least in initial regressions – appears to be greater rather than smaller.

In the sections that follow, we start by exploring more deeply the nature of kidnapping. The lack of social opprobrium is what makes this research possible: when asked how they came to be married, women openly acknowledged being kidnapped. We then explore game-theoretic models that lead to kidnapping as a rational marriage strategy for prospective grooms, and exposure to kidnapping hazard as a rational strategy for prospective brides. Data are discussed in Section 4, while empirical methodology is considered in the following section. We then turn to empirical analysis of why brides are kidnapped (this section is still to be written), and finally an assessment of the consequences.

2. BACKGROUND: BRIDE KIDNAPPING IN KYRGYZSTAN

Kyrgyz people are traditional nomads with a herding culture (Abazov 2004). Their history is mostly oral. One of the Turkic translations for the name "Kyrgyz" is "qyrq" and "yz", which means 40 tribes or clans. Historically, Kyrgyz tribes were spread over mountain ranges separating the valleys: Chuy, Talas, Naryn, Issyk-kul and Ferghana. Since these mountains had few passes, the communication between tribes was very limited. Traditionally, tribes engaged in nomadic animal husbandry, raising cattle, horses, sheep, goats and yaks. In the winter, they migrated to the lower altitude valleys (*kyshtoo*) and in the summers they migrated to the *jayloo* (summer pasture in the highlands). They lived in *yurts* (tents). The traditional role of a woman was a housekeeper.

Under Soviet rule, Kyrgyzstan was shaped by the Soviet ideology of gender equality before the law. Laws were established in the 1920s that banned forced marriages. Women were generally well-integrated into the labor force and public life. Access to free basic education, health care, social services such as childcare and guaranteed employment was universal. The collapse of the Soviet Union greatly influenced not only the living standards of the population but also the prevailing gender roles (Akiner 1997). Many Islamic and traditional ideologies re-emerged, and to an extent, re-defined the role of women within the family and the workplace. Kyrgyzstan is considered one of the most reformist and liberal post-communist countries (Shleifer and Treisman 2014). Kyrgyzstan had Central Asia's first female president, which makes the persistence of bride kidnapping more puzzling.

In Kyrgyzstan, "*ala kachuu*" (in Russian: *захват невесты*) is the traditional practice of abducting a woman to marry her.[1] The term *ala kachuu* in the Kyrgyz language literally means "to take and run away". There are different forms of *ala kachuu*; it ranges from elopement to violent non-consensual

[1] The background information in this section is drawn from Amsler and Kleinbach (1999), Kleinbach *et al.* (2005, 2007), Handrahan (2000, 2004), Werner (2004, 2009), Borbieva (2012), Agadjanian and Nedoluzhko (2013).

kidnapping. According to the *Historical Dictionary of Kyrgyzstan*, non-consensual kidnapping is described as a young man kidnaps a young woman when he cannot either win her affection or cannot find an appropriate bride until a certain age (Abazov 2004). We define "*ala kachuu*" or "*bride kidnapping*" in our research as the forced, non-consensual form. [2, 3]

Ala kachuu usually involves a young man and his male friends taking a young woman (typically by force or deception) into a car, and then she is taken to his parent's house or to the home of a close relative. She might get kidnapped from home or another location such as a school or a workplace. The event itself is usually a surprise because she is not aware of how or when she is going to get kidnapped, if at all. She is kept at his parents' home until she puts on the marriage scarf. Often she is physically and psychologically coerced to submit and marry her "kidnapper". Once she puts the marriage scarf *jooluk* over her hair, she accepts the marriage. This process could last from a few hours to several days. Eventually, the groom's side goes to visit the bride's parents to "apologize" and they traditionally bring their daughter's letter of "consent", sheep and many other gifts. Such offers of bridal "gifts" are usually considered the bride price (*kalym*).[4] Some parents remain angry and reluctant but most parents accept the bride price. Most kidnapped women remain with their kidnapper-husband because they do not want to expose themselves and their families to shame and bad reputation in the community (Amsler and Kleinbach 1999; Werner 2009; Stross 1974). It is shameful to have a daughter return because she is not "pure" or a virgin anymore. Her family's reputation is questioned because her elders were married through the process of kidnapping. This tradition is practiced uniquely among the ethnic Kyrgyz and often viewed as "an act of ethnic definition" (Handrahan 2004). Very few people report cases of kidnapping to the authorities; hence prosecutions are rare today. Law enforcement and legal protection for women are weak in Kyrgyzstan (Human Rights Watch 2006). Divorce is possible for young brides who are forced into marriage, yet it is very difficult for them to end such relationships. On one hand, it is harder to re-marry because of community stigma and social pressure; on the other hand, the brides often lack financial support and have no place to go after the divorce (Human Rights Watch 2006). Kidnapping creates an environment of intimidation for young girls, and, sometimes a young woman gets kidnapped more than once with intention to marry her. This practice is a complex social and cultural phenomenon.[5]

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[2] The Foreign and Commonwealth Office (2006) defines forced marriage "where one or both parties are coerced into a marriage against their will and under duress."

[3] This traditional practice has recently received significant attention in Kyrgyzstan and abroad. On January 28, 2013, the President of Kyrgyzstan, Mr. Almazbek Atambayev, signed a bride kidnapping bill into law to increase the maximum prison sentence from three to seven years and up to 10 years if the kidnapped bride is below the minimum legal age for marriage of 17 years old. See http://www.unwomen.org/2013/02/new-law-in-kyrgyzstan-toughens-penalties-for-bride-kidnapping/ (posted on Feb 6, 2013).

[4] Kidnapping makes it very difficult to locate who consented to what. Men usually claim that bride kidnapping was consensual. This ambiguity makes kidnapping popular as a marriage strategy. Of course, it also raises serious questions about the rights and choices of women to marry (Amsler and Kleinbach 1999; Borbeiva 2012; Handrahan 2000; Kleinbach *et al.* 2005).

[5] *Ala kachuu* was first broadcast in the international media with the distribution of the film *Bride Kidnapping in Kyrgyzstan* (Lom 2004). It aired on PBS's *Frontline* show in 2004. The show generated much publicity and raised awareness about bride kidnapping. Another film was produced by the journalists of *Vice* in 2011 (Vice News 2011). More informational videos are now available online. There is also a Kyrgyz-made movie "*Boz*

Although there are no official reliable data on the number of kidnappings that occur each year, up to a third of all ethnic Kyrgyz women may have gotten married through the process of non-consensual kidnapping (Kleinbach 2003).[6] Several sources indicate that approximately 15,000 girls are kidnapped and forced into marriage annually.[7] From interviews with dozens of scholars in Kyrgyzstan, Kleinbach and Salimjanova (2007) report that non-consensual *ala kachuu* was infrequent in pre-Soviet times. According to a single village survey conducted in the north-eastern region of Kyrgyzstan in 2004, 80 percent of Kyrgyz marriages were the result of *ala kachuu*, and 57 percent of these marriages were non-consensual (Kleinbach *et al.* 2005). Of the 374 kidnapped Kyrgyz women, one fifth did not know their kidnapper before marriage. Only 34 percent indicated that kidnapping took place with the woman's consent, 46 percent were kidnapped through deception and 18 percent by physical force. The two most frequent reasons a woman was kidnapped were the "woman might refuse marriage proposal" (29 percent) and "to prevent woman from marrying another" (28 percent). There is no single unique explanation for motives of kidnapping. 92 percent of the kidnappings resulted in marriage. Kleinbach *et al.* (2005) also suggest that there is an increase in the rate of non-consensual kidnappings among Kyrgyz women over the last 40-50 years. The 2011-2012 nationally representative survey collected data on men and women in Kyrgyzstan between the ages of 18-49 (n=2032) and shows that one-third of marriages were the result of kidnappings among Kyrgyz; half of these marriages were of forced nature (Agadjanian and Nedoluzhko 2013). The authors conclude that the risks of bride kidnapping declined since the collapse of the USSR, particularly within the most recent marriage cohort (2002-2011). These results are in stark contrast to the ethnographic claims mentioned above.

3. CONCEPTUAL FRAMEWORK

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 or all of their selection power. In the Kyrgyz setting, (3) a "limited, one-sided search" involving unilateral action – kidnapping – by the groom is a third option.

From the groom's perspective, search and courtship costs for a love marriage are costly in terms of time and money and the marital outcome is not certain. The potential bride can choose to select

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Salkyn" about kidnapping and living "happily ever after". Today, there is a significant increase in public awareness of non-consensual *ala-kachuu* as a violation of the Universal Declaration of Human Rights (Article 16, 1948), the Criminal Code of the Kyrgyz Republic (Article 155) and *Sharia* (Islamic law).

[6] According to an email interview with Dr. Nathan Light of Uppsala University (October 2014): "about one-half of rural kidnappings are non-consensual with the woman not expecting or not wanting to be kidnapped".

[7] See links: http://www.sueddeutsche.de/leben/brautraub-in-kirgisistan-krimineller-hochzeitsbrauch-1.1606781 (posted on Oct 3, 2014)
http://registan.net/2012/11/12/guest-post-kyrgyzstans-new-law-on-bridenapping/ (posted on Dec 11, 2012)

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 for 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 parental involvement. But, similar to love marriages, both mates generally have a choice and evaluate their gains from marriage (Batabyal 1998, 1999, 2001).

The search for a suitable mate in a kidnaped marriage is initiated by the groom, but there is non-coerced consent only by the male. (Kidnapping for show in order to reduce marriage costs but with the prior agreement of both parties is a form of "own search" marriage. The empirical question is whether virtually all kidnappings are in fact mutually pre-arranged, making them in fact a subset of own search marriages.) 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 are lower in kidnapped marriages.

The decision to form a union through the three types of match-making mechanisms depends on the whole range of search behavior and search costs. Search behavior varies across time and place and from groom to groom. Search costs differ across potential brides. Own search marriages are difficult in a society where there is no dating culture for pre-marital interactions between young men and women. It is also hard to search for a potential groom when there is very high supervision of young women before marriage due to the high value placed on virginity and "purity." Arranged marriages are sometimes defined by rigid timelines and dating restrictions for the young couple to marry.

