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**Conference Paper**

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2017: Alternative Geld- und Finanzarchitekturen - Session: Labor Supply I, No. B04-V1

**Provided in Cooperation with:**

Verein für Socialpolitik / German Economic Association

*Suggested Citation:* Landmann, Andreas; Seitz, Helke; Steiner, Susan (2017) : Intergenerational Coresidence and Female Labour Supply, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2017: Alternative Geld- und Finanzarchitekturen - Session: Labor Supply I, No. B04-V1, ZBW - Deutsche Zentralbibliothek für Wirtschaftswissenschaften, Leibniz-Informationszentrum Wirtschaft, Kiel, Hamburg

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# Intergenerational Co-Residence and Female Labour Supply\*

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February 15, 2017

## Abstract

We examine the role of family structure, specifically of co-residence with parents in-law, for female labour supply. To account for the endogeneity of co-residence, 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 that the effect of co-residence on female labour supply - though insignificant - tends to be negative. This is in contrast to the previous literature, which has found substantial positive effects. We also shed light on the underlying mechanisms. Women who co-reside with in-laws spend about the same amount of time on housekeeping tasks and child care and more time on elderly care compared to women who do not co-reside.

**Keywords:** Marriage, Family Structure, Labor Supply, Co-residence, Kyrgyzstan

**JEL codes:** J12, J21

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\*This study is an output of the project "Gender and Employment in Central Asia - Evidence from Panel Data" funded by the UK Department for International Development (DFID) and the Institute for the Study of Labor (IZA) for the benefit of developing countries. The views expressed are not necessarily those of DFID or IZA. We gratefully acknowledge the financial support received. Andreas Landmann received additional funding from project LA 3936/1-1 of the German Research Foundation (DFG). We thank Charles M. Becker and participants of conferences in Göttingen, Bishkek and Chicago for helpful and valuable comments. Many thanks in particular to Damir Esenaliev and Tilman Brück for their support.

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# 1 Introduction

The family is the most fundamental institution in society. It plays a key role for economic decisions and, hence, for economic outcomes. For example, the family serves as a risk-pool against adverse shocks (Cox and Fafchamps, 2007; Barr *et al.*, 2012), redistributes income - often across generations (Shorrocks, 1979; Cox and Fafchamps, 2007), and influences entrepreneurial activity and productivity (Hadnes *et al.*, 2013; Grimm *et al.*, 2013). In this study, we investigate the role of the family in labour market outcomes. We focus on labour supply of women as it lags behind that of men in most countries around the globe. We analyse how the structure of the family, in particular the co-residence with parents or in-laws, drives female labour force participation and working hours. A clear understanding of this relationship is important for designing appropriate policies: For example, if intergenerational co-residence reduced the labour supply of women, the promotion of institutionalised elderly care may be a way to allow more women to enter the labour market.

While the importance of family structure for the labour supply of women is widely recognized, the emphasis is typically on the presence of children. Having children negatively affects female labour supply, with the effect being stronger for having young children (Angrist *et al.*, 1998; Jacobsen *et al.*, 1999). It is rarely acknowledged that co-residing with parents or in-laws can also influence the labour supply of women. Such an influence can work through at least four channels.

First, co-residing parents or in-laws might still participate in the labour force or receive pensions and thereby contribute to household income (Maurer-Fazio *et al.*, 2011). High non-labour income is likely to make a woman reduce her labour supply. Second, co-residing parents or in-laws might take care of a woman's children or take over housekeeping tasks. Being freed from such tasks, the value of non-market time (the reservation wage) is reduced for the woman, 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). Third, co-residing parents or in-laws might need to be taken care of. Given that the woman is typically the one in the household providing care to the elderly, this increases her reservation wage and thus reduces her labour supply (for a review on elderly care and female labour supply, see Lilly *et al.*, 2007). 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. Depending on the type of preferences, parents or in-laws can either induce an increase or

a reduction in female labour supply.

