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ABSTRACT

Patrilocal Residence and Female Labour Supply*

We examine the role of intergenerational co-residence for female labour supply in a patrilocal society. To account for the endogeneity of women's co-residence with parents or in-laws, we exploit a tradition in Central Asia, namely that the youngest son of a family usually lives with his parents. Using data from Kyrgyzstan, we therefore instrument co-residence with being married to a youngest son. We find the effect of co-residence on female labour supply to be negative and insignificant. This is in contrast to the previous literature, which found substantial positive effects in less patrilocal settings. Women who co-reside in Kyrgyzstan have more children, spend similar time on housekeeping tasks and child care, and invest more time in elder care compared with women who do not co-reside. These mechanisms appear to be inherently different from those in less patrilocal settings where co-residing parents relieve the women from household chores.

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1 Introduction

The family is a fundamental institution in society and plays a key role for many economic decisions. Female labour supply is one such decision: Supply of labour to the market depends on whether women have a spouse, how much the spouse earns, and whether they have young children (Killingsworth and Heckman, 1986; Angrist et al., 1998; Jacobsen et al., 1999; Lundborg et al., 2017). Female labour supply also depends on whether women live with their parents or in-laws. Several authors established a positive impact of intergenerational co-residence on the labour force participation of married women (Kolodinsky and Shirey, 2000; Sasaki, 2002; Oishi and Oshio, 2006; Maurer-Fazio et al., 2011; Compton, 2015; Shen et al., 2016). The literature has paid limited attention to the fact that this impact potentially differs by norms on post-marital residence, though. A large share of the world population lives in societies with a patrilocal residence rule, which prescribes that women should move in with their husbands' parents, or sometimes the husband's wider family, upon marriage. 74 percent of societies around the world were traditionally patrilocal (Murdock, 1967, cited in Baker and Jacobsen, 2007). Today, patrilocality is most common in the Caucasus, Central Asia, and South Asia. The share of elderly co-residing with a son and his wife is particularly high in these societies (Grogan, 2013; Ebenstein, 2014). When joining the new household, women are usually expected to take over housekeeping tasks from their in-laws (Grogan, 2013). This allocation of responsibilities should have negative implications for women's labour supply. In fact, the extent of patrilocality is negatively related with female labour force participation around the world (Figure 1).[1]

[INSERT FIGURE 1 ABOUT HERE]

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[1] The observed cross country-correlation could also be explained by a differential prevalence of co-residence. Yet, the extent of co-residence with the parent generation increases with the extent of patrilocality (Pearson correlation coefficient = 0.54), and patrilocal countries should hence obtain *more* of the positive effect. We therefore exclude the alternative explanation that simply different co-residence rates drive the difference between more and less patrilocal countries. A more detailed assessment rather reveals that co-residence - in line with our motivation - seems to have a heterogeneous relationship with female labour force participation across countries. In patrilocal countries (patrilocality index > 0), higher co-residence is related with lower female labour supply, while the reverse is true in all other countries (Figure A.1).

In this paper, we investigate how intergenerational co-residence affects female labour supply in a patrilocal setting, in which virtually all co-residing women live with their in-laws. This extent of patrilocality stands in contrast to the previous literature, which focused on settings that are not or much less patrilocal. We also examine the channels through which co-residence affects women's supply of labour to the market; a question that remained open in most of the previous studies. We focus on Kyrgyzstan, which is a post-Soviet country in Central Asia with a population of 5.9 million and where patrilocality is common: 46 percent of married females in the age group 15-30 live with at least one parent-in-law and only 9 percent live with at least one own parent (Grogan, 2013). Young married women reportedly have the lowest status in their in-laws' household (Kuehnast, 2004). They are supposed to be obedient and fulfill the demands of their husbands and his parents, including doing housekeeping and caring for the husband's parents if needed. Married couples tend to live with the husband's parents until the husband's younger brothers get married. At that point, they often move out and form their own household. According to tradition, the youngest son and his wife never move out and are responsible for the well-being of the parents (Bauer *et al.*, 1997; Kuehnast, 2004; Thieme, 2014; Rubinov, 2014). As a way of compensation, the youngest son inherits the house and the land upon the death of his father.[2]

The literature has elaborated on four channels through which intergenerational co-residence can affect female labour supply in general. First, co-residing parents or in-laws might contribute to household income or share housing and other assets (Maurer-Fazio *et al.*, 2011). Any advantage in economic conditions (e.g. high non-labour income) is likely to make women reduce their labour supply. Second, co-residing parents or in-laws might require care. Women are typically the care-givers in the household. This responsibility increases their value of non-market time (their reservation wage) and reduces their labour supply (Lilly *et al.*, 2007). Third, co-residing parents or in-laws might take care of women's children or take over

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[2]All children traditionally get a share of the parents' wealth, though in different forms and at different times in their life cycle (Giovarelli *et al.*, 2001).

housekeeping tasks. The reservation wage is reduced for the women, leading to an increase in labour supply (Compton and Pollak, 2014; García-Morán and Kuehn, 2017; Posadas and Vidal-Fernández, 2013; Shen *et al.*, 2016). Fourth, co-residing parents or in-laws might be better able to impose their preferences on a woman's labour market behaviour than distant parents or in-laws (Chu *et al.*, 2014). Depending on the type of preferences, parents or in-laws can either induce an increase or a reduction in female labour supply. These four channels are plausible in patrilocal societies in the same way as in other societies - with one exception. Women who move in with their in-laws typically take over housekeeping tasks from them rather than the in-laws taking care of housekeeping for the women (Grogan, 2013). This distribution of tasks within the household should result in more adverse effects of co-residence on female labour supply in a patrilocal context.

A priori the overall impact of intergenerational co-residence on the labour supply of women is unclear because several channels can be at play and might counteract each other. The picture from existing empirical studies is surprisingly unambiguous; all these studies find a positive impact. They use data from the US (Kolodinsky and Shirey, 2000), Japan (Sasaki, 2002; Oishi and Oshio, 2006), and China (Maurer-Fazio *et al.*, 2011; Shen *et al.*, 2016).[3] Among these countries, patrilocality is common in China (Ebenstein, 2014) and, to a lesser extent, in Japan (Takagi *et al.*, 2007). Yet, the studies on China do not capture the full extent of patrilocality. Maurer-Fazio *et al.* (2011) focus on urban China, where patrilocality is much less practised than in rural China[4], and Shen *et al.* (2016) fully exclude patrilocality by restricting their analysis to women's co-residence with own parents. Nevertheless, the magnitude of the estimated impacts is in line with our argument. It is smaller in settings with

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[3]Additionally, Compton (2015) evaluates the effect of proximity to parents on labour market outcomes of Canadian women. She finds that, when controlling for the endogeneity of distance to the parents, close proximity to parents increases the labour force participation of married women. Please note that this study is not fully comparable to the other studies, as it focuses on proximity to parents rather than co-residence with parents.

[4]The Global Data Lab database (Institute for Management Research, Radboud University, 2017) reports a patrilocality index of 0.81 for urban China and of 2.55 for rural China. The patrilocality index is the log of the percentage of patrilocal residence divided by the percentage of matrilocal residence. This means the larger the value the more patrilocal is the setting. For comparison, Kyrgyzstan has a mean patrilocality index of 2.31 at the national level in the period 2000-2016.

a higher prevalence of patrilocality. Living with parents or in-laws increases the probability of female labour force participation by 56 percentage points in the US (Kolodinsky and Shirey, 2000), by 28 percentage points in China when analysis is limited to co-residence with own parents (Shen *et al.*, 2016), by 19-24 percentage points in Japan (Oishi and Oshio, 2006), and by 7 percentage points in urban China (Maurer-Fazio *et al.*, 2011). All of these studies claim that the overall positive impact is due to parental assistance with child care and housekeeping. Only Shen *et al.* (2016) explicitly test and confirm this claim; the other authors limit themselves to speculation.

Empirical analysis is not straightforward because co-residence is not exogenous. Even in patrilocal societies, there is selection into co-residence. Couples that are expected to co-reside with the husband's parents do not always do so, while couples that are not necessarily expected to co-reside sometimes decide to live with the older generation. The reason is that co-residence and labour supply decisions are often made jointly (Sasaki, 2002). For example, young women with low ambition to work outside the home or with conservative attitudes on gender roles may be inclined to co-reside with their in-laws. Additionally, parents are likely to move in with their adult children when they need to be taken care of or when the adult children need them as caregivers for their own children, especially if formal care is not easily available or too costly. If there are several siblings, the co-residence decision could be the result of a bargaining process. The sibling with the lowest (highest) opportunity costs may be the one who co-resides with parents if elder (child) care is required (Ettner, 1996; Ma and Wen, 2016). Due to this endogeneity of co-residence, simple comparisons of co-residing and non-co-residing women are most likely subject to a bias.