Kidnapping is more likely the search strategy when the bride price, the costs of the marriage, and/or the costs of search for a mate are high. The bride price (*kalym*) is affected by three conditions: competition for brides, the bride's potential productivity in the home or on the farm, and the bride's "purity." The more single men relative to women in the community, the greater the competition for brides; the bride price rises with the relative scarcity of women. The bride price is also elevated when the wife's potential productivity in the home or on the farm is high (Anderson 2007) and when she is a virgin. If she is kidnapped, her "purity" value immediately falls, and she is more likely to stay with the kidnapper because her market value is lower. Wedding gifts and the wedding feast expenditures bring economic hardship and insecurity for young men, especially when in poor communities. These wedding related expenses can be a big financial burden for poor households and are reduced if the bride is kidnapped. The cost of search is obviously higher in rural areas with scattered settlements than in urban areas.

It may be argued that there is also a fourth option facing prospective grooms and brides: abstention from marriage. In reality, this option is empirically unimportant, and indeed is an easily

dominated option for all but a tiny number of people with unusually wretched choice sets. 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, 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. These men are also pressured to marry young (in agricultural/traditional societies) 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 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. In contrast, never-married, childless women rarely if ever attain high social status in rural areas.

3.1 A SIMPLE MODEL OF BRIDE SEARCH

Search models have been standard in economics for more than a generation, and the point of departure for spousal search is no different than for many other goods and services. We start by borrowing shamelessly from Courant (1978), though the context – racial discrimination in a US housing search model – is superficially distinct.

We begin by posing the problem from the prospective groom's perspective. To make things simple, let us assume at first that there are two types of prospective grooms, defined as high and low socioeconomic status (SES) males. The groom is the first mover in this game, and we know from Gale and Shapley (1962) that order matters, though for our reduced form empirical specification it will not be important. Thus, we start by assuming that characteristics of all potential brides – and their prices, or impact on requisite *kalym* – are known to all, and grooms have utility over a vector **H** of bride characteristics. Preferences by both prospective brides and grooms are formed over a set of commonly-valued (by all prospective, competing brides and grooms) and readily observable features, as well as over features that are not readily observable and are not identically valued. We refer to these as *idiosyncratic differences*.

Bride costs (including flow costs of *kalym* and wedding, and net cost of bride to the groom's bridehold, which is likely to be negative) are $\mathbf{P_H'H}$. Associated with each level of bride expenditures is groom (indirect) utility level $V(\mathbf{P_H'H})$. To begin the exposition, let us assume that all transactions (marriages) are voluntary and mutually agreeable to both parties.

We further assume that a groom looking for a bride considers a variety of them; they yield utilities from $\underline{V}$ to $\bar{V}$. We then define $F(V^*)$ as the probability of a given bride's utility being below V^* and assume a constant cost c of assessing a prospective bride. Given the bride characteristics available on the market and per bride search cost c, searchers will have the following problem. Their expected utility will be:

$$V = \max\begin{Bmatrix} V_0 \\ -c + [1 - F(V_0)] \cdot E(V \mid V \geq V_0) + V_0 F(V_0) \end{Bmatrix} \quad \textbf{(1a)}$$

Here, V_0 is the groom's utility from the best bride courted thus far. The second term is equal to (a) the probability that the next bride visited will provide a utility greater than V_0 -- the [1-$F(V_0)$] term, times the expected value of that bride's utility if it does exceed V_0, plus (b) the probability of the bride *not* offering more utility than V_0, times V_0, less (c) the search cost. These three together equal the expected utility of the next bride, less the search cost.

The rational groom who is not afraid of rejection will search until V_0 is greater than or equal to the second line in (1a).

$$V_o \geq -c + [1 - F(V_0)] \cdot E(V \mid V \geq V_0) + V_0 F(V_0) \quad \rightarrow \quad \textbf{(1.b)}$$

$$(1 - F(V_0)) \cdot V_o + c \geq [1 - F(V_0)] \cdot E(V \mid V \geq V_0) \quad \rightarrow \quad \textbf{(1.c)}$$

$$c \geq [1 - F(V_0)] \cdot \left[E(V \mid V \geq V_0) - V_0\right] \quad \textbf{(2.a)}$$

This can be shown to equal:

$$c \geq \int_{V_0}^{\bar{V}} (V - V_0) dF \quad \textbf{(2.b)}$$

Equations (2.a) and (2.b) define an optimal search. The value V^* for which (2b) holds as an equality defines an optimal utility level at which to stop searching. The implication is that prospective grooms should stop short of their dream bride, even if that dream is defined within a current budget constraint, if searching is costly. This holds as well for other life decisions.

To further specify the problem, let us assume that some proportion of prospective brides will automatically reject low SES men. Specifically, we assume:

(a) $j=1,\ldots,n$ villages in a *raion*;
(b) two types of potential grooms: wealthy/high SES (W) and low SES (B)
(c) for each village j in which there are potential brides, low SESs perceive a non-zero probability γ_j that wealthy households will be unwilling to part with their daughters at the current market price (the probability that low SES women will not consider offers from low SES men at the prevailing market price is 0). Then the probability that a low SES man searching in a given village will bump into an averse bride will equal this probability times the percentage of wealthy or otherwise choosy prospective brides in the village, $\%W \cdot \gamma_j \equiv \alpha_j$.
(d) α_j varies across villages.

Then, without loss of generality, order villages by α_j value, so that $\alpha_1 \le \alpha_2 .... \le \alpha_n$. Then a low SES man contemplating search for a bride will have the choice of searching in any of the *n* villages. His utility at any stage of the search will be:

$$V = \max\left\{ \begin{array}{c} V_0 \\ -c_1 + (1-\alpha_1)[1-F_1(V_0)] \cdot E(V_1 \mid V_1 \ge V_0) + (1-\alpha_1)V_0 F_1(V_0) + \alpha_1 V_0 \\ \cdots \\ -c_n + (1-\alpha_n)[1-F_n(V_0)] \cdot E(V_n \mid V_n \ge V_0) + (1-\alpha_n)V_0 F_n(V_0) + \alpha_n V_0 \end{array} \right\} \quad \textbf{(3)}$$

The effect of bride's or bride's family's aversion is to take a portion of the brides to be searched over and effectively assign them an automatic V=0 value, since a low SES groom cannot get any utility from courting a bride if she is going to reject him. Alternatively, aversion dooms a portion of searches to be duds, thereby effectively raising the cost per "fruitful" search – that is, searches in which there is an option to find an agreeable bride.

The equilibrium condition analogous to (2b) is given in (4). Letting V_j* be the utility from the most desirable bride courted in village *j*, in equilibrium, searches will occur until:

$$\frac{c_j}{1-\alpha_j} = \int_{V_j^*}^{\bar{V_j}} (V_j - V_j^*)\, dF_j \quad \textbf{(4)}$$

This equation has a straightforward implication (shown formally in Courant, 1978, along with other results mentioned here): if the utility distributions over bride types are identical across villages (that is, the same F_j for all *j*) and $c_j = c$ everywhere, then low SES men will only search where *a* is lowest. If any villages are all low SES, then low SESs will only search there, as in these villages $a = 0$. Thus, even a very modest amount of social discrimination among a small number of wealthy types of brides will lead to completely socially segregated villages.

More generally, F_i will vary. Moreover, in the short run, bride prices will depend on demand level relative to fixed supply in any village, and therefore may vary across village for reasons other than standard distance forces. Any value $a_j > a_1$ and $a_1 > 0$ will be consistent with market equilibrium in which:

- P_j – the "quality-adjusted" cost of a bride in village *j* – is a decreasing function of a_j for the obvious reason that the higher is *a* the less search there will be (low SESs won't bother to search where it's hopeless), and hence the less demand,
- If the distribution of *F* is the same, low SESs will never search where $a_j > a_1$ and $P_1 = P_j$;
- There is nothing to force bride prices + *kalym* to equilibrate at a uniform level in different villages.

The maximum equilibrium price differential between villages *1* and *j* can be found as follows:

(a) Solve for V_1* -- the utility level that represents the optimal stopping point for search in village *1*.

(b) For a given village *j*, add in the effect (an improvement) on utility of lower prices. (If prices were higher, then subtract). Now, if the distribution of bride types and hence utilities is identical in the two villages, low SES men will never search where $a_j > a_1$ unless $P_1 > P_j$;
(c) Calculate the utility level V_j^* in village *j* taking into account this price differential. To find out the price differential D_j^* for which some search in *j* is appropriate, substitute $V_j^* = V_1^*$ into the village *j* utility maximization formula: (recalling that *V* reflects value, or willingness to pay),

$$c_j = (1-\alpha_j)\cdot \int_{V_j^*}^{V\wedge+D_j} [V - V_j^*]\cdot f(V + D_j)dF_j \quad . \qquad \textbf{(5)}$$

That is, the price [indirect utility if purchased] differential D_j^*such that $V_j^* = V_1^*$ must compensate for the greater difficulty of search (higher effective search costs) in a village. As these effective costs rise with a_j then it can be shown that D_j is an increasing function of a_j – bride prices must be lower in high a_j villages if low SES men search there. Thus,

(i) The presence of some discriminating behavior by high quality prospective brides is consistent with a cost differential in which a bride is "purchased" by low SES men in low SES villages at higher prices than in wealthy and socially integrated villages;
(ii) The maximum price differential D_j^* is an increasing function of a_j;
(iii) If the actual differential D_j^{actual} is < D_j^* then low SES men will never search in village *j* and the bride price savings will not be sufficient to compensate for added search costs. Note that in equilibrium, $D_j^{actual} > D_j^*$ is impossible, as low SES men would then flood that village, driving up demand.