A priori, the impact of co-residence with parents or in-laws on the labour supply of women is unclear and requires empirical investigation. However, an empirical analysis is not straightforward. Co-residence and labour supply decisions are likely to be made jointly (Sasaki, 2002). For example, young adults with low ambitions on the labour market or with traditional gender attitudes may be inclined to co-reside with their parents or in-laws. Additionally, parents or in-laws 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 on the labour market may be the one who ends up co-residing with parents if elderly (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.

Early attempts to evaluate the relationship between family structure and female labour supply neglect the endogenous nature of the family structure and treat co-residence as exogenous (for example, Kolodinsky and Shirey, 2000 for the US). Later studies recognize that the decision to form an intergenerational household is endogenous and apply instrumental variable approaches. Sasaki (2002) and Oishi and Oshio (2006) find that co-residence with parents or in-laws encourages women to participate in the labour market in Japan. Other studies find positive effects also for the case of China (Maurer-Fazio *et al.*, 2011; Shen *et al.*, 2016).<sup>1</sup> According to the authors, this finding indicates that women share the burden of housekeeping tasks with their co-residing parents or in-laws. Only Shen *et al.* (2016) explicitly test and confirm this interpretation: they show that co-residence increases the likelihood to receive parental assistance in housekeeping and reduces women's weekly hours of housework.

In the present study, we illustrate that the positive effects found for Japan and China are not generalizable. We focus on Kyrgyzstan, a post-Soviet country with a population of 5.9 million located in Central Asia. Using an instrumental variable estimation, we find

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<sup>1</sup>Compton (2015) provides a related, but slightly different analysis. She 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.

that co-residence does not significantly affect the labour market outcomes of females. If anything, the effect appears to be negative in this country. In order to explain our deviating finding, we shed light on the channels through which co-residence affects female labour supply. It turns out that women who co-reside with parents or in-laws spend about the same amount of time on housekeeping tasks and child care and more time on elderly care compared to women who do not co-reside. In addition, women whose co-residing parents or in-laws contribute substantially to household income appear to refrain from working themselves. Taken together, these points reasonably explain the non-positive effect.

We use an instrument that is highly relevant and plausibly exogenous. Kyrgyzstan, like Tajikistan (Grogan, 2007), is patrilocal. Women tend to move in with their husband's family when getting married. In our data, 98 percent of those couples who co-reside with the older generation live with the husband's parents and only 2 percent with the wife's parents. Hence, what we analyze in this study is, in fact, the impact of living with in-laws. Couples are free to move out of the parents' house and form an own household and typically do so when the husband's younger brothers get married. It is a tradition among Central Asians that the youngest son (and his wife and children) co-resides with his parents and never moves out (Bauer *et al.*, 1997; Thieme, 2014; Rubinov, 2014). This tradition is of crucial importance for our analysis. We use being married to the youngest son as an instrument for a woman's co-residence with in-laws. We show that the wife of a youngest son is significantly and substantially more likely to co-reside with in-laws than the wife of an older son, everything else equal. We also show that being married to the youngest son is unrelated to pre-marriage characteristics, which could influence later labour supply, of the females and their husbands.

Kyrgyzstan is a relevant case to analyze. Despite the political objective of the Soviet government to achieve gender equality, women remained the main providers of care for the household (Akiner, 1997; Paci *et al.*, 2002). The provision of institutionalised child care, for example, covered only 31 percent of children aged 3-6 years in 1990, one year before the dissolution of the Soviet Union (Giddings *et al.*, 2007). The labour force participation rate of females (aged 15-64 years) always remained lower than that of males. It amounted to 65 percent in 1990, compared with 78 percent for males (International Labour Office (ILO), 2016). Since then, the distance between females and males has increased: while 53 percent of females participated in the labour force in 2015; 80 percent of males did

so. The provision of institutionalised care for children and the elderly remains low, which potentially keeps women from participating in the labour market. The Ministry of Labour and Social Development reports a total of six care homes for elderly people, with 750 residents and an additional 10,000 people receiving care from these homes in their own houses.<sup>2</sup> Compared with around 500,000 pensioners in the country, these numbers are very low. The enrolment rate in formal child care for children aged 3-6 years was as low as 9 percent in 1998 (Giddings *et al.*, 2007) and increased to 22 percent in 2013/14 (UNICEF Transmonee Database). The care for children and, more importantly, the elderly is thus mostly organised within families.