To address the endogeneity of co-residence, we make use of the tradition that youngest sons are expected to live with their parents. This tradition is followed by all ethnic groups residing in Kyrgyzstan. It generates exogenous variation in the co-residence of women with the parent generation, driven by the birth order of hus-

bands. We use being married to the youngest son as an instrument for women's intergenerational co-residence. One challenge with this instrument is that, by construction, husbands have a higher probability of being the youngest son when they have fewer male siblings. Also, youngest sons tend to be younger than older sons and, given age, they have older parents. We therefore control for the age of the husband and his parents as well as the number of his brothers. We show that, even conditional on these variables, wives of youngest sons are significantly and substantially more likely to co-reside than wives of older sons. We illustrate that our instrument is plausibly valid. We find no evidence for selection on the marriage market or in terms of marital stability: Youngest sons and their wives do not seem to be different from older sons and their wives with regard to pre-marriage characteristics and divorce rates.

We find that intergenerational co-residence does not significantly affect the labour market outcomes of married females in Kyrgyzstan. As implied by the patrilocal residence rule, women who live with the parent generation do not benefit from parental support. They spend about the same amount of time on housekeeping tasks as women in nuclear families. In addition, time used for child care is similar between co-residing women and women in nuclear families, but women who co-reside tend to have more small children. Co-residing women also spend slightly more time on elder care. In sum, the patrilocal setting in Kyrgyzstan proves to be different from the settings investigated in the previous literature, which is reflected in the deviating overall effect of co-residence on female labour supply.

2   Background: Female Labour Supply in Kyrgyzstan

Despite the political objective of the Soviet government to achieve gender equality on the labour market, the labour force participation rate of females (aged 15-64 years) always remained lower than that of males in what is today Kyrgyzstan. Just before the dissolution of the Soviet Union, female labour force participation amounted to

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58 percent in 1990, compared with 74 percent for males (Figure 2). Since then, the distance between females and males has increased: while 50 percent of females participated in the labour force in 2016, 77 percent of males did so.

[Insert Figure 2 about here]

The provision of institutionalised care for children and the elderly remains low, which potentially keeps women from participating in the labour market. The enrolment rate in formal child care for children aged 3-6 years was as low as 31 percent in 1990, further decreased to 9 percent in 1998 (Giddings *et al.*, 2007) and then increased again to 22 percent in 2013/14 (UNICEF, 2017). The Ministry of Labour and Social Development (2017) currently reports a total of six care homes for the elderly, with 750 residents and an additional 10,000 people receiving care from these homes in their own houses. Compared with around 550,000 pensioners in the country, these numbers are very low. Kyrgyzstani women have been and still are the main providers of care for the household (Akiner, 1997; Paci *et al.*, 2002).

Women tend to be employed in sectors with relatively low pay. The share of females is highest in health care and social services, education, and hotels and restaurant services. The higher paid transportation and communication sector as well as public administration are in turn male-dominated (Ibraeva *et al.*, 2011; Schwegler-Rohmeis *et al.*, 2013). A sizable gender earnings gap is the consequence. In 2013, men earned approximately 26 percent more per month than women, but they also worked 6 percent more hours. The average hourly earnings gap was 25 percent (Anderson *et al.*, 2015).

3 Data

We use data from the Life in Kyrgyzstan (LIK) survey, which is a nationally representative panel, conducted annually between 2010 and 2013 and again in 2016.[5]

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[5]The first three waves were collected by the German Institute of Economic Research, the fourth wave by the Stockholm International Peace Research Institute, and the fifth wave by the Leibniz Institute of Vegetable and Ornamental Crops. For detailed information on the survey, see Brück *et al.* (2014).

The LIK provides a wide range of individual and household level information on socio-demographic characteristics, employment, and many other topics. In contrast to household panels where only one member of the household is interviewed, the LIK is an individual panel, in which all adult individuals living in the originally sampled households are interviewed and tracked over time. The first wave of the survey included 8,160 adults living in 3,000 households.

In our empirical analysis, we use data from the 2011 wave of the LIK and restrict the estimation sample to married women in the age range 20-50. There are 2,043 such women. We further restrict the sample to those women with at least one living parent-in-law because women without any living parent-in-law do not have the opportunity to co-reside. The 2011 wave did not contain information on whether women's in-laws were still alive. We thus collected supplementary data in 2014. We obtained information on whether the parents of the LIK respondents were alive in 2011 and on the birth order of the respondents and their siblings. 1,582 women (and their husbands) were successfully re-interviewed in 2014.[6] Our final sample is further reduced to 1,048 observations due to the following reasons: both parents of the husband are deceased (478 observations), the birth order of the husband could not clearly be identified (1 observation), and there are missing values on the variables used in the empirical analysis (55 observations).

3.1 Outcome Variables

We measure the labour market outcomes of women in two ways: first, the probability to engage in the labour market, i.e. labour force participation (extensive margin), and second, the number of weekly working hours (intensive margin). Women participate in the labour force if they actively engage in the labour market by working or if they are unemployed and seeking work. In contrast, women do not participate in the labour force if they do not work *and* do not seek work. In the LIK, engaging in the labour market is measured by (a) working for someone who is not a house-

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[6]Failure to re-interview was higher in urban than in rural areas.

hold member, (b) working for a farm or business owned or rented by the respondent or another household member, (c) engaging in farming, fishing, gathering fruits or other products or (d) being absent from a job to which one will return.[7] Women are identified as unemployed if they do not fall under any of these four categories but report that they look for work. For all working women, we observe the number of working hours. We use the total number of working hours per week in our analysis, which may be spent in up to two occupations.[8] Unemployed women and women who do not participate in the labour force are assumed to have zero working hours.

Table 1 illustrates that close to half of the sample participates in the labour force. Out of 1,048 women, 500 (48 percent) participate in the labour force and 548 (52 percent) do not. Among those participating, 483 are employed and 17 are unemployed. The average number of weekly working hours for employed women is 36 hours.

[INSERT TABLE 1 ABOUT HERE]

3.2 Co-residence and Youngest Son

Our main explanatory variable is co-residence. We define co-residence as a married woman - and her husband and children (if any) - living in one household with at least one parent. In principle, the parent can be a parent of the wife or the husband. Out of 1,048 women, 547 (52 percent) live in nuclear families and 501 (48 percent) co-reside with parents or parents-in-law (Table 1). Among the co-residing women, 490 (98 percent) live with at least one of the husband's parents and 11 (2 percent) with at least one own parent.[9] These numbers illustrate the extent of patrilocality in Kyrgyzstan. Table 1 shows that women who co-reside tend to supply

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[7] Categories (a), (b) and (d) are defined in accordance with the Integrated Sample Household Budget and Labour Survey of the National Statistics Committee of the Kyrgyz Republic. Category (c) was added in the LIK because the other three categories missed an important part of self-employment activities. The resulting definition of labour force participation conforms to that of the International Labour Organization.

[8] 1.7 percent of the women in our estimation sample have two occupations, which corresponds to 3.7 percent of all those with positive working hours.

[9] Among women who co-reside with in-laws, 34 percent live with only the mother-in-law, 8 percent with only the father-in-law, and 58 percent with both mother-in-law and father-in-law. Among the few women who co-reside with own parents, 55 percent live with their mother and 45 percent with both parents.

less labour to the market. 39 percent of co-residing women and 56 percent of non-co-residing women participate in the labour market. Among employed women, co-residing women work 35 hours per week and non-co-residing women work 36 hours (difference insignificant). Co-residence is likely endogenous. We create an indicator variable for whether a woman's husband is the youngest son in his family and use this as our instrument for co-residence. 35 percent of the women in our sample are married to a youngest son. Co-residence and marriage with a youngest son are strongly associated: Among the co-residing women, 50 percent are married to a youngest son; among the non-co-residing women, only 21 percent are married to a youngest son (Table 1).

3.3 Other Covariates

In addition to co-residence, several other factors potentially drive labour market outcomes of females. We here describe the variables that we use as controls in our analysis (descriptive statistics are reported in Table A.2 in the Appendix). Note that we restrict ourselves to variables which are plausibly unaffected by individual co-residence decisions to avoid problems of endogenous controls.