3.2 CONCEPTUAL FRAMEWORK: ADDING COMPLEXITY

The simple framework outlined above contains only one type of marriage – a non-romantic, market clearing arrangement following what Walras termed *tatônnement* (literally, "groping," though the analogy refers to figurative inching toward an equilibrium by searching to better and better options) behavior in an otherwise timeless process. However, if there are different numbers of available prospective brides and grooms, then, assuming that no wife has more than one (openly acknowledged) husband/mate, and ignoring as well the possibility of polygyny, it is clear that some prospective brides or grooms will go unmarried at least for some length of time. Moreover, if there are some common features of prospective brides and grooms that all prospective partners value, it is also obvious that more desirable grooms will never go unwed in the market-clearing setting. Nor will desirable women go unwed, since bride-prices will adjust.

Players understand the risk of non-marriage, and they and their families may react to change the game if they understand that the simple market equilibrium might leave them either spouseless, or paying a very high bride price for a low-quality bride. The temptation to refuse to participate in the simple market game will be especially great in cases where:

(a) There are a small number of small villages in a plausible catchment area, as small numbers increase the likelihood that there will be an imbalance of one gender, and hence that there will be a surplus of prospective grooms in some of the settings with few villages and low population density;

(b) Population growth is also low, since the returns to waiting for the next period (not formally modeled above, but an obvious extension) are also lower;
(c) Social inequality or barriers are greater;
(d) Search (sampling) costs c_j are high because of proscriptions on cross-gender pre-marital interactions, or simply low population density;
(e) Intergenerational conflict between children and parents exist.

In the simple exposition above, there is only one agent on each party's (bride/groom) side. But, obviously, there could be disagreement between child and parents, and this will be worsened by the fact that they each bear different costs (the child bears the cost of a poor match; the parents bear the costs of brideprice – negative for the bride's parents – and a portion of wedding costs). Of the forces above, (a) and (b) will be critical determinants of the propensity not to participate in a market equilibrium marriage.

The social inequality factor also should matter empirically. Controlling for level of economic development and structure, some regions will have greater university enrollment by young people, and this exacerbates the problem of potential failed marriage for young grooms without higher education for several reasons. First, it pushes them further down the totem pole relative to their more educated peers, thereby restricting their choices. Second, it makes them less acceptable to upwardly mobile women: in essence, a_j rises. Third, even if educated prospective brides are not averse to marrying low SES men, tertiary education delays their entrance into the marriage market and robs them (from the groom's family's perspective) of some of their most productive child-bearing and helping-the-mother-in-law years.

The families of prospective grooms, able to anticipate unattractive market outcomes (also termed "love marriages," especially when explained to non-economists), have two alternatives. First, the groom's family or its agents can come to terms with a prospective bride's family or its agents prior to entry by the prospective groom or bride on the marriage market – that is, there can be an "arranged" marriage. Second, the prospective groom, usually with the support of several friends, can "seize," or kidnap a prospective bride.

Each of these options has advantages and disadvantages. Love marriages involve search costs (to the groom, but also to the bride). On the other hand, if there are idiosyncratic characteristics of individuals that are valued differently by different people, so that market price (based on average preferences, or reputation/readily observable characteristics) is imperfectly correlated with individual preferences, then courtship has potentially valuable payoffs to both parties.

In contrast, from the groom's perspective, kidnapping reduces the likelihood of a failed search. If this preemptive step is rejected, that will cause the bride's future value to depreciate (since there is a risk that she was sexually violated – in a society where notional virginity is valued – and, of course, her refusal marks her as a high γ_j person). Hence, the bride's family's bargaining power is reduced. In that case, the price for the bride also declines. Typically, because of the insult the *kalym* actually rises, but the wedding is smaller and total costs to the groom's family decline.

In this setting, the bride (reduced sampling) and her family (reduced wealth transfer, assuming the wedding is valued at cost or more) are unambiguously worse off in terms of expected value if a kidnapping occurs relative to a love marriage. However, exposing their daughter to kidnapping hazard may be rational if (a) there is a failed arranged marriage market, or (b) there are potentially

high returns to participating in the love marriage market that, unfortunately, does not clear instantly. The groom has an ambiguous outcome from kidnapping: reduced sampling but lower search costs and almost certain marriage. The groom's family is unambiguously better off (lower wedding costs) unless there is a prestige loss from kidnapping.

To some degree, arranged marriages offer insurance to both parties. Matchmakers can match on observed SES and other characteristics, so losses are limited. However, many matches are agreed to well before the prospective mates are fully mature, thereby increasing risk. Ignoring differences in preferences between a bride and her parents (or the matchmakers), the bride's family should expect to receive a smaller transfer from the groom's family in compensation for no longer being exposed to the hazard of being kidnapped, and also because there are no idiosyncratic utility benefits to the groom that his family is willing to pay for. Relative to kidnapping, the average groom benefits from an improved match (though this would not be the case at the left tail of the groom distribution). Willingness to pay *kalym* plus wedding costs therefore should be greater for the groom's family in the case of arranged marriages relative to kidnappings for all but the least desirable grooms. Relative to love marriage, the groom benefits from greater certainty but loses idiosyncratic utility. It is ambiguous whether total wedding costs will be higher for arranged or love marriages.

Brides should always prefer arranged marriages to being kidnapped and, save for in the case of the most hardhearted parents whose daughters have very poor prospects, so will her family. The bride's family also will expect to be compensated for exposing their daughter to the risk of being kidnapped, and therefore will expect a (delayed) love marriage to yield more *kalym* plus groom wedding costs than an arranged marriage.

These alternatives are important to consider for empirical analysis, because it is unlikely that any particular woman will be exposed to all three marriage hazards simultaneously. Before considering all options, there are four considerations that will decide which risks are binding – conditional on their being a shortage of prospective brides, slow arrival of new prospective brides, substantial socioeconomic differentiation, and substantial amounts of both commonly observable and idiosyncratic bride and groom quality.

The first of these is prospective bride age. Younger women have limited sampling exposure and are unlikely to make wise love marriage choices: for most, then, the option (if a marriage occurs) is between being kidnapped and having an arranged marriage. (For extremely young women, kidnapping is less socially acceptable, though). As women age, both the likelihood of being kidnapped and having an arranged marriage declines. Thus, the greatest kidnap risk exposure will occur for women whose dominant alternative is arranged marriage, and empirical specifications need to incorporate this elevated risk (or interaction with age).

The second is the value the community places on child quality *vs.* quantity. Communities that value schooling also will value educated mothers. Kidnapping is a huge deterrent to completed secondary (much less tertiary) education. Consequently, the risk of kidnapping should decline as average education level in a community rises, suggesting that observations might be weighted by an inverse community education measure.

A third factor is the matter of who actually raises children. It is customary in many Central Asian households for grandmothers (and other adult women relatives to a lesser extent) to engage in much of the child-raising effort, and in many cases to become the primary care-giver. This pattern

reduces the link between maternal and child human capital, thereby reducing deterrents to kidnapping, and also returns to female education.

The fourth factor concerns the relative availability of attractive (high SES) grooms. Waiting is unattractive if there is little heterogeneity among grooms *and there is a shortage of brides*. From the perspective of the bride and her family, search benefits will be small in this case. Thus, in more homogeneous communities, viable marriages for those who are not kidnapped will be arranged. In more heterogeneous communities, there will be higher returns to search, especially with a shortage of brides, and love marriages will coexist with kidnappings.

In addition to these considerations, it should be understood 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 even less attractive to kidnap a woman of whose background the prospective groom is uncertain, and hence further reduces the incentives to kidnap in populous settings where many people do not know one another.

Finally, while shortages of prospective brides and social inequality may give rise to bride kidnapping, low SES grooms may not be the only ones to kidnap. A simple non-cooperative decision tree is all that is needed to show that, once high SES prospective grooms realize that the dominant strategy of their low SES peers is to kidnap, they too have incentive to kidnap – unless their parents have solved the problem by arranging a marriage. This point is important: not only will there be many unhappy kidnap victims; there may also be many reluctant kidnappers.

3.3 THE MEASURABLE CONSEQUENCES OF BEING KIDNAPPED.

Bride seizure, if not pre-arranged, is traumatic for the young women who are involved in this physical (violent) public affair. Being forcibly kidnapped imposes high psychological, emotional and physical costs, both imminently and in the future (including fear, abuse, threats of divorce/beatings). A kidnapped woman generally will have less control over the timing of fertility and the number of children.

When the relationship is founded on force, the psychological stress and anxiety during gestation can result in poor pregnancy outcomes. Based on a comprehensive review of the medical literature, Hobel *et al.* (2008) conclude that psych-social risk factors during pregnancy include major life events, mental health issues (depression, emotional disorder), work-related stress, absence social support, poor nutrition (food frequency, food insecurity), tobacco use, and pregnancy-specific stress. Paarlberg *et al.* (1999) also find that maternal psychosocial factors contribute to low birth weight in the first trimester.

The influence of maternal psychosocial risk 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, earnings (Behrman *et al.*, 2004; Black *et al.*, 2007). Many recent studies also have examined the effect of stress on birth outcomes using an exogenous source of acute stress (Glynn *et al.*, 2001; Eskenazi *et al.*, 2007; Camacho 2008; Torche 2011; Mansour *et al.*, 2012; Bozzoli *et al.*, 2014). For instance, Torche (2011) finds a significant decline in mean birth weight among the

population exposed to a high-intensity earthquake in Chile. Mansour *et al.* (2012) discuss four factors associated with low birth weight: psychological stress, physical exertion, prenatal care and malnutrition. They find positive association between fatalities 9-6 months before birth caused by Israeli security forces and low birth weight. They argue that psychological stress is a plausible mechanism for this relationship.