The remainder of this paper is structured as follows. The data is described in Section 2, in particular the outcome variables, the co-residence indicator, and our instrumental variable. Section 3 presents the empirical analysis. We comprehensively discuss the identifying assumptions for our instrumental variable approach and then report the estimation results. We also examine effect channels from co-residence to female labour supply. Finally, Section 4 concludes.

## 2 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 (for detailed information, see Brück *et al.*, 2014). 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 adult individuals living in 3,000 households.

The LiK provides a wide range of individual and household level information on socio-demographic characteristics, employment, and many other topics. In our empirical analysis, we use data from the 2011 wave of the LiK and complement it with information from a supplementary data collection in 2014. This data collection aimed at obtaining information on the birth order of the LiK respondents and their siblings as well as on whether the parents of the respondents had been alive in 2011. This information was not included in the LiK but was crucial for our analysis (see below).

We restrict our estimation sample to married women in the age range 20-50 who have

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<sup>2</sup><http://www.mlsp.gov.kg/?q=ru/sotsuchrejdeniya>

at least one living parent-in-law. The latter restriction of the sample is important because women without any living parent-in-law do not have the opportunity to co-reside. As already indicated, co-residence with the women’s parents is rare. In the 2011 LiK, we identified 2,043 women who were married and aged 20-50. Out of these, 1,582 women (and their husbands) were successfully re-interviewed in 2014. Our final estimation 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 in the variables used in the later empirical analysis (55 observations).

## 2.1 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 household 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.<sup>3</sup> Women are identified as unemployed if they do not fall under any of these four categories but report to look for work. For all working women, we observe the number of working hours. We use the total number of working hours in our analysis, which may be spent in up to two occupations.<sup>4</sup> 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.

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<sup>3</sup>Employment possibilities (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.

<sup>4</sup>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.

[INSERT TABLE 1 ABOUT HERE]

## 2.2 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 (see 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. These numbers illustrate the patrilocality of the Kyrgyzstani society, namely that married couples tend to co-reside with the husband's rather than the wife's family. For simplicity, we therefore refer to co-residence with parents-in-law in the remainder of this paper, even if a woman co-resides with an own parent. Table 1 shows that women who co-reside tend to supply less labour to the market. 39 percent of co-residing women participate in the labour force, but 56 percent of non-co-residing women. Among those women who are employed, co-residing women work 35 hours per week and non-co-residing women 36 hours.

As explained above, co-residence with parents-in-law is likely endogenous. We therefore use information about the birth order of a woman's husband and create an indicator variable for whether her husband is the youngest son in his family. This is our instrument. 35 percent of the women in our sample are married to a youngest son. 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). These numbers point to the explanatory potential of being married to the youngest son for the co-residence with in-laws.

## 3 Empirical Strategy and Results

### 3.1 Identifying Assumptions

Earlier studies on the effect of intergenerational co-residence on female labour market outcomes use a variety of instrumental variables to take the endogeneity of co-residence into account. 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 Maurer-Fazio *et al.* (2011)’s study are the percentage of households in the prefecture that have co-resident parents, husband’s age, wife’s age and provincial dummies. Similar to our strategy, 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.

All of these instruments 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 reflect 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.

There are additional challenges to instrumenting co-residence, which were not addressed by the mentioned studies. Spouses may select each other according to factors that influence the likelihood of co-residence. Any good instrument, by definition, should increase the likelihood of co-residence but it should not represent such a selection factor. If it does, it threatens the IV approach. Furthermore, if there were differential divorce rates among co-residing and non-co-residing couples, those women with the higher divorce rate may be more inclined to participate in the labour market in anticipation of a divorce.

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-residing with parents-in-law.

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. Thus, 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, which is conceptually very different. We illustrate further below that this approach is appropriate in our context.

Several threats to the crucial exclusion restriction remain, though. 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. Here, 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-residing with in-laws. Second and related to the previous point, we need to rule out that youngest sons have a preference for partners with lower career ambitions. For example, 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 the 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 the divorce.