Our first set of variables characterizes the woman. Following Mincer (1958), we include her educational attainment (dummies for different stages of education: low, medium, and high) and age (as a proxy for experience). Kyrgyzstan is a multi-ethnic society with ethnicity-specific gender norms related to the labour market (Anderson *et al.*, 2015; Fletcher and Sergeyev, 2002). We thus control for the ethnicity of the women. We account for the three main ethnic groups (Kyrgyz, Uzbek, Russian) and summarize the remaining groups as "other ethnicity".[10] Our second set of variables relates to the residence of the women. This set helps us account for geographic heterogeneity. Economic conditions, and with them labour markets, vary largely within the country. The North is historically more economically developed than the South and urban areas more than rural areas (Fletcher and Sergeyev, 2002; Anderson

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[10]"Other ethnicity" is mainly composed of Dungans, Uigurs, Tajiks and Kazakhs, but contains a number of other small ethnic groups as well.

and Pomfret, 2002). We thus include dummy variables for south Kyrgyzstan as well as urban areas. We also have information on the local availability of child care facilities. As such facilities ease women's integration in the labour market, we control for whether the community in which a woman lives has a kindergarten. Finally, a third set of variables relates to the husband. We control for the husband's educational attainment, because determinants of the husband's income might affect a woman's decision to work. Education of the husband might furthermore capture attitudes on gender roles which are relevant for the woman's labour market participation.

4   Empirical Strategy and Results

4.1   Discussion of Instrument and Identifying Assumptions

Earlier studies on the effect of intergenerational co-residence on female labour market outcomes use a variety of instrumental variables to control for the endogeneity of co-residence. Sasaki (2002) uses sibling characteristics (number of siblings and birth order of husband and wife) and housing information (house owned or rented, detached house or apartment, house size) as instruments. Oishi and Oshio (2006) enrich this set of instruments with information on, for example, the husband's age and educational attainment. The instruments in the Maurer-Fazio *et al.* (2011) study are the percentage of households in the prefecture that have co-resident parents, husband's age, wife's age and provincial dummies. Shen *et al.* (2016) exploit a tradition about co-residence via sibling structures. They use the number of surviving brothers and sisters of a woman as well as her birth order as instruments for co-residing with the woman's parents. This identification strategy is the most similar to ours.

All of the instruments used in the previous literature are relevant and explain the co-residence decision well. However, some of them may not be valid instruments. For example, housing conditions, husband's educational attainment, living in a particular province, and the number of siblings are unlikely to affect female labour supply only through co-residence: housing conditions as well as the number of siblings re-

flect the wealth of a family, husband's education is a proxy for spousal income, and provincial dummies capture labour market differences across provinces, all of which may influence female labour supply. Thus, we consider it possible that the exclusion restriction is not fulfilled. Sasaki (2002), Oishi and Oshio (2006), Maurer-Fazio *et al.* (2011) and Shen *et al.* (2016) do not provide evidence to refute this possibility.

We argue that the instrument that we use in this paper is both relevant and plausibly valid. It is derived from a Central Asian tradition, according to which the youngest son of a family is supposed to stay with his parents and to ensure their well-being (Bauer *et al.*, 1997; Thieme, 2014; Rubinov, 2014). Any woman who is married to a youngest son is thus substantially more likely to co-reside with parents-in-law than a woman who is married to an older sibling. This could already be seen from our descriptive statistics in Table 1; and our first-stage estimation results (see below) provide further support. A dummy variable that indicates whether a woman's husband is the youngest son thus provides a relevant instrument for co-residence.

In all of our estimations, we control for the age of the husband, the number of brothers of the husband, and the age of the oldest living parent of the husband. We refer to these variables as conditioning variables. They are included because they are, by construction, correlated with being the youngest son. Youngest sons are on average younger than older sons; the probability of being the youngest son decreases with the number of brothers; and conditional on son's age, parents of youngest sons tend to be older than parents of older sons. Given these relationships, being married to the youngest son may influence female labour supply through other channels than through co-residence. For example, younger sons who are of the same age as older sons tend to have older parents. Older parents, in turn, are likely to require more care, which potentially reduces female labour supply. Controlling for the conditioning variables blocks such channels, which may otherwise violate the exclusion restriction. In contrast to Sasaki (2002), Oishi and Oshio (2006) and Shen *et al.* (2016), we *control* for the number of siblings (the number of brothers, to be precise) rather than using it as a separate instrument.

Several threats to the crucial exclusion restriction remain. First, we need to assure that there is no selection on the marriage market in the sense that women with certain characteristics get married to youngest sons. One could think of anticipation effects: women who are willing to care for a parent-in-law and are less prone to participate in the labour force might be more likely to marry a youngest son, as this would result in co-residence with in-laws. Second, we need to rule out that youngest sons have low career ambitions or have a preference for partners with low career ambitions. Youngest sons are likely aware of the responsibility for their parents and could look for a wife willing to share this responsibility with them. Third, we assume that being married to the youngest son has no effect on marital stability. If, for example, the wives of youngest sons are more likely to divorce (possibly due to the responsibility for parents-in-law), they might be more active on the labour market in anticipation of divorce.

In contrast to prior studies with an instrumental variable strategy - which all face these challenges - we explicitly test the plausibility of the exclusion restriction. To address the first two assumptions, we compare pre-marriage characteristics between (a) women married to youngest sons and women married to older sons and (b) men who are the youngest son and men who are an older son. Panel A of Table 2 reports the results for women. We regress a number of pre-marriage characteristics on a dummy variable indicating whether a woman is married to a youngest son, controlling for our conditioning variables. The pre-marriage characteristics are socio-demographic characteristics (age at marriage, ethnicity, number of siblings), proxy variables for labour market affinity (years of education, an indicator for having more than 11 years of education, employment status one and two years prior to the marriage) and a proxy for the prevalence of traditional values (evolution of the marriage decision). With regard to the latter point, we distinguish between love marriage, arranged marriage, and bride capture with the latter two representing traditional values (Nedoluzhko and Agadjanian, 2015; Becker *et al.*, forthcoming), which have potential implications for labour market outcomes of females.

We estimate a logit model if the pre-marriage characteristic is binary and an OLS model if it is continuous. Column (1) presents the coefficient for being married to the youngest son, column (2) the standard error and column (3) the t-statistic/z-statistic. As can be seen from the last column, we do not find differences at the 5 percent significance level. Panel B of Table 2 compares pre-marriage characteristics for youngest sons and older sons, and we find no differences in these characteristics. We conclude that couples involving a youngest son do not seem to self-select in terms of labour market characteristics at the time of marriage.[11]

Last, we want to rule out any effect of being married to a youngest son on marriage stability. More precisely, we would like to find out whether divorced women are significantly more likely to have been married to youngest sons compared with older sons.[12] We cannot test this assumption with our sample because all women in the sample are married. We instead use information on all brothers of the husband, including information of the husband himself, and all brothers of the women in our sample.[13] Their marital status and their birth order are known. We compare the likelihood of being divorced between male siblings who are the youngest son and those who are not the youngest son. We estimate a logit model for the probability of divorce. Divorce is estimated as a function of the son's birth order and the conditioning variables. Based on a sample of 5,679 male siblings, the marginal effect of being the youngest son is -0.002; the corresponding z-statistic is -0.75. We conclude that couples involving a youngest son do not differ with respect to marriage stability from other couples.[14]

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[11] In addition we use a non-parametric matching method in order to test for differences in pre-marriage characteristics. We also do not find significant differences (see Table A.3 in the Appendix).

[12] Divorce is rare but exists in Kyrgyzstan. The divorce rate, according to the 2011 LIK, is 4%.

[13] The list of siblings of all wives and husbands was compiled during the supplementary data collection in 2014, with the aim to identify the youngest son in every family.

[14] As before, we additionally use a non-parametric matching method to test for differences in marriage stability between youngest and non-youngest sons. In accordance with our parametric result, we do not find a significant difference.

4.2 Estimation Results

We estimate the effect of co-residence with parents or in-laws on labour market outcomes of women using a two-stage least squares estimation.[15] For the effect on labour force participation, the estimation equations for the two stages are:

$$Co\text{-}residence_i = \alpha_1 + \alpha_2 Youngest\ Son_i + \alpha_3 X_i + \epsilon_i \tag{1}$$

$$LFP_i = \beta_1 + \beta_2 \hat{Co\text{-}residence}_i + \beta_3 X_i + v_i \tag{2}$$

where i indexes individual women. $Co\text{-}residence_i$ is a dummy variable that captures whether a woman lives with at least one parent or parent-in-law in the same household, and $Youngest\ Son_i$ denotes whether she is married to a youngest son. LFP_i is her labour force participation. X_i is a vector of control variables, including the characteristics of the woman (age, educational attainment, ethnicity), the residence (community is located in south Kyrgyzstan, community is urban, availability of kindergarten) and the husband (educational attainment). We also control for the conditioning variables, i.e. the age, the number of brothers, and the age of the oldest living parent of the husband.