Being kidnapped, while surely raising psychological stress, may affect birth weight through other channels as well. Kidnapped women might be obliged to quit schooling/jobs and do more strenuous household work during pregnancy. Chevalier *et al.* (2007) find that maternal education is positively correlated with birth weight. Currie *et al.* (2003) identify a causal effect of maternal education on the increased use of prenatal care, improved marriage prospects and infant health. Tiring upright postures and physical exertion have been associated with low birth weight (Bonzini *et al.*, 2007). Nutrition and prenatal care also matter. Almond *et al.* (2011) find that mild prenatal nutritional deprivation results in lower birth weight. Grossman *et al.* (1990) and Wehby *et al.* (2009) show that less frequent prenatal visits decrease birth weight significantly. These studies contribute to a growing body of medical evidence linking psychosocial stress with lower birth weight.

In light of the literature linking bride capture to stress, and stress to poorer birth outcomes, as well as the strong belief in the "stylized facts" that young married women work harder than their unmarried counterparts, and that a major motivation for kidnapping in many households is to augment labor supply, and in light of the literature linking workload to poorer birth outcomes, we hypothesize that being kidnapped will lead to inferior birth outcomes. Our measure of pregnancy outcome is child birth weight. Hence, our main hypothesis is that **forced marriages have an adverse impact on child's birth weight**. Exposure to psychosocial stress, anxiety and strenuous maternal work in kidnapped marriages increases the risk of a bad pregnancy outcome. The hypothesis (at least at this point) is a reduced form assertion, as we do not model the particular channels through which the outcomes occur.

The data also provide two other indicators of a woman's well-being. The first is a self-assessment of **life satisfaction**. While subjective and surely moulded by surroundings, it is an important check on the plausibility of our model and/or data. In particular, we expect women – and, in particular, those who were unexpectedly kidnapped, to have lower life satisfaction.

The final measure is a simple measure of marriage success, or at least stability: whether or not a **divorce** occurred. While marriages could remain intact for other reasons even when birth outcomes are worse and wives are even more miserable than if they had married through own search or delegated search mechanisms, and they could destruct because of unobserved heterogeneity among husbands (those inclined to kidnapping may be more impulsive or unstable), divorce nonetheless serves as yet another important check on the plausibility of our story.

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. In 2010, 3,000 households were selected into the sample and all adult individuals (slightly more than 8,000) in these households were interviewed. 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 (also known as "oblasts"). The data are representative at the national, urban/rural and North/South levels. The LIK survey is an individual-level panel: In each of the survey waves after 2010, all adult individuals, who are part of a LIK household in the previous year, and their households are tracked.

In this paper, we use the data from the 2011 LIK wave. This is because it provides 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*.[8] We are unable to distinguish between consensual and non-consensual kidnapping. We therefore treat all women who reported to have been kidnapped as belonging to the non-consensual type, which may exaggerate its extent. For the below estimations, this implies that we are likely to underestimate the true effect of kidnapping; *i.e.*, the effect of non-consensual abductions. Our results should therefore be regarded as a lower bound estimate for the effect of forced marriage on birth weight.

Female respondents were also asked about their and their husband's age at marriage, whether their parents received a bride price (*kalym*), 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 are increasingly being stored at home. We believe that this practice of documentation helps mothers recall their children's birth weight relatively correctly, even if the card was not kept by them.

Bride kidnapping is a rural phenomenon among the ethnic Kyrgyz. Other ethnic groups residing in Kyrgyzstan do not practice kidnapping but either marry through love or arranged marriages (Handrahan, 2004). In the empirical analysis below, we therefore restrict our sample to rural Kyrgyz women who were ever married, gave birth to at least one child, and are between the ages of 18 and 59 (to keep the survivor bias to a minimum).

[8] It may seem awkward to ask such a question in a survey since it refers to seemingly sensitive information. When drafting the questionnaire, we (one of the authors, B. Mirkasimov, was 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, he assured us that Kyrgyz people do not regard this information to be sensitive and encouraged us to ask the question as bluntly as we did.

5. EMPIRICAL METHODOLOGY

In line with the hypothesis derived above, we focus first on estimating the effect of bride kidnapping on pregnancy outcomes, and specifically on the birth weight of children. The birth weight (measured in grams) of child *h* born to mother *i* in household *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_{ijk}), a set of child (X_{hijk}), mother (M_{ijk}), household (Z_{jk}) and community (C_k) characteristics, and birth date dummies (T_h). The empirical model is given in equation (6):

$$Birth\ Weight_{hijk} = \alpha + \beta_1 K_{ijk} + \beta_2 X_{hijk} + \beta_3 M_{ijk} + \beta_4 Z_{jk} + \beta_5 C_k + \beta_6 T_h + \varepsilon_{hijk} \quad (6)$$

The control variables included in X_{hijk}, M_{ijk}, Z_{jk} and C_k have been identified as important determinants of birth weight (Bozzoli and Quintana-Domeque, 2014; Camacho, 2008; Mansour and Rees, 2012). Child characteristics (X_{hijk}) capture whether child *h* is male and whether the child is the firstborn to the mother. As in Mansour and Rees (2012), we cannot control for gestation duration because we do not have this information. Mother characteristics (M_{ijk}) include her age at marriage, age at child *h*'s birth, and her educational attainment. 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. Household characteristics (Z_{jk}) are household size and household wealth, measured by a wealth index. This index is constructed using principal components analysis on the basis of information about ownership of household assets such as land, livestock, a car, a microwave, a washing machine, a computer as well as the number of rooms in the dwelling. It should be noted that these household characteristics are derived from information at the time of the survey; *i.e.*, not the time of child *h*'s birth, as we do not have this information. However, we argue that household size and wealth are proxies for the standard of living which are unlikely to change substantially over time, especially in cultures in which multi-generation extended families live together in a single household, thereby mitigating life cycle effects.

Given that birth weight is affected by access to medical care during the pregnancy, we control for whether there is a doctor's office in the community (C_k). This also refers to the time of the survey. We would prefer to control for the actual use of antenatal care during child *h*'s time in uterus but the 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 antenatal care from a skilled provider; and 98-99 percent of births were delivered by a skilled provider (National Statistical Committee, 2013). We assume that the health care system in Soviet times was not much worse than this, if at all, and we are therefore unconcerned about the lack of exact information on antenatal care. We also control for the community's level of altitude because it has been shown that birth weight is reduced at high altitudes, presumably due to the lower levels of oxygen (Giussani *et al.*, 2001; Jensen and Moore, 1997; Unger *et al.*, 1988). T_h is a set of fixed effects for child *h*'s birth month and birth year, to control for seasonal variations in birth weight and time trends over the years. ε_{hijk} is the random error term. We cluster the standard errors of this estimation at the mother level. We are interested in the coefficient β_1. If β_1 is negative, mothers married through bride capture give birth to lighter children, which may potentially have adverse consequences for the long-term development of these children and which reflects worsened circumstances for the mother.

As discussed above, kidnapping is most unlikely a random event. Therefore, equation (6) potentially suffers from endogeneity due to omitted variable bias. Estimates of β_1 are biased if women are kidnapped based on unobserved characteristics that also affect child health. To test whether kidnapping is endogenous to child's birth weight, we conduct Wooldridge's (1995) score test for endogeneity. This test yields the conclusion that OLS estimation is inconsistent. We therefore estimate a two-stage least-squares estimation, with the first stage given in equation (7):

$$Kidnap_{ijk} = \mu + \gamma_1 Z + \gamma_2 V + \epsilon_{ijk} \quad (7)$$

Z is the instrument for kidnapping, and V is the set of control variables included in equation (6). An instrument is statistically valid if it is significantly correlated with kidnapping and unrelated to birth weight through unobserved factors. We argue that historical population density in rural areas of district *d* (in Russian: *район*), derived from the 1970 Census, is such a valid instrument.[9] Population density is calculated as the total rural population over the square root of land area in each district.[10] Kyrgyzstan is composed of seven provinces (in addition to the two major cities of Bishkek and Osh, which have independent provincial-level status). Provinces have a minimum of three districts (Batken) and a maximum of eight districts (Jalal-abad and Chui); with districts comprising of several communities *k* as defined in equation (6). In 1970, districts were home to at least 4,479 rural people and at most 118,060 rural people. In 2009, the minimum and maximum rural population size in a district was 13,729 and 299,970 people, respectively.

What is the logic behind using population density as an instrument? Variation in population density affects the availability of potential spouses. The search costs of locating a prospective spouse are higher in a sparse population than in a dense population. When men have the opportunity to lower their search costs by kidnapping their bride, they will be more likely to do so in sparse than in dense populations.[11] Hence, population density should be a good predictor for whether or not a woman will be kidnapped. Our identifying assumption is that variations in population density are uncorrelated with the unobservable determinants of birth weight. We argue that population density has no effect on birth weight other than its effect through kidnapping, once we control for the above mentioned child, mother, household, and community characteristics. Given that the LIK dataset is very rich, we intend to address this crucial assumption at greater length in subsequent revisions and, hopefully, provide convincing evidence that it holds.

To what extent is 1970 population density across Kyrgyz districts likely to be exogenous? During the Soviet era, three developments, which can be treated as natural experiments, led to the wide variation in the observed district-level population density (Abazov, 2004). First, Soviet officials in the 1930s launched the mass collectivization and settlement campaigns of Kyrgyz *ails* (tribal/extended family unit). These policies forced pastoral nomads into sedentary agriculture. They also established the Soviet local administration system (*i.e.*, districts) in the rural areas of Kyrgyzstan.

[9] The main reason that we instrument with 1970 USSR Census data is that, to our knowledge, only this Census provides the rural population numbers for each district.

[10] The distribution of land area is right skewed. Thus, we apply a square root transformation.

[11] In anthropological studies, this is described as follows: In places where there are few opportunities for young people to meet and "it is difficult to identify potential spouses", kidnapping appears to be a mechanism to quickly secure a wife (Borbieva, 2012, p. 148).

Substantial involuntary population movements occurred as nomads were herded into collective farms (*kolkhozy*) and state farms (*sovkhozy*); it if often alleged that Soviet agricultural and collectivization policies had substantial political (in effect, exogenous for our purposes) and arbitrary components.