With regard to 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 being youngest sons and men being older sons. Panel A of Table 2 reports the results for the 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 potential 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), other socio-demographics (current age, age at marriage, number of siblings), ethnicity, and type of marriage (love, arranged or captured marriage).

[INSERT TABLE 2 ABOUT HERE]

We estimate a logit model in case 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, again, we find no differences in these characteristics. Hence, we conclude that couples involving a youngest son do not seem to self-select in terms of labor market characteristics at the time of marriage.<sup>5</sup>

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. This assumption cannot be tested with our estimation sample, as the women in this sample are all married. An alternative would be to exploit the fact that we have a list of all female siblings of every wife and husband in our estimation sample.<sup>6</sup> However, while we do know the marital status of all female siblings, we lack information on whether these women are or were married to youngest sons. Hence, we instead use information on all male siblings (i.e. all brothers of the husband, including information of the husband himself, and all brothers of the women in our estimation sample): we know their marital status and their birth order. We compare the likelihood of being divorced between male siblings being youngest sons and those not being youngest sons. We estimate a logit model and regress being divorced on being the youngest son of a family 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.<sup>7</sup>

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<sup>5</sup>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.4 in the Appendix A).

<sup>6</sup>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.

<sup>7</sup>As before, we additionally use a non-parametric matching method to test for differences in marriage

### 3.2 Estimation Results

We estimate the effect of co-residence with parents-in-law on labour market outcomes of women using a two-stage least squares estimation. For the effect on labour force participation, the estimation equations of the two stages are as follows:

$$Co-residence_i = \alpha_1 + \alpha_2 Youngest Son_i + \alpha_3 X_i + \epsilon_i \quad (1)$$

$$LFP_i = \beta_1 + \beta_2 \hat{Co-residence}_i + \beta_3 X_i + v_i \quad (2)$$

where  $i$  indexes individual women.  $Co-residence_i$  is a dummy variable that captures whether a woman lives with at least one 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 level, ethnicity), the residence (community is located in the south of the country, community is urban or rural, availability of kindergarten) and the husband (educational level). As explained above, 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. Descriptive statistics for the control variables are reported in Table A.1 in the Appendix.

Note that - different to the 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 the decision to have children is potentially determined by being married to the youngest son. To test for this possibility, 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 thus 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 (see Table A.2 in the Appendix). We consequently estimate the effect of co-residing with in-laws on the number of children, instrumenting co-residence with being married to the youngest son. We find that, *ceteris paribus*, co-residing couples have 0.5 more children in the household (Table A.3 in the Appendix). Given that the number of children is a consequence of being married to the youngest son, it would be a bad control in our main estimations which aim at establishing causality between co-residence and female labour stability between youngest and non-youngest sons. In accordance with our parametric result, we do not find a significant difference.

supply.

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 by the predicted values of the first stage ( $Co-residence_i$ ).  $\beta_2$  then has the interpretation of the 'true' (i.e. unbiased) effect of co-residence on female labour force participation. Estimation results can be found in Panel B of Table 3; for the ease of comparison, OLS results are included in Panel A.

[INSERT TABLE 3 ABOUT HERE]

For estimating the effect of co-residence on working hours, the estimation equations are as follows:

$$Co-residence_i = \alpha_1 + \alpha_2 Youngest\ Son_i + \alpha_3 X_i + \epsilon_i \quad (3)$$

$$WH^*_i = \gamma_1 + \gamma_2 Co-residence_i + \gamma_3 X_i + \mu_i \quad (4)$$

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 IV Tobit estimation results are presented in Panel B of Table 4. Again, Tobit results are shown in Panel A.

[INSERT TABLE 4 ABOUT HERE]

With regard to the relevance of our instrument, the first stage results show that being married to the youngest son has a positive and highly significant effect on co-residence with parents-in-law. Women who married a youngest son are 21 percentage points more likely to live with in-laws 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. As can be seen, 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 regres-

sion. 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). Once including the control variables in columns (2)-(5), this reduces to between -8 to -10 percentage points (-2 to -6 percentage points in the OLS) and becomes insignificant. A similar picture emerges when analysing 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 OLS) per week. Adding control variables reduces the