Unlike related papers (Sasaki, 2002; Oishi and Oshio, 2006; Maurer-Fazio *et al.*, 2011; Shen *et al.*, 2016), we do not control for the number of children in the household because this variable turns out to be a bad control in our context. The number of children is determined by being married to the youngest son. To illustrate this, we regress the number of children up to age five on being married to the youngest son, controlling for the conditioning variables. We restrict this exercise to the number of children up to age five because these children are not yet in school and are most likely to affect female labour supply. There is a positive and significant relationship between the number of children and being married to the youngest son (Table A.4 in the Appendix). We subsequently estimate the effect of co-residence on the number of children, instrumenting co-residence with being married to the youngest son. We

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[15]Note that - as in every IV estimation - the treatment effect has a local interpretation, i.e. it is the effect for women who live with the parent generation only because they are married to a youngest son.

find that, *ceteris paribus*, co-residing couples have 0.5 more children in the household (Table A.5 in the Appendix). Since we are interested in establishing causality between co-residence and female labour supply, controlling for the number of children would be inappropriate.

In the first stage of the estimation (equation (1)), the endogenous variable (co-residence) is treated as a linear function of the instrument (being married to the youngest son) and the remaining control variables (X_i). In the second stage (equation (2)), we estimate a linear probability model and replace co-residence with the predicted values from the first stage ($Co\text{-}\hat{residence}_i$). β_2 is the unbiased effect of co-residence on female labour force participation. The main two-stage estimation results are in Panel B of Table 3; the main OLS results are in Panel A. Full estimation results are reported in Tables A.6, A.7, and A.8 in the Appendix.

[INSERT TABLE 3 ABOUT HERE]

The estimation equations for the effect of co-residence on hours of work are:

$$Co\text{-}residence_i \;=\; \alpha_1 + \alpha_2 Youngest\ Son_i + \alpha_3 X_i + \epsilon_i \tag{3}$$

$$WH^*_i \;=\; \gamma_1 + \gamma_2 Co\text{-}\hat{residence}_i + \gamma_3 X_i + \mu_i \tag{4}$$

where WH^*_i is the linear index determining working hours WH_i ($WH_i = 0$ if $WH^*_i \leq 0$, $WH_i = WH^*_i$ if $WH^*_i > 0$). All other variables are defined as above. The first stage is identical to equation (1). We slightly adapt our approach for the second stage and employ an IV Tobit model to account for the censored nature of the dependent variable. The main IV Tobit estimation results are presented in Panel B of Table 4. The main Tobit results are shown in Panel A. Full estimation results are reported in Tables A.9 and A.10 in the Appendix.

[INSERT TABLE 4 ABOUT HERE]

The first stage results show that being married to the youngest son has a positive and highly significant effect on intergenerational co-residence. Women who married

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a youngest son are 21 percentage points more likely to co-reside compared with women who married an older son (Table 3 or 4, column (5)). We test for strength of the instrument and report the relevant F-statistics in Tables 3 and 4. The F-statistic is > 40 in all specifications and hence sufficiently large to rule out weak instrument problems (Staiger and Stock, 1997).

Instrumenting co-residence with being married to the youngest son in all specifications yields a negative effect which is larger in magnitude than in the corresponding OLS regression. When we compare the OLS and IV regressions with a Hausman test, we cannot reject the consistency of OLS; both OLS and IV models produce consistent parameter estimates. In column (1) of Table 3, we estimate a significant effect of -20 percentage points on female labour force participation (-17 percentage points in the OLS). Including the control variables in columns (2)-(5) reduces the effect to between -8 to -10 percentage points (-2 to -6 percentage points in the OLS) and makes it insignificant. Even though a null effect cannot be rejected, we can compare our effects to the estimates in the previous literature. Taking the full model (column (5)) as a reference point, we can reject that our OLS estimate is larger or equal to the smallest effect that had previously been estimated (0.07 in Maurer-Fazio *et al.* (2011)). For the IV estimate, which has a much larger variance, we can still reject that it is larger or equal to the second smallest effect (0.19 in Oishi and Oshio (2004)). Our estimates hence appear to be more negative than what most previous findings suggest.

A similar picture emerges when we analyze the effect of co-residence on working hours (Table 4). In column (1), co-residence significantly reduces the number of women's working hours by 20 hours (14 hours in the Tobit) per week. Adding control variables reduces the effect to between -12 and -15 hours (-1 to -4 hours in the Tobit) per week (columns (2)-(5)) and this effect is again insignificant.[16]

We observe that, once we control for the conditioning variables in column (2) in Tables 3 and 4, the estimated effects do not change much with the inclusion of the

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[16]We also ran an IV estimation for the impact of co-residence on the number of working hours of only those women with positive working hours. The results are again negative but statistically insignificant.

additional control variables in columns (3)-(5). The key variable is the age of the husband, which proxies the age of the woman. Younger women are more likely to co-reside (Table A.7), are less likely to participate in the labour force (Tables A.6 and A.8), and work fewer hours (Tables A.9 and A.10). Controlling for the age of the woman, either explicitly in columns (3)-(5) or implicitly in column (2), therefore reduces the stark difference in labour force participation and working hours between co-residing and non-co-residing women.

We tested for heterogeneity in the effect of intergenerational co-residence on female labour supply among different groups but never obtained significant results. Although labour markets differ substantially between urban and rural areas in Kyrgyzstan, co-residence influences female labour supply neither in urban areas nor in rural areas. Furthermore, living with the parent generation has no influence on the labour supply of women with low education, women with medium education and women with high education and also women in the age ranges 20-29, 30-39, and 40-50. Intergenerational co-residence merely seems to not matter for women's labour market decisions.

4.3   Channels

We find that co-residence with parents or in-laws does not significantly affect female labour supply in Kyrgyzstan. This finding supports our argument that the impact of co-residence on the labour supply of women should be different in patrilocal societies than in other societies. To be precise, the impact should be smaller - if positive - or be even negative in patrilocal societies because married women are expected to do housekeeping for their co-residing in-laws. In the following, we shed light on this explanation. We examine not only this channel, but all four channels mentioned in Section 1, through which co-residence may influence the labour market outcomes of women. For two channels, we can conduct a causal analysis; for the other two channels, we can only provide descriptive evidence.[17]

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[17]Descriptive statistics of the channel variables can be found in Table A.11 in the Appendix.

First, we exploit information on the time use of the women in our estimation sample. We run an instrumental variable estimation in which hours spent on elder care, housekeeping, and child care are outcome variables. In line with the previous literature, we expect that co-residence leads to more time spent on elder care and less time spent on child care. Different from the literature, we also expect that co-residence leads to more time spent on housekeeping because of the expectations prevalent in patrilocal settings. Among all women in our sample, 10 percent spend time on elder care (among these, 1.2 hours per day on average), 96 percent spend time on housekeeping (among these, 5.6 hours per day on average), and 64 percent spend time on child care (among these, 2.8 hours per day on average).

[INSERT TABLE 5 ABOUT HERE]

Table 5 reports the results. Co-residence with parents or in-laws leads to one more hour spent per day on elder care, on average (column (1)). In contrast, co-residence does not significantly influence the time spent by women on housekeeping or child care (columns (2) and (3)). This latter finding is surprising as it implies that women who co-reside with the parent generation spend the same amount of time on housekeeping and child care as women who live in nuclear families. Co-residing women do not perform more household tasks than non-co-residing women, as could be expected due to the claim that married women run the household of their co-residing in-laws in patrilocal societies (Grogan, 2013), but they also do not perform less as argued by Kolodinsky and Shirey, Oishi and Oshio (2004), Maurer-Fazio *et al.* (2011), and Shen *et al.* (2016). The fact that women who co-reside spend the same amount of time on child care as women who do not co-reside although they tend to have more small children suggests that someone in the household, possibly the in-laws, supports them in child care. Yet, it would also be possible that co-residing women do not receive support but spend less time per child on child care.