Second, Stalin's purge policy claimed the lives of thousands of Kyrgyz who were sent to labor camps in Siberia during that time. Third, between 1941 and 1945, the Soviet Union fought the war against Nazi Germany. About 70,000 soldiers did not return home. Since units tended to be composed of men from a small number of regions (at least initially; presumably, replacements were less selective), especially for soldiers for whom Russian language would have been limited, it is likely that some districts had far greater losses than others.

Together, these developments exogenously changed the population numbers within Kyrgyzstan and affected the density of the population within each district. Moreover, at the height of Stalin's collectivization programs, the internal passport *propiska* (literally "record") system came into effect. Thereafter, the right to move to another province was heavily controlled. While this ended with the collapse of the USSR, even since then, and especially until recently, out-migration among the ethnic Kyrgyz population in rural areas has been limited. A primary reason for the modest out-migration is the importance of fluency in Russian for those moving to major cities, or outside of Kyrgyzstan to Russia or Kazakhstan. In recent years, out-migration has increased dramatically but, we believe [and need to document better in subsequent drafts], those young men and women most likely to be perpetrators or victims of kidnapping are unlikely to be prime candidates for out-migration.

As discussed in Section 7, the IV results obtained so far are implausibly large, suggesting an approximately 400g decline in birth weight for the infants of kidnapped women. At this point, we are not sure whether or not we lack a valid instrument, or whether our sample still contains many women who are not at risk of being kidnapped, generally because they come from higher SES backgrounds. To improve sample comparability, we turn to propensity score matching [NOT YET DONE], which in effect matches on observables. However, propensity scoring also can be used to further trim the sample used in IV estimation.

In a simple propensity scoring (PSM) exercise, a model is estimated that includes the *Z* controls and, alternately, with and without the IV, along with other likely determinants of being kidnapped. The regression is then used to form a kidnapping propensity; women are then matched to a nearest neighbor who had a different kidnapping experience. Birth weight means and higher moments can then be compared between women who were and were not kidnapped. Similar comparisons between the groups of women can be made for life satisfaction and divorce outcomes.

Our standard individual/household controls are fairly comprehensive. Other determinants of kidnapping risk that can be measured include district characteristics, including educational attainment for each gender, wealth and income mean and distribution measures, and the proportion of the population that is ethnically Kyrgyz (as intermingling with other cultures that do not countenance kidnapping may reduce its social acceptability among the Kyrgyz population as well). Nonetheless, many important characteristics remain unobserved. These include village-specific characteristics, and whether a woman's mother had been kidnapped (since that would affect the woman's expectations).

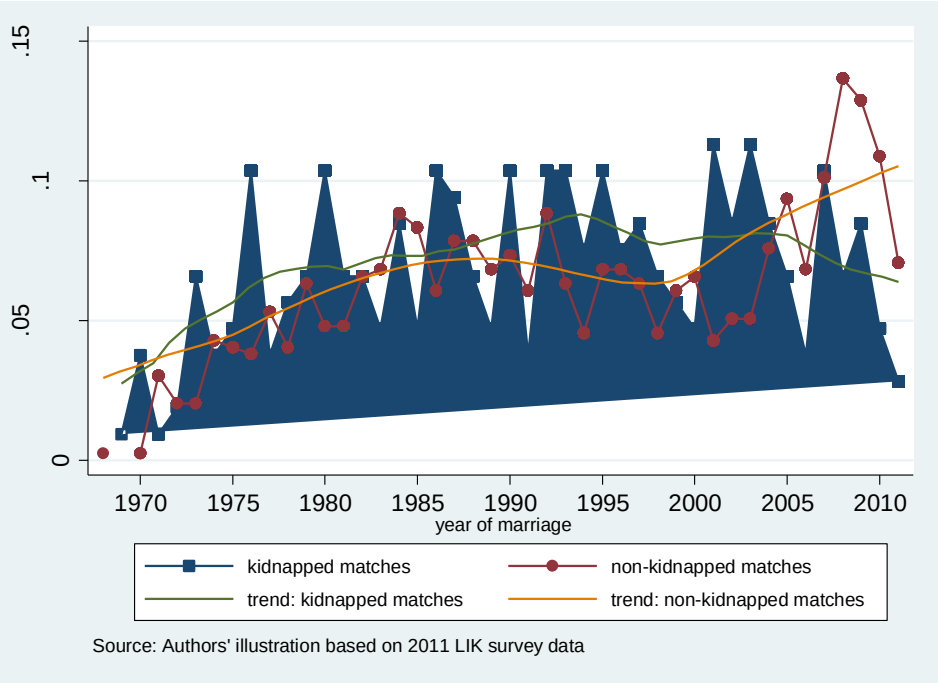
The other measures of the consequences of kidnapping include measures of divorce and life satisfaction. Because we do not know exactly when divorces occurred, we cannot estimate a conventional hazard model. Rather, we analyze divorce as a binary outcome, dependent on similar variables as birth weight (excluding those related to fetal health, such as parity or maternal age at conception), and again using uncorrected Logit and IV models, as well as a PSM approach. Since marriage duration is unknown, current age and age at marriage will be included separately.

A similar analysis will be carried out for life satisfaction. There are two main modifications. First, expectations are likely to be formed relative to visible experiences. People who live in poverty but who have no experience of opulence will regard their situation differently from those who once were wealthy but now find themselves poor. This adjustment process can be accommodated by grouping women by age and region, estimating mean satisfaction values, and then in effect norming each woman's value by including the local standard as an explanatory variable. Given the possible confounding with differential kidnapping risk, we restrict the mean values to those for women who married in an own search process. Second, interaction terms will be necessary, especially between kidnapped status and marriage duration. We anticipate that recently kidnapped women will be more traumatized than those whose kidnappings happened long ago; conversely, those who married after own or delegated search processes may find that honeymoon periods do not last indefinitely. Finally, those who are deeply unhappy are more likely to divorce, implying that the error terms are likely to be correlated.

6. DESCRIPTIVE STATISTICS

Figure 1 shows the trend for kidnapped and non-kidnapped marriages over time by year of marriage. This figure is based on the complete sample of ever-married women in the 2011 LIK wave and portrays kidnapped and non-kidnapped marriages in each year as a share of the total of observed kidnapped and non-kidnapped marriages, respectively. The trend indicates that the incidence of kidnapping has been falling since the mid-1990s, while the incidence of non-kidnapped matches has been on the rise. This is in line with the results by Agadjanian and Nedoluzhko (2013) but it is in contrast to anthropological studies such as Kleinbach *et al.* (2005) and Handrahan (2004). We believe that this contradiction can be explained by the fact that the data used by Agadjanian and Nedoluzhko (2013) as well as ours are nationally representative, whereas the anthropological studies are based on data from limited geographical areas where trends in kidnapping may well deviate from the national average.

Figure 1: Incidence of kidnapped and non-kidnapped matches, by year of marriage



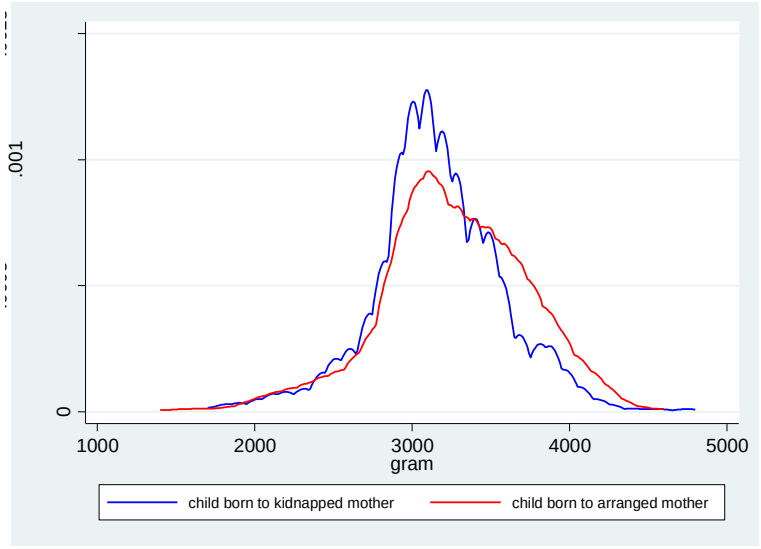
Source: Authors' illustration based on 2011 LIK survey data

In what follows, we only include ever-married rural Kyrgyz mothers between the ages of 18 and 59 for our empirical analysis. After dropping those observations for which we do not have full information on the variables defined in equation (6) and (7), these are 1,170 women living in 986 distinct households. Of these women, 265 (22.7%) reported that they got married through the process of kidnapping, 652 women (55.7%) reported love (own search) marriage, and 253 (21.6%) arranged (delegated search) marriage. In our preferred specification, we compare the birth weight of children of kidnapped mothers with that of children of mothers from arranged marriages. To test for robustness, we also include mothers from love marriages. We then compared the birth weight of children of kidnapped mothers with that of children of non-kidnapped mothers. We define non-kidnapped mothers as those who got married either through love or arranged marriage.

Table 1 provides summary statistics on all variables included in equation (1), distinguished by different forms of marriage. Mean birth weight is 3,162g for children from kidnapped mothers, 3,265g for children from arranged marriage mothers, and 3,164g for children from love marriage mothers. Among all children, 4.6 percent are born with low birth weight, defined as weight below 2,500g. There are no statistically significant differences in the prevalence of low birth weight between the different marriage types. Figures 2 and 3 display the full distribution of birth weight for children from kidnapped vs. arranged marriage mothers and children from kidnapped *vs.* non-kidnapped mothers, respectively. As becomes clear, the distribution of birth weight does not differ much when we compare children of kidnapped with children of non-kidnapped mothers (Figure 3). However, there are stark differences when we look at only children from kidnapped and arranged marriage mothers (Figure 2). There is no difference in terms of the share of male and female children across the marriage types. There is, however, a difference between kidnapped and love marriages with regard to the share of children being the firstborn. This reflects the tendency of kidnapped mothers to have more children than mothers in love marriages. Kidnapped mothers on average have borne 3.45 children (note that child-bearing is not complete for the entire sample),

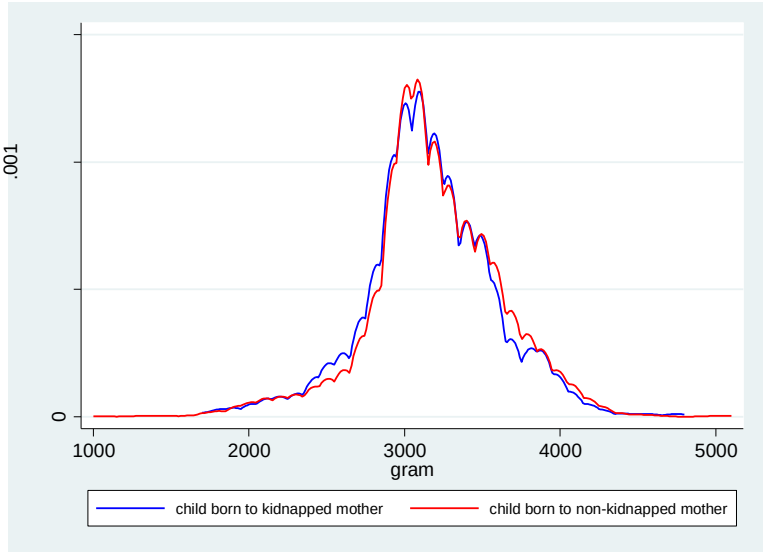
which is similar to arranged marriage mothers with 3.46 children but substantially higher than love marriage mothers with 3.06 children. In sum, the 1,170 women gave birth to 3,773 children.

Figure 2: Birth weight distribution, kidnapped and arranged mothers



Source: Authors' illustration based on 2011 LIK data.

Figure 3: Birth weight distribution, kidnapped and non-kidnapped mothers



Source: Authors' illustration based on 2011 LIK data.

Kidnapped mothers are only slightly younger at the time of marriage as well as birth than non-kidnapped mothers. This indicates that kidnapping is not targeted at very young girls but rather at young women who finished their secondary education. There is a larger share among kidnapped mothers than among non-kidnapped mothers with only basic education, and there is a smaller share among kidnapped mothers than among mothers in love marriages with a university degree. Women do not differ with regard to average household size, household wealth, and the existence of a doctor's office in the community. They do differ, however, with regard to altitude. Kidnapped mothers live at more elevated heights than other mothers.

7. ESTIMATION RESULTS

Tables 2 and 3 provide OLS estimates of equation (6), ignoring the potential endogeneity of kidnapping for the moment. Table 2 is based on all children born to mothers who were either kidnapped or married through arrangement. Table 3 additionally includes children born to mothers who married through love marriage. In column 1 of each table, we control for child characteristics only; column 2 adds mother characteristics; column 3 adds household characteristics; community characteristics are added in column 4.

Results for the control variables provide a consistent, plausible picture of the determinants of birth weight outcomes in rural Kyrgyzstan. Male children are born with significantly higher and firstborns with lower birth weight. Birth weight increases with increased maternal age, though with decreasing marginal effects. Altitude decreases birth weight, a finding again consistent with the literature (see above). Somewhat surprisingly, the mother's level of education, household size, household wealth, and the proximity to a doctor's office do not affect birth weight in OLS regressions.

As far as education and the availability of medical care are concerned, the absence of a relationship may reflect Kyrgyzstan's Soviet heritage. Compared to developing countries in Africa or other parts of Asia, Kyrgyzstan has relatively high levels of educational attainment and health care, even among the poorer segments of the population (Brück *et al.*, 2014). Secondary schooling and the presence of some medical care became nearly universal in the late Soviet eras, and have been maintained, at least to a certain extent, during the post-Soviet era as well. Anecdotal evidence (of unheated school buildings, absent teachers, sporadic attendance, and lack of basic equipment in some rural schools, and absence of medicines and instruments in rural clinics) suggests that there is enormous variation in the quality of education and health care. Unfortunately, we are unable to measure these quality dimensions. Worse still, not only are they likely to matter, they are also likely to be correlated with our instrumental variable, thereby diminishing its validity.

Ceteris paribus, kidnapped mothers give birth to lower birth weight children (by between 64 and 104 grams) compared with arranged marriage mothers (Table 2), which theory suggests is the preferred comparison group. When comparing the children of kidnapped mothers with those of mothers of all non-kidnapped marriage types, birth weight is not significantly affected by the type of marriage (Table 3). As noted above, these results are likely to be biased due to the endogeneity of kidnapping. We therefore turn to Tables 4 and 5, which report the results of the IV estimation. The columns are similar to above.

First-stage results are not reported. They nevertheless confirm that rural population density is a good predictor of kidnapping. The coefficient on population density is always statistically significant at the 1% level (t-value of at least 4) across the different columns in Tables 4 and 5. The *F*-statistic of the first-stage regression is between 13 and 16 for Table 4 and between 110 and 115 for Table 5.

It is shown that the impact of kidnapping on birth weight is statistically significant and negative. Kidnapping reduces birth weight by between 300 and 450 grams, depending on whether we include or exclude love marriage mothers. This is a huge effect that almost certainly implies detrimental consequences for the long-run development of children born to kidnapped mothers. 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).[12]

8. ROBUSTNESS CHECKS

To be completed:

- Control for husband's age at marriage
- Control for mother's height
- Control for smoking (should not matter much in Kyrgyzstan)
- Are twins and stillborn babies still included?
- Consider different age gaps between husbands and wives (assumption: higher age gap reduces female autonomy and bargaining position within the household)
- Construct asset index differently
- Look at birth order in more detail: the negative effect should be there mostly for the first children (include mother fixed effects for different sub-samples?)
- Check timing of fertility: do kidnapped mothers get children with less time between births?

9. CONCLUSION

This paper provides the first empirical evaluation of the effects of forced marriages on birth outcomes. Our findings suggest that standard OLS estimates may significantly underestimate the detrimental effects of bride kidnapping on birth weight. Initial IV estimates illustrate that kidnapping reduced birth weight by between 300 and 450 grams, which is a huge effect. Low birth weight in turn is a major health risk and likely will translate into further health risks during adulthood.

These findings make it difficult to continue to claim that kidnapping is actually an elaborate, consensual charade undertaken by both parties to reduce wedding costs and circumvent a lengthy wedding planning period. Even if kidnapped women eventually reconcile themselves to their fates, they are unlikely to be happy about it, since it implies weakened bargaining power on their part, increased work-loads, an end to schooling, likely greater than desired fertility, worse birth outcomes – and a likely repetition of the cycle for their daughters.

The endogeneity of everything observable that is not correlated with important unobservables hampers our ability to make unequivocal causal statements. Instead, we rely on what we hope is a mass of consistent, reinforcing evidence. While each piece is imperfect, it is difficult to imagine that the entire weight of evidence [assuming that life satisfaction and divorce results are consistent] is a mirage.

The take-away from this paper should not simply be a reminder of the losses incurred by the victims of cruel customs that have emerged in authoritarian societies dominated by male hierarchies.

[12] 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.

Nor is this a simple good *vs.* evil paradigm, or a reminder that traditional societies unspoiled by rapacious capitalism (or socialism) are likely less than idyllic themselves.

Rather, we emphasize that bride kidnapping may be a rational strategy in a non-cooperative game in which opportunities are limited and especially when initial endowments are unevenly divided. Indeed, it is reasonable to conjecture that brides realize this, and also recognize that not all kidnappers are inherently evil – surely, many must argue to their intended brides that a primary motive for the kidnapping was to prevent her from being kidnapped by others during the period that the groom sought to accumulate resources to finance a wedding. It is this awareness that may lead many to accept their fates with limited resistance and, ultimately, for at least some forced marriages to be successful in some dimensions.

Thus, we see kidnapping as the result of two institutional failures. The first is the failure of conventional marriage markets in low density settings. The second is a failure of capital markets, and hence in the inability of many grooms to amass resources to finance a conventional wedding. Alternatively, one can view the accumulation problem as stemming from wedding costs. Indeed, governments throughout Central Asia have taken measures to curb wedding and other ceremony (*toi*) expenditures.[13] It is too early to say whether or not these measures will be successful. However, economic theory would suggest that a combination of measures to reduce marriage search costs and ongoing financial transfers by government to young women conditional on specific behavior (staying in school until age 18 and not marrying before age 21, for example) may be more effective.

[13] See, for example, the following media stories on Kyrgyzstan, Tajikistan, Uzbekistan, and Pakistan, respectively:
http://www.washingtontimes.com/news/2012/aug/12/kyrgyzstan-eyes-law-curb-extravagance/?page=all
http://www.rferl.org/content/article/1076782.html
http://centralasiaonline.com/en_GB/articles/caii/features/main/2012/11/02/feature-01
http://www.nbcnews.com/id/24843024/ns/world_news-south_and_central_asia/t/one-pakistani-region-frugal-wedding-parties/#.VJ7Ruf8M-U

REFERENCES

Abazov, R., 2004. Historical Dictionary of Kyrgyzstan, Asian/Oceanian Historical Dictionaries. The Scarecrow Press, Lanham and Oxford.

Agadjanian, V., Nedoluzhko, L., 2013. Arranged and Forced Marriages in Kyrgyzstan: Persistence or Change?

Akiner, Sh., 1997. Between traditions and modernity: the dilemma facing contemporary Central Asian women. In: Buckley, Mary (Ed.), Post-Soviet Women: From the Baltic to Central Asia. Cambridge University Press, Cambridge, pp. 261-304.

Almond, D., Chay, K.Y., Lee, D.S., 2005. The Costs of Low Birth Weight. The Quarterly Journal of Economics 120, 1031–1083.

Almond, D., Mazumder, B., 2011. Health Capital and the Prenatal Environment: The Effect of Ramadan Observance During Pregnancy. American Economic Journal: Applied Economics 3, 56–85.