Second, we exploit variation in income provided to the household by the parent generation and in gender attitudes of parents and in-laws. Because we rely on information provided by the parents or in-laws themselves, we here need to restrict

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our sample to those households where women are co-resident. We analyze whether parents' or in-laws' income and gender attitudes are related with female labour force participation and the number of working hours. We control for the same variables as above, except for the conditioning variables.[18] This exercise serves as a plausibility check for two of the channels mentioned in Section 1; the results have no causal interpretation. Estimation results are found in Table 6 (OLS for labour force participation and Tobit for working hours).

[INSERT TABLE 6 ABOUT HERE]

In terms of labour income, we restrict attention to income from dependent employment, because we are interested in the pure income effect and want to rule out effects on female labour supply from family-owned businesses that may provide employment to women. Among all intergenerational households, 86 (17%) benefit from labour income of the parents or in-laws; and 301 (63%) from pension income. In households with labour income, the average earned per month is 7,990 Som (approx. 173 US$). In households with pension income, the average monthly pension is 4,450 Som (approx. 96 US$). As expected, we observe a negative correlation between parents' or in-laws' income and the labour supply of the co-residing women (columns (1) and (3)). However, the estimates are not statistically significant.

We measure the gender attitudes of parents or in-laws in terms of their expressed attitudes towards the role of females in society. LIK respondents reported their level of agreement on a four-point Likert scale ranging from *Strongly disagree* (1) to *Strongly agree* (4) on seven statements. A list of these statements can be found in Table A.12 in the Appendix. We conduct a factor analysis to extract one single latent factor from the seven statements. To facilitate interpretation, we use a standardized index ranging from lower traditional attitudes (lower index values) to stronger traditional attitudes (higher index values). Our estimation results suggest that the gender attitudes of parents or in-laws are unrelated to female labour force

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[18]The conditioning variables are neglected because we restrict the analysis to only co-residing households and do not use information on being married to the youngest son.

participation and working hours (columns (3) and (6)). This is somewhat surprising but may simply reflect the fact that parents pass their gender attitudes on to their sons, who in turn choose spouses with similar values.

5 Conclusion

We investigate the role of family structure, namely co-residence with parents or in-laws, for labour market outcomes of married women in a patrilocal society. Previous studies suggested a positive impact of intergenerational co-residence on female labour force participation (Kolodinsky and Shirey, 2000; Sasaki, 2002; Oishi and Oshio, 2006; Maurer-Fazio *et al.*, 2011; Shen *et al.*, 2016). However, the existing evidence is from contexts where patrilocal residence rules are of relatively little importance, even though a large share of the world population live in patrilocal societies. We argue that the distribution of tasks within the household implied by patrilocality changes the effect of intergenerational co-residence on female labour supply.

Using data from Kyrgyzstan where patrilocality is common, we study the consequences of co-residence with parents or in-laws for female labour force participation and working hours. We account for the potential endogeneity of co-residence decisions by using an instrument based on a Central Asian tradition, according to which the youngest son and his wife are supposed to live in his parents' house. We find that intergenerational co-residence has no significant effect on labour force participation and the number of working hours of females. In fact, point estimates are always negative and we can reject the null hypothesis that the effects are equal or larger than most of the positive estimates of the prior studies.

To understand our finding better, we investigate the channels through which living with the parent generation affects the labour market activity of females. Importantly, women who co-reside spend the same amount of time on housekeeping and child care as women who do not co-reside. This fact appears to make our setting

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different from the prior evidence, as parents and in-laws in China, Japan and the US are supposed to provide assistance with housekeeping and child care. In Kyrgyzstan, we do not find evidence for such parental assistance. At the same time, co-residing women have on average 0.5 more children up to age five and spend more time on elder care. It appears as if intergenerational co-residence in Kyrgyzstan is a living arrangement which does not relieve women from time-consuming tasks within the household and does not facilitate female labor supply.

More generally, our findings illustrate the importance of contextualization in economic studies. Social norms, such as postmarital residence rules, can have important implications for economic outcomes. We make the point that the impact of intergenerational co-residence on female labour supply depends on the extent of patrilocality within a society. Due to the expectations on married women, living with the parent generation is less conducive to female activity on the labor market in patrilocal societies.

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Tables and Figures

Figure 1: Patrilocality and Female Labour Force Participation Across Countries

Source: Data from Global Data Lab (patrilocality index) and World Development Indicators (female labour force participation). The Global Data Lab provides data on 104 countries, out of which 102 have patrilocality measures between 1990 and 2016. For 101 countries, we can match female labour force participation. Our analysis focuses on 68 countries with a population greater than 5 million. Results hold when including smaller countries.
Note: The patrilocality index is the logarithm of the percentage of patrilocal residence divided by the percentage of matrilocal residence. This means that positive values indicate patrilocal societies, while negative values indicate matrilocal societies. A list of countries used for the cross-country analyses can be found in Table A.1.

Table 1: Co-Residence, Female Labour Supply, and Married to Youngest Son

	(1)	(2)	(3)
	All (n=1,048)	Co-residence	
		Yes (n=501)	No (n=547)
Labour force participation (share)	0.48	0.39	0.56
	(0.50)	(0.49)	(0.50)
Working hours (mean)[a]	35.97	35.32	36.38
	(14.30)	(14.42)	(14.24)
Married to youngest son (share)	0.35	0.50	0.21
	(0.48)	(0.50)	(0.41)

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard deviation in parentheses.
[a] Working hours are calculated based on the sample of employed women.

Figure 2: Labour Force Participation in Kyrgyzstan, 1990-2016

Source: World Development Indicators, World Bank

Table 2: Differences in Pre-Marriage Characteristics

	(1) Coefficient/Marginal Effect	(2) S.E.	(3) Z-Stat/T-Stat
A. Wife			
Age at marriage^c	0.47	0.24	1.93
Kyrgyz	-0.01	0.04	-0.14
Uzbek	-0.03	0.03	-1.01
Russian	0.02	0.01	1.36
Other ethnicity	-0.01	0.02	-0.52
Total number of siblings^c	-0.07	0.16	-0.47
Years of education^c	0.24	0.18	1.33
More than 11 years of education	0.05	0.04	1.28
Worked t-1 if t=year of marriage	0.01	0.04	0.34
Worked t-2 if t=year of marriage	0.02	0.03	0.61
Love marriage	0.03	0.04	0.92
Arranged marriage	-0.02	0.03	-0.44
Bride capture	-0.02	0.02	-0.78
B. Husband			
Age at marriage^c	0.52	0.31	1.69
Kyrgyz	-0.01	0.04	-0.32
Uzbek	-0.04	0.03	-1.28
Russian	0.02	0.01	1.31
Other ethnicity	0.002	0.02	0.13
Total number of siblings^c	0.07	0.11	0.60
Years of education^c	-0.03	0.18	-0.18
More than 11 years of education	-0.002	0.04	-0.07
Worked t-1 if t=year of marriage	0.04	0.04	0.93
Worked t-2 if t=year of marriage	0.01	0.04	0.33

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.

Notes: ^{c} denotes continuous variable.

Panel A shows the effect of being married to the youngest son of a family on pre-marriage characteristics of the wife. Panel B shows the effect of being a youngest son of a family on pre-marriage characteristics of the husband. Results are based on Logit estimations for binary outcome variables and ordinary least-squares (OLS) estimations for continuous outcomes. Column (1) reports the Logit marginal effect or OLS coefficient of the variable *youngest son*, while further controlling for number of brothers of the husband, age of the husband and age of the oldest living parent of the husband. Column (2) reports the corresponding standard errors, column (3) the values of z-statistic (for Logit estimations) or t-statistic (for OLS estimations). Critical values of t-distribution: $t_{\infty,0.95} = 1.645$, $t_{\infty,0.975} = 1.96$, $t_{\infty,0.995} = 2.576$.

Table 3: Estimation Results: Labour Force Participation

	(1)	(2)	(3)	(4)	(5)
A. OLS Estimation Results (Co-residence exogenous)					
Co-residence	-.168***	-.057	-.023	-.049	-.050
	(0.03)	(0.036)	(0.037)	(0.037)	(0.037)
B. Two-stage Least-Squares Estimation Results (Co-residence endogenous)					
First Stage					
Youngest son	0.316***	0.204***	0.21***	0.216***	0.214***
	(0.031)	(0.032)	(0.031)	(0.03)	(0.03)
F-statistic	104.104	41.637	46.865	51.254	50.192
Second Stage					
Co-residence	-.196*	-.084	-.106	-.097	-.102
	(0.101)	(0.185)	(0.175)	(0.169)	(0.171)
Observations	1,048	1,048	1,048	1,048	1,048
Conditioning Variables		✓	✓	✓	✓
Wife Characteristics			✓	✓	✓
Residence Characteristics				✓	✓
Husband Characteristics					✓

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Conditioning variables: age of the husband, number of brothers of the husband, age of the oldest living parent of the husband.