Anderson, S., 2007. The Economics of Dowry and Brideprice. The Journal of Economic Perspectives 21, 151–174.

Anne E. McLaren, 2001. Marriage by Abduction in Twentieth Century China. Modern Asian Studies 35, 953-984.

Ayres, B., 1974. Bride Theft and Raiding for Wives in Cross-Cultural Perspective. Anthropological Quarterly 47, 238–252.

Barnes, R.H., 1999. Marriage by Capture. The Journal of the Royal Anthropological Institute 5, 57–73.

Batabyal, A.A., 2001. On the likelihood of finding the right partner in an arranged marriage. The Journal of Socio-Economics 30, 273–280.

Bates, D.G., 1974. Normative and Alternative Systems of Marriage among the Yörük of Southeastern Turkey. Anthropological Quarterly 47, 270–287.

Becker, G.S., 1973. A Theory of Marriage: Part I. Journal of Political Economy 81, 813-846.

Becker, G.S., 1974. A Theory of Marriage: Part II. Journal of Political Economy 82, S11-S26.

Becker, G.S., 1991. A TREATISE ON THE FAMILY. Harvard University Press.

Behrman, J.R., Rosenzweig, M.R., 2004. Returns to Birthweight. The Review of Economics and Statistics 86, 586–601.

Black, S.E., Devereux, P.J., Salvanes, K.G., 2007. From the Cradle to the Labor Market? The Effect of Birth Weight on Adult Outcomes. The Quarterly Journal of Economics 122, 409–439.

Boerma, J.T., Weinstein, K.I., Rutstein, S.O., Sommerfelt, A.E., 1996. Data on birth weight in developing countries: can surveys help? Bulletin of the World Health Organization 74, 209–216.

Bonzini, M., Coggon, D., Palmer, K.T., 2007. Risk of prematurity, low birthweight and pre- eclampsia in relation to working hours and physical activities: a systematic review. Occupational and Environmental Medicine 64, 228–243.

Borbieva, N.O., 2012. Kinapping Women: Discourses of Emotion and Social Change in the Kyrgyz Republic. Anthropological Quarterly 85, 141–169.

Bozzoli, C., Quintana-Domeque, C., 2013. The Weight of the Crisis: Evidence From Newborns in Argentina. Review of Economics and Statistics 96, 550–562.

Bozzoli, C., Quintana-Domeque, C., 2014. The Weight of the Crisis: Evidence from Newborns in Argentina. Review of Economics and Statistics 96, 550–562.

Brück, T., Esenaliev, D., Kroeger, A., Kudebayeva, A., Mirkasimov, B., Steiner, S., 2014. Household Survey Data for Research on Well-Being and Behavior in Central Asia. Journal of Comparative Economics 42, 819–835.

Camacho, A., 2008. Stress and Birth Weight: Evidence from Terrorist Attacks. American Economic Review 98, 511–515.

Courant, P., 1978. Racial prejudice in a search model of the urban housing market. Journal of Urban Economics 5, 329-345.

Currie, J., Hyson, R., 1999. Is the Impact of Health Shocks Cushioned by Socioeconomic Status? The Case of Low Birthweight. The American Economic Review 89, 245–250.

Currie, J., Moretti, E., 2003. Mother's Education and the Intergenerational Transmission of Human Capital: Evidence from College Openings. The Quarterly Journal of Economics 118, 1495–1532.

Currie, J., Neidell, M., Schmieder, J.F., 2009. Air Pollution and Infant Health: Evidence from New Jersey. Journal of Health Economics 28, 688–703.
Dow, W.H., Philipson, T.J., Sala-i-Martin, X., 1999. Longevity Complementarities under Competing Risks. The American Economic Review 89, 1358–1371.
Duc, L.T., 2011. Height and Cognitive Achievement of Vietnamese Children. World Development 39, 2211–2220.
Esenaliev, D., Steiner, S., n.d. Ethnicity and the distribution of welfare: Evidence from southern Kyrgyzstan. Journal of Comparative Economics.
Edlund, L., Lagerlöf, N.-P., 2006. Individual versus Parental Consent in Marriage: Implications for Intra-Household Resource Allocation and Growth. The American Economic Review 96, 304-307.
Evans, W.N., Ringel, J.S., 1999. Can higher cigarette taxes improve birth outcomes? Journal of Public Economics 72, 135–154.
Fafchamps, M., Quisumbing, A.R., 2007. Chapter 51 Household Formation and Marriage Markets in Rural Areas, in: T. Paul Schultz and John A. Strauss (Ed.), Handbook of Development Economics. Elsevier, pp. 3187–3247.
Frongillo, E.A., de Onis, M., Hanson, K.M.P., 1997. Socioeconomic and Demographic Factors Are Associated with Worldwide Patterns of Stunting and Wasting of Children. The Journal of Nutrition 127, 2302–2309.
Gale, D., Shapley L., 1962. College Admissions and the Stability of Marriage. American Mathematical Monthly 69, 9-15.
Giussani, D.A., Phillips, P.S., Anstee, S., Parker, D.J.P., 2001. Effects of Altitude versus Economic Status on Birth Weight and Body Shape at Birth. Pediatric Research 49, 490–494.
Grossman, M., Joyce, T.J., 1990. Unobservables, Pregnancy Resolutions, and Birth Weight Production Functions in New York City. Journal of Political Economy 98, 983–1007.
Handrahan, L., 2004. Hunting for Women. International Feminist Journal of Politics 6, 207–233.
Handrahan, L., 2000. Implications of International Human Rights Law and Bride Kidnapping in Kyrgyzstan. The Fletcher Journal of Development Studies 16, 1-13.
Human Rights Watch, 2006. Reconciled to Violence. State Failure to Stop Domestic Abuse and Abduction of Women in Kyrgyzstan. Volume 18, No. 9.
Hobel, C., Culhane, J., 2003. Role of Psychosocial and Nutritional Stress on Poor Pregnancy Outcome. The Journal of Nutrition 133, 1709S–1717S.
Jason D. Boardman, Powers, D.A., Padilla, Y.C., Hummer, R.A., 2002. Low Birth Weight, Social Factors, and Developmental Outcomes among Children in the United States. Demography 39, 353–368.
Jensen, G.M., Moore, L.G., 1997. The Effect of Altitude and other Risk Factors on Birth Weight: Independent or Interactive Effects? American Journal of Public Health 87, 1003–1007.
Kleinbach, R., Ablezova, M., Aitieva, M., 2005. Kidnapping for Marriage (ala kachuu) in a Kyrgyz Village. Central Asian Survey 24, 191–202.
Kleinbach, R., Salimjanova, L., 2007. Kyz ala kachuu and adat: non-consensual bride kidnapping and tradition in Kyrgyzstan. Central Asian Survey 26, 217–233.
Kramer, M.S., 1987. Determinants of Low Birth Weight: Methodological Assessment and Meta-Analysis. Bulletin of the World Health Organization 65, 663–737.
Lien, D.S., Evans, W.N., 2005. Estimating the Impact of Large Cigarette Tax Hikes: The Case of Maternal Smoking and Infant Birth Weight. The Journal of Human Resources 40, 373–392.
Mansour, H., Rees, D.I., 2012. Armed Conflict and Birth Weight: Evidence from the Al-Aqsa Intifada. Journal of Development Economics 99, 190–199.
National Statistical Committee, 2013. Kyrgyz Republic. Demographic and Health Survey 2012.
Noor O'Neill Borbieva. "Kidnapping Women: Discourses of Emotion and Social Change in the Kyrgyz Republic." Anthropologic, n.d.
Paarlberg, K.M., Vingerhoets, J.J.M., Passchier, J., Dekker, G.A., Heinen, A.G.J.J., van Geijn, H.P., 1999. Psychosocial predictors of low birthweight: a prospective study. BJOG: An International Journal of Obstetrics & Gynaecology 106, 834–841.

Reeves, M., 2012. Black Work, Green Money: Remittances, Ritual, and Domestic Economies in Southern Kyrgyzstan. Slavic Review 71, 108–134.
Rosenzweig, M.R., Schultz, T.P., 1983. Estimating a Household Production Function: Heterogeneity, the Demand for Health Inputs, and Their Effects on Birth Weight. Journal of Political Economy 91, 723–746.
Sebastian Galiani, Paul Gertler, Ernesto Schargrodsky, 2005. Water for Life: The Impact of the Privatization of Water Services on Child Mortality. Journal of Political Economy 113, 83–120.
Shleifer, A., Treisman, D., 2014. Normal Countries: The East 25 Years After Communism. Foreign Affairs.
Stross, B., 1974. Tzeltal Marriage by Capture. Anthropological Quarterly 47, 328–346.
Torche, F., 2011. The Effect of Maternal Stress on Birth Outcomes: Exploiting a Natural Experiment. Demography 48, 1473–1491.
Unger, C., Weiser, J.K., McCullough, R.E., Keefer, S., Moore, L.G., 1988. Altitude, Birth Weight, and Infant Mortality in Colorado. Journal of the American Medical Association 259, 3427–3432.
Wehby, G., Fletcher, J.M., Lehrer, S.F., Moreno, L.M., Murray, J.C., Wilcox, A., Lie, R.T., 2011. A Genetic Instrumental Variables Analysis of the Effects of Prenatal Smoking on Birth Weight: Evidence from Two Samples. Biodemography and Social Biology 57, 3–32.
Wehby, G.L., Murray, J.C., Castilla, E.E., Lopez-Camelo, J.S., Ohsfeldt, R.L., 2009. Quantile Effects of Prenatal Care Utilization on Birth Weight in Argentina. Health economics 18, 1307–1321.
Weiss, Y., 1997. Chapter 3 The formation and dissolution of families: Why marry? Who marries whom? And what happens upon divorce, in: Mark R. Rosenzweig and Oded Stark (Ed.), Handbook of Population and Family Economics. Elsevier, pp. 81–123.
Werner, C., 1998. Household networks and the security of mutual indebtedness in rural Kazakstan. Central Asian Survey 17, 597–612.
Werner, C., 2009. Bride Abduction in Post-Soviet Central Asia: Marking a Shift Towards Patriarchy through Local Discourses of Shame and Tradition. The Journal of the Royal Anthropological Institute 15, 314–331.
Wooldridge, J.M., 1995. Score diagnostics for linear models estimated by two stage least squares. In Advances in Econometrics and Quantitative Economics: Essays in Honor of Professor C.R. Rao, ed. G.S. Maddala, P.C.B. Phillips, and T.N. Srinivasan, 66-87. Oxford: Blackwell.

Table 1: Descriptive statistics, by type of marriage

	Kidnapping	Arranged marriage	Love marriage	Love and arranged marriage
CHILD CHARACTERISTICS				
Birth weight	3162	3265*	3164	3195*
	(416)	*(469)*	*(399)*	*(424)*
Child is male	0.524	0.54	0.52	0.526
	(0.500)	*(0.499)*	*(0.500)*	*(0.499)*
Child is firstborn	0.291	0.289	0.327*	0.316
	(0.454)	*(0.454)*	*(0.469)*	*(0.465)*
Number of observations	*911*	*874*	*1988*	*2862*
MOTHER CHARACTERISTICS				
Age at first marriage	19.83	20.74*	20.97*	20.91*
	(2.29)	*(2.74)*	*(2.93)*	*(2.88)*
Age at birth	21.74	22.92*	22.46*	22.59*
	(3.63)	*(4.19)*	*(3.75)*	*(3.88)*
Basic education	0.091	0.040*	0.049*	0.042*
	(0.288)	*(0.195)*	*(0.203)*	*(0.201)*
Secondary education	0.653	0.806*	0.566*	0.633
	(0.477)	*(0.396)*	*(0.496)*	*(0.482)*
Technical education	0.185	0.091*	0.181	0.156
	(0.389)	*(0.288)*	*(0.385)*	*(0.363)*
University education	0.068	0.059	0.210*	0.170*
	(0.252)	*(0.237)*	*(0.408)*	*(0.374)*
Household size	6.13	5.96	6.27	6.19
	(2.35)	*(2.16)*	*(2.37)*	*(2.31)*
Wealth index	0.551	0.629	0.571	0.587
	(0.653)	*(0.556)*	*(0.735)*	*(0.690)*
Doctor's office in community	0.472	0.522	0.489	0.498
	(0.500)	*(0.501)*	*(0.500)*	*(0.500)*
Altitude (in meters)	1580	1247*	1396*	1354*
	(578)	*(613)*	*(585)*	*(596)*
Number of observations	*265*	*253*	*652*	*905*

Note: Cell entries are means; standard deviation in brackets. * indicates that the mean of this type of marriage is statistically different at the 5% level from the mean of kidnapping.
Source: Authors' illustration based on 2011 LIK data.

Table 2: OLS estimates of birth weight, kidnapped and arranged marriages

	(1)	(2)	(3)	(4)
kidnap	-104.2***	-94.01***	-94.09***	-64.44*
	(34.06)	(35.32)	(35.33)	(36.69)
ch_male	74.75***	73.82***	74.85***	74.49***
	(21.43)	(21.17)	(21.05)	(20.96)
ch_firstborn	-50.03**	-26.36	-28.74	-29.16
	(20.47)	(27.38)	(27.11)	(27.51)
wifeage_atmarriage		9.973	9.364	7.699
		(8.137)	(8.248)	(8.226)
wifeage_atbirth		48.60**	47.41**	46.59**
		(21.31)	(21.15)	(21.07)
sq_wifeage_atbirth		-0.831**	-0.811**	-0.779**
		(0.364)	(0.360)	(0.359)
wife_basic_educ		65.83	72.50	41.95
		(91.30)	(90.86)	(89.66)
wife_sec_educ		34.38	36.83	53.81
		(67.44)	(66.85)	(65.98)
wife_tech_educ		28.38	23.65	37.86
		(77.21)	(77.06)	(75.67)
hhsize			-7.147	-5.833
			(6.535)	(6.825)
wealth_index			0.793	7.306
			(25.51)	(25.59)
doctor_office				-21.64
				(35.19)
altitude				-0.0856***
				(0.0274)
Constant	2,849***	2,008***	2,061***	2,209***
	(70.59)	(299.2)	(302.4)	(301.2)
Birth month & year FE	YES	YES	YES	YES
Observations	1,785	1,785	1,785	1,785
R-squared	0.054	0.062	0.064	0.075

Note: Clustered standard errors in brackets. *** significant at 1%, ** at 5%, * at 10%.
Source: Authors' illustration based on 2011 LIK data.

Table 3: OLS estimates of birth weight, all marriages

	(1)	(2)	(3)	(4)
kidnap	-36.59	-34.67	-35.16	-17.76
	(24.37)	(25.27)	(25.27)	(25.20)
ch_male	91.70***	91.15***	90.71***	88.53***
	(14.03)	(14.05)	(14.10)	(14.04)
ch_firstborn	-52.36***	-35.39**	-36.45**	-36.15**
	(12.97)	(17.16)	(17.02)	(17.15)
wifeage_atmarriage		-0.376	-0.256	-1.254
		(4.940)	(4.956)	(4.949)
wifeage_atbirth		29.19**	28.07**	28.74**
		(13.82)	(13.80)	(13.83)
sq_wifeage_atbirth		-0.497**	-0.482**	-0.489**
		(0.236)	(0.235)	(0.236)
wife_basic_educ		10.84	18.05	-7.643
		(54.59)	(53.54)	(53.22)
wife_sec_educ		15.91	17.90	21.36
		(29.91)	(29.85)	(29.62)
wife_tech_educ		-6.228	-5.630	-8.339
		(34.73)	(34.74)	(34.28)
hhsize			-5.861	-6.035
			(4.192)	(4.306)
wealth_index			23.78	32.12**
			(15.03)	(14.98)
doctor_office				5.637
				(21.74)
altitude				-0.0686***
				(0.0182)
Constant	2,830***	2,436***	2,455***	2,548***
	(43.94)	(187.5)	(190.5)	(190.9)
Birth month & year FE	YES	YES	YES	YES
Observations	3,773	3,773	3,773	3,773
R-squared	0.031	0.033	0.035	0.044

Note: Clustered standard errors in brackets. *** significant at 1%, ** at 5%, * at 10%.
Source: Authors' illustration based on 2011 LIK data.

Table 4: IV estimates of birth weight, kidnapped and arranged marriages

	(1)	(2)	(3)	(4)
kidnap	-424.0***	-416.3***	-444.4***	-449.8**
	(133.1)	(138.1)	(139.4)	(183.0)
ch_male	70.43***	71.05***	71.91***	72.29***
	(22.01)	(21.46)	(21.51)	(21.48)
ch_firstborn	-48.18**	-30.29	-33.15	-33.06
	(20.87)	(27.98)	(27.93)	(28.02)
wifeage_atmarriage		-0.721	-2.287	-2.256
		(10.39)	(10.87)	(11.06)
wifeage_atbirth		39.48*	37.63	37.10
		(23.49)	(23.43)	(23.50)
sq_wifeage_atbirth		-0.688*	-0.658	-0.647
		(0.403)	(0.402)	(0.401)
wife_basic_educ		94.08	102.8	98.61
		(108.2)	(109.4)	(115.0)
wife_sec_educ		-26.80	-29.86	-30.74
		(77.23)	(77.81)	(83.81)
wife_tech_educ		66.94	65.30	64.67
		(84.52)	(85.52)	(85.75)
hhsize			-7.180	-7.000
			(7.345)	(7.497)
wealth_index			-3.401	-5.231
			(30.26)	(31.23)
doctor_office				-18.94
				(39.01)
altitude				0.00167
				(0.0480)
Constant	3,164***	2,693***	2,809***	2,836***
	(150.0)	(439.5)	(453.8)	(456.7)
Birth month & year FE	YES	YES	YES	YES
Observations	1,785	1,785	1,785	1,785

Note: Clustered standard errors in brackets. *** significant at 1%, ** at 5%, * at 10%.
Source: Authors' illustration based on 2011 LIK data.

Table 5: IV estimates of birth weight, all marriages

	(1)	(2)	(3)	(4)
kidnap	-325.0***	-337.1***	-401.5***	-329.1*
	(122.7)	(124.3)	(125.0)	(171.7)
ch_male	91.32***	90.04***	89.52***	88.73***
	(14.40)	(14.42)	(14.73)	(14.45)
ch_firstborn	-59.15***	-36.02**	-37.64**	-37.37**
	(13.61)	(17.59)	(17.78)	(17.55)
wifeage_atmarriage		-8.488	-10.12	-8.797
		(6.064)	(6.393)	(6.620)
wifeage_atbirth		28.24*	26.74*	27.34*
		(14.44)	(14.70)	(14.37)
sq_wifeage_atbirth		-0.468*	-0.444*	-0.456*
		(0.247)	(0.251)	(0.246)
wife_basic_educ		83.30	105.9	82.64
		(73.16)	(73.75)	(82.45)
wife_sec_educ		27.76	32.32	31.09
		(32.15)	(32.69)	(31.77)
wife_tech_educ		32.29	40.49	31.55
		(41.26)	(42.29)	(43.80)
hhsize			-7.244	-7.061
			(4.804)	(4.640)
wealth_index			24.18	27.91
			(17.64)	(17.15)
doctor_office				11.17
				(23.20)
altitude				-0.0270
				(0.0293)
Constant	3,111***	2,861***	2,977***	2,911***
	(127.5)	(260.4)	(271.1)	(283.1)
Birth month & year FE	YES	YES	YES	YES
Observations	3,773	3,773	3,773	3,773

Note: Clustered standard errors in brackets. *** significant at 1%, ** at 5%, * at 10%.
Source: Authors' illustration based on 2011 LIK data.

Figure 1: Diagram of Instrumental Variable: district level natural experiments in the Soviet era