Wife characteristics: age, educational attainment, ethnicity.

Residence characteristics: community is located in south Kyrgyzstan, community is urban, availability of kindergarten.

Husband characteristic: educational attainment.

Table 4: Estimation Results: Working Hours

	(1)	(2)	(3)	(4)	(5)
A. Tobit Estimation Results **(Co-residence exogenous)**					
Co-residence	-14.241***	-4.388	-1.264	-2.700	-2.820
	(2.672)	(3.131)	(3.179)	(3.244)	(3.254)
B. IV Tobit Estimation Results **(Co-residence endogenous)**					
First Stage[a]					
Youngest son	0.316***	0.204***	0.21***	0.216***	0.214***
	(0.031)	(0.032)	(0.031)	(0.03)	(0.03)
F-statistic	104.104	41.637	46.865	51.254	50.192
Second Stage					
Co-residence	-19.731**	-12.161	-15.299	-14.115	-14.417
	(8.874)	(16.120)	(15.519)	(15.041)	(15.212)
Observations	1,048	1,048	1,048	1,048	1,048
Conditioning Variables		✓	✓	✓	✓
Wife Characteristics			✓	✓	✓
Residence Characteristics				✓	✓
Husband Characteristics					✓

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Conditioning variables: age of the husband, number of brothers of the husband, age of the oldest living parent of the husband.
Wife characteristics: age, educational attainment, ethnicity.
Residence characteristics: community is located in south Kyrgyzstan, community is urban, availability of kindergarten.
Husband characteristic: educational attainment.
[a] The first stage is identical to the first stage in Table 3.

Table 5: Channel Analysis I: Time Use Woman

	Elder Care (in hours) (1)	Housekeeping (in hours) (2)	Child Care (in hours) (3)
Two-stage Least-Squares Estimation Results (Co-residence endogenous)			
Co-residence	0.959*** (0.339)	-1.449 (1.906)	1.114 (0.681)
Observations	1,048	1,048	1,048
Wife Characteristics	✓	✓	✓
Residence Characteristics	✓	✓	✓
Husband Characteristics	✓	✓	✓

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

(1) Elder Care (in hours per day): Total time of woman spent for elder care.

(2) Housekeeping (in hours per day): Total time of woman spent for housekeeping (e.g. cooking, washing, laundry, cleaning, shopping, repairs, other household tasks).

(3) Child Care (in hours per day): Total time of woman spent for child care.

Table 6: Channel Analysis II: Parents' Financial Contributions and Gender Preferences

	Labour Force Participation		Working Hours	
	(1)	(2)	(3)	(4)
Financial contribution to the Household				
Income parents (in 1000 Som)	-0.005		-0.508	
	(0.004)		(0.536)	
Preferences of Parents				
Gender attitudes (std.)		0.003		1.095
		(0.022)		(2.184)
Observations	501	490	501	490
Wife Characteristics	✓	✓	✓	✓
Residence Characteristics	✓	✓	✓	✓
Husband Characteristics	✓	✓	✓	✓

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
The analysis is restricted to only co-residing women.
(1) Income parents (in 1000 Som): Includes income of all co-residing parents earned as employees and pension contributions.
(2) Gender Attitudes (std.): Average gender attitudes of co-residing parents in the household. We define preferences as the parents' attitude towards the role of females in society. Gender attitudes are measured using seven self-reported items. Item responses are reported on a four-point Likert scale ranging from *Strongly disagree* (1) to *Strongly agree* (4). We identify two liberal and five traditional items. We then use all items to conduct a factor analysis and to extract one single latent factor. To facilitate the interpretation, we use a standardized index ranging from lower traditional attitudes (lower index values) to stronger traditional attitudes (higher values).

A Supplementary Tables and Figures

Table A.1: List of Countries Used for Cross-Country Analyses

(1) ISO Code	(2) Country	(3) Patrilocality Index mean	(4) % Matrilocal Residence mean	(5) % Patrilocal Residence mean
KHM	Cambodia	-1.03	15.05	5.36
CUB	Cuba	-0.49	8.22	5.02
COL	Colombia	-0.38	7.08	4.87
CHL	Chile	-0.37	4.75	3.29
PER	Peru	-0.37	6.89	4.79
HTI	Haiti	-0.32	5.02	3.63
THA	Thailand	-0.29	9.79	7.31
BRA	Brazil	-0.23	4.60	3.65
IDN	Indonesia	-0.22	10.70	8.55
LAO	Lao PDR	-0.21	16.40	13.30
PHL	Philippines	-0.05	7.49	7.08
UKR	Ukraine	-0.04	5.75	5.53
BOL	Bolivia	-0.02	3.73	3.65
SLV	El Salvador	-0.01	6.14	6.09
PRY	Paraguay	0.02	4.55	4.65
MWI	Malawi	0.14	2.44	2.78
ZMB	Zambia	0.17	2.23	2.69
MEX	Mexico	0.22	4.53	5.59
HND	Honduras	0.26	5.17	6.66
GHA	Ghana	0.41	2.10	3.16
RWA	Rwanda	0.51	0.39	0.86
COD	Congo, Dem. Rep.	0.52	3.29	4.84
BDI	Burundi	0.53	0.23	0.89
AGO	Angola	0.53	1.82	3.10
MDG	Madagascar	0.58	2.22	3.92
GTM	Guatemala	0.65	5.62	10.80
SOM	Somalia	0.85	2.42	5.65
ETH	Ethiopia	0.89	2.28	5.61
TCD	Chad	1.02	1.66	4.52
MOZ	Mozambique	1.05	2.11	6.09
SDN	Sudan	1.11	3.27	9.84
UGA	Uganda	1.21	1.09	3.66
TZA	Tanzania	1.26	2.11	6.89
SLE	Sierra Leone	1.29	3.78	13.75
CMR	Cameroon	1.30	1.95	7.14
KAZ	Kazakhstan	1.31	3.36	13.70
TGO	Togo	1.35	1.79	6.87
ZWE	Zimbabwe	1.41	1.92	7.49
BEN	Benin	1.53	1.47	6.85
VNM	Vietnam	1.60	3.83	18.95
CIV	Cote d'Ivoire	1.64	1.76	7.53
TUR	Turkey	1.71	2.48	13.65
KEN	Kenya	1.79	0.68	4.09
NGA	Nigeria	1.89	0.83	5.56
BGD	Bangladesh	1.92	3.97	26.98
MAR	Morocco	1.93	2.58	17.80
TUN	Tunisia	1.93	0.99	6.84
CHN	China	1.98	1.22	17.60
IRN	Iran, Islamic Rep.	2.07	0.82	6.48
YEM	Yemen, Rep.	2.10	2.73	22.20
JOR	Jordan	2.27	0.91	8.77
KGZ	**Kyrgyz Republic**	**2.31**	**2.29**	**21.65**
EGY	Egypt, Arab Rep.	2.35	1.12	12.11
GIN	Guinea	2.36	1.29	13.65
MLI	Mali	2.40	0.41	5.57
AZE	Azerbaijan	2.45	2.17	25.20
SEN	Senegal	2.49	2.54	30.16
IND	India	2.63	2.12	31.45
BFA	Burkina Faso	2.65	0.61	10.36
NPL	Nepal	2.74	1.98	30.73

(1) ISO Code	(2) Country	(3) Patrilocality Index mean	(4) % Matrilocal Residence mean	(5) % Patrilocal Residence mean
NER	Niger	2.85	0.53	10.87
DZA	Algeria	2.98	0.81	16.00
PAK	Pakistan	2.99	1.84	36.60
UZB	Uzbekistan	3.20	1.22	30.00
IRQ	Iraq	3.33	0.88	24.70
TKM	Turkmenistan	3.39	1.03	30.60
AFG	Afghanistan	3.40	1.17	34.70
TJK	Tajikistan	3.81	0.83	37.75

Source: Data from Global Data Lab (https://globaldatalab.org/areadata/patrilocal/).
Notes: This table contains the 68 countries included in Figure 1. They have a population
greater than 5 million and at least one patrilocality measure between 2000 and 2016.
The patrilocality index is the logarithm of the percentage of patrilocal residence (couples living with
husbands' parents) divided by the percentage of matrilocal residence (couples living with husbands' parents).
The table presents the average index value between 2000 and 2016, as well as the average percentage of
matrilocal and patrilocal residence amongst.

Figure A.1: Co-Residence and Female Labour Force Participation Across Countries

Note: The slope of the estimated lines is 1.01 (N=14, p-value=0.036) for non-patrilocal countries and -0.84 (N=54, p-value=0.004) for patrilocal countries.

Table A.2: Summary Statistics of Explanatory Variables

	(1) mean	(2) sd	(3) min	(4) max
Conditioning Variables				
Age (husband)^c	36.46	(8.50)	19.00	61.00
Number of brothers (husband)^c	2.09	(1.40)	0.00	8.00
Age oldest living parent (husband)^c	65.85	(10.28)	42.00	98.00
Wife Characteristics				
Age^c	32.83	(8.49)	20.00	50.00
Low education^b	0.10	(0.30)	0.00	1.00
Medium education^b	0.58	(0.49)	0.00	1.00
High education^b	0.32	(0.47)	0.00	1.00
Kyrgyz	0.70	(0.46)	0.00	1.00
Uzbek	0.16	(0.37)	0.00	1.00
Russian	0.03	(0.18)	0.00	1.00
Other ethnicity	0.11	(0.31)	0.00	1.00
Residence Characteristics				
South Kyrgyzstan^a	0.57	(0.50)	0.00	1.00
Community in urban area	0.27	(0.45)	0.00	1.00
Kindergarten in community	0.61	(0.49)	0.00	1.00
Husband Characteristics				
Low education (husband)^b	0.09	(0.28)	0.00	1.00
Medium education (husband)^b	0.58	(0.49)	0.00	1.00
High education (husband)^b	0.29	(0.45)	0.00	1.00

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.

Notes: ^{c} denotes continuous variable.

^{a} The provinces of Jalal-Abad, Batken and Osh as well as Osh city belong to the south. The provinces of Issyk-Kul, Naryn, Talas and Chui as well as the capital city Bishkek belong to the north.

^{b} Education is defined based on the highest certificate / diploma / degree obtained so far. The categories are: Low education (illiterate, primary, basic), Medium education (secondary general, primary technical), High education (secondary technical, university).

Table A.3: Non-Parametric Differences in Pre-Marriage Characteristics

	(1) Treated	(2) Controls	(3) Difference	(4) S.E.	(5) T-Stat
A. Wife					
Age at marriage^c	21.35	20.84	0.51	0.82	0.62
Kyrgyz	0.64	0.69	-0.05	0.11	-0.45
Uzbek	0.15	0.18	-0.03	0.09	-0.33
Russian	0.05	0.03	0.03	0.04	0.75
Other ethnicity	0.15	0.10	0.05	0.07	0.70
Total number of siblings^c	3.36	3.88	-0.52	0.47	-1.11
Years of education^c	11.00	10.97	0.03	0.49	0.06
More than 11 years of education	0.28	0.36	-0.08	0.11	-0.73
Worked in t-1 if t=year of marriage	0.23	0.26	-0.03	0.11	-0.27
Worked in t-2 if t=year of marriage	0.10	0.23	-0.13	0.10	-1.30
Love marriage	0.74	0.71	0.03	0.11	0.27
Arranged marriage	0.24	0.21	0.03	0.10	0.30
Bride capture	0.03	0.08	-0.05	0.05	-1.00
B. Husband					
Age at marriage^c	25.32	25.49	-0.16	1.10	-0.15
Kyrgyz	0.64	0.69	-0.05	0.11	-0.45
Uzbek	0.15	0.18	-0.03	0.09	-0.33
Russian	0.03	0.03	0.00	0.04	0.00
Other ethnicity	0.18	0.10	0.08	0.08	1.00
Total number of siblings^c	3.64	3.85	-0.21	0.40	-0.52
Years of education^c	10.92	10.78	0.14	0.45	0.31
More than 11 years of education	0.31	0.28	0.03	0.11	0.27
Worked in t-1 if t=year of marriage	0.82	0.82	0.00	0.1	0.00
Worked in t-2 if t=year of marriage	0.86	0.68	0.18	0.11	1.64

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.

Notes: ^{c} denotes continuous variable.

Panel A compares pre-marriage characteristics of women married to youngest sons (treated) and not married to youngest sons (control). Panel B compares pre-marriage characteristics of husbands being youngest sons (treated) and not being youngest sons (control). Comparisons are based on matching results, whereby the variable *youngest son* is used as treatment. The following information are used for balancing: number of brothers of the husband, age of the husband and age of the oldest living parent of the husband. Column (1) (column (2)) provides the average treatment effect of the treated (controls), column (3) their difference. Column (4) provides the standard error and column (5) the t-statistic. Critical values of t-distribution: $t_{\infty,0.95} = 1.645$, $t_{\infty,0.975} = 1.96$, $t_{\infty,0.995} = 2.576$.

Table A.4: Number Of Children Up To Age Five

	(1)
Married to youngest son	0.117**
	(0.059)
Age husband	-.040***
	(0.004)
No. of brothers (husband)	0.039**
	(0.02)
Age oldest living parent (husband)	-.0006
	(0.004)
Const.	2.201***
	(0.154)
Obs.	1,048

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Estimation Results: Number Of Children Up To Age Five

	(1)	(2)	(3)	(4)	(5)
A. OLS Estimation Results					
(Co-residence exogenous)					
Co-residence	0.334***	-.046	-.031	-.024	-.029
	(0.051)	(0.057)	(0.056)	(0.057)	(0.057)
B. Two-stage Least-Squares Estimation Results					
(Co-residence endogenous)					
Second Stage					
Co-residence	0.596***	0.573*	0.579**	0.557**	0.552**
	(0.171)	(0.307)	(0.282)	(0.272)	(0.275)
Observations	1,048	1,048	1,048	1,048	1,048
Conditioning Variables		✓	✓	✓	✓
Wife Characteristics			✓	✓	✓
Residence Characteristics				✓	✓
Husband Characteristics					✓

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Conditioning variables: age of the husband, number of brothers of the husband, age of the oldest living parent of the husband.

Wife characteristics: age, educational attainment, ethnicity.

Residence characteristics: community is located in south Kyrgyzstan, community is urban, availability of kindergarten.

Husband characteristic: educational attainment.

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Table A.6: OLS Estimation Results: Female Labour Force Participation

	(1)	(2)	(3)	(4)	(5)
Co-Residence	-.168***	-.057	-.023	-.049	-.050
	(0.03)	(0.036)	(0.037)	(0.037)	(0.037)
Age Husband		0.012***	-.003	-.004	-.004
		(0.003)	(0.005)	(0.005)	(0.005)
No. of brothers (husband)		0.003	0.005	0.002	0.002
		(0.011)	(0.011)	(0.011)	(0.011)
Age oldest living parent (husband)		-.0002	-.0007	-.00002	0.00007
		(0.002)	(0.002)	(0.002)	(0.002)
Age Women			0.047***	0.045***	0.045***
			(0.016)	(0.016)	(0.016)
Age Women^2			-.0004**	-.0004*	-.0004*
			(0.0002)	(0.0002)	(0.0002)
Medium school education			0.177***	0.164***	0.178***
			(0.054)	(0.054)	(0.056)
Higher school education			0.275***	0.291***	0.301***
			(0.058)	(0.059)	(0.061)
Kyrgyz			0.068	-.002	-.001
			(0.084)	(0.086)	(0.086)
Uzbek			0.106	0.033	0.032
			(0.091)	(0.095)	(0.096)
Other ethnicities			-.059	-.119	-.121
			(0.093)	(0.094)	(0.094)
Oblast in south				0.047	0.045
				(0.034)	(0.034)
Community in urban area				-.143***	-.146***
				(0.039)	(0.039)
Kindergarten in community				0.055	0.055
				(0.034)	(0.034)
Medium school education (husband)					-.042
					(0.049)
Higher school education (husband)					-.029
					(0.055)
Const.	0.558***	0.07	-.643**	-.551**	-.530*
	(0.021)	(0.109)	(0.279)	(0.278)	(0.28)
Obs.	1048	1048	1048	1048	1048

Table A.7: Two-stage Least-Squares Estimation Results: Co-Residence (First Stage)

	(1)	(2)	(3)	(4)	(5)
Youngest son	0.316***	0.204***	0.21***	0.216***	0.214***
	(0.031)	(0.032)	(0.031)	(0.03)	(0.03)
Age (husband)		-.033***	-.014***	-.013***	-.013***
		(0.002)	(0.004)	(0.004)	(0.004)
No. of brothers (husband)		-.006	-.006	-.007	-.009
		(0.011)	(0.01)	(0.01)	(0.01)
Age oldest living parent (husband)		0.004**	0.004**	0.004**	0.005**
		(0.002)	(0.002)	(0.002)	(0.002)
Age women			-.104***	-.102***	-.103***
			(0.013)	(0.013)	(0.013)
Age women^2			0.001***	0.001***	0.001***
			(0.0002)	(0.0002)	(0.0002)
Medium education			0.073	0.055	0.077*
			(0.045)	(0.044)	(0.046)
High education			0.086*	0.098**	0.13***
			(0.048)	(0.048)	(0.05)
Kyrgyz			0.081	-.018	-.025
			(0.07)	(0.071)	(0.071)
Uzbek			0.143*	0.007	-.009
			(0.075)	(0.078)	(0.079)
Other ethnicities			0.134*	0.068	0.055
			(0.078)	(0.077)	(0.077)
South Kyrgyzstan				0.12***	0.117***
				(0.028)	(0.028)
Community in urban area				-.116***	-.112***
				(0.032)	(0.032)
Kindergarten in community				0.047*	0.051*
				(0.028)	(0.028)
Medium education (husband)					-.058
					(0.04)
High education (husband)					-.097**
					(0.045)
Const.	0.368***	1.358***	2.477***	2.465***	2.506***
	(0.018)	(0.082)	(0.219)	(0.216)	(0.217)
Obs.	1,048	1,048	1,048	1,048	1,048

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.8: Two-stage Least-Squares Estimation Results: Labour Force Participation (Second Stage)

	(1)	(2)	(3)	(4)	(5)
Co-Residence	-.196*	-.084	-.106	-.097	-.102
	(0.101)	(0.185)	(0.175)	(0.169)	(0.171)
Age Husband		0.011	-.005	-.005	-.005
		(0.008)	(0.006)	(0.006)	(0.006)
No. of brothers (husband)		0.002	0.002	0.0005	-.0002
		(0.013)	(0.013)	(0.013)	(0.013)
Age oldest living parent (husband)		0.00002	0.0001	0.0005	0.0006
		(0.003)	(0.003)	(0.003)	(0.003)
Age Women			0.039	0.04*	0.039*
			(0.024)	(0.023)	(0.023)
Age Women^2			-.0003	-.0004	-.0004
			(0.0003)	(0.0003)	(0.0003)
Medium school education			0.183***	0.167***	0.183***
			(0.056)	(0.055)	(0.058)
Higher school education			0.283***	0.296***	0.309***
			(0.06)	(0.061)	(0.066)
Kyrgyz			0.071	-.005	-.005
			(0.084)	(0.086)	(0.086)
Uzbek			0.114	0.031	0.029
			(0.092)	(0.095)	(0.095)
Other ethnicities			-.051	-.118	-.120
			(0.094)	(0.093)	(0.093)
Oblast in south				0.052	0.051
				(0.038)	(0.038)
Community in urban area				-.149***	-.152***
				(0.043)	(0.044)
Kindergarten in community				0.057	0.058
				(0.035)	(0.035)
Medium school education (husband)					-.045
					(0.049)
Higher school education (husband)					-.035
					(0.057)
Const.	0.571***	0.106	-.437	-.431	-.398
	(0.051)	(0.267)	(0.508)	(0.493)	(0.504)
Obs.	1048	1048	1048	1048	1048

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.9: Tobit Estimation Results: Working Hours

	(1)	(2)	(3)	(4)	(5)
Co-residence	-14.241***	-4.388	-1.264	-2.700	-2.820
	(2.672)	(3.131)	(3.179)	(3.244)	(3.254)
Age (husband)		1.118***	-.014	-.048	-.040
		(0.258)	(0.467)	(0.468)	(0.469)
No. of brothers (husband)		0.29	0.443	0.355	0.345
		(0.964)	(0.97)	(0.972)	(0.974)
Age oldest living parent (husband)		-.082	-.114	-.083	-.081
		(0.195)	(0.194)	(0.195)	(0.195)
Age women			5.102***	5.021***	5.024***
			(1.439)	(1.442)	(1.445)
Age women^2			-.056***	-.055***	-.055***
			(0.019)	(0.02)	(0.02)
Medium education			14.432***	13.605***	14.974***
			(5.202)	(5.228)	(5.477)
High education			22.755***	23.155***	23.992***
			(5.512)	(5.583)	(5.857)
Kyrgyz			1.859	-1.544	-1.339
			(7.318)	(7.540)	(7.553)
Uzbek			7.431	3.458	3.571
			(7.893)	(8.360)	(8.406)
Other ethnicities			-9.901	-12.711	-12.659
			(8.297)	(8.420)	(8.439)
South Kyrgyzstan				3.119	2.984
				(2.979)	(2.981)
Community in urban area				-6.473*	-6.881**
				(3.448)	(3.486)
Kindergarten in community				4.056	3.977
				(3.013)	(3.018)
Medium education (husband)					-3.956
					(4.362)
High education (husband)					-1.861
					(4.861)
Const.	6.661***	-34.123***	-113.060***	-110.261***	-108.637***
	(1.871)	(9.708)	(25.309)	(25.499)	(25.642)
Obs.	1,048	1,048	1,048	1,048	1,048

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.10: IV Tobit Estimation Results: Working Hours (Second Stage)

	(1)	(2)	(3)	(4)	(5)
Co-residence	-19.731**	-12.161	-15.299	-14.115	-14.417
	(8.874)	(16.120)	(15.519)	(15.041)	(15.212)
Age (husband)		0.816	-.279	-.260	-.251
		(0.666)	(0.552)	(0.545)	(0.543)
No. of brothers (husband)		0.003	-.067	-.077	-.114
		(1.130)	(1.124)	(1.125)	(1.143)
Age oldest living parent (husband)		-.009	0.023	0.031	0.039
		(0.245)	(0.246)	(0.245)	(0.249)
Age women			3.660*	3.867*	3.833*
			(2.127)	(2.071)	(2.103)
Age women^2			-.039	-.042	-.042
			(0.027)	(0.026)	(0.026)
Medium education			15.635***	14.390***	16.047***
			(5.407)	(5.353)	(5.678)
High education			24.170***	24.441***	25.709***
			(5.771)	(5.857)	(6.293)
Kyrgyz			2.332	-2.251	-2.141
			(7.402)	(7.637)	(7.666)
Uzbek			8.744	3.063	2.963
			(8.092)	(8.423)	(8.491)
Other ethnicities			-8.631	-12.422	-12.511
			(8.479)	(8.473)	(8.487)
South Kyrgyzstan				4.392	4.239
				(3.416)	(3.403)
Community in urban area				-7.802**	-8.175**
				(3.870)	(3.881)
Kindergarten in community				4.621	4.597
				(3.117)	(3.140)
Medium education (husband)					-4.694
					(4.490)
High education (husband)					-3.104
					(5.145)
Const.	9.289**	-23.599	-78.264*	-82.056*	-79.463*
	(4.442)	(23.480)	(45.350)	(44.314)	(45.292)
Obs.	1,048	1,048	1,048	1,048	1,048

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.
Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.11: Summary Statistics of Variables used in Channel Analysis

	(1) n	(2) mean	(3) sd	(4) min	(5) max
Woman					
Elder care time (in Hours)	1,048	0.13	(0.47)	0	6.5
Child care time (in Hours)	1,048	1.76	(1.97)	0	12
Housekeeping time (in Hours)	1,048	5.38	(2.69)	0	14
Parents or in-laws					
Income parents (in 1000 Som)	501	4.17	(4.84)	0	60.00
Gender attitudes (std.)	490	-0.05	(0.98)	-2.86	1.52

Source: Life in Kyrgyzstan (LIK) Survey, wave 2011, own calculations.

Notes: Summary statistics of parents or in-laws are restricted to only co-residing women.

Table A.12: Gender Attitude Items

Gender Attitude Items (Scale 1-4)	Liberal/ Traditional
I1: Important decisions should be made by the husband rather than the wife	T
I2: A man's job is to earn money; a woman's job is to look after the home and family	T
I3: A women is really fulfilled only when she becomes a mother	T
I4: A working women can establish just as warm and secure of relationship with her children as a mother who does not work	L
I5: A husband's career should be more important to the wife than her own	T
I6: A university education is more important for a boy than for a girl	T
I7: Both the husband and the wife should contribute to the household income	L

Source: Life in Kyrgyzstan (LiK) Individual Questionnaire 2011.

Notes: Items marked with T/L refer to items which are categorized as traditional (T) or liberal (L), meaning the respondent has a rather traditional/liberal attitude towards the role of females in the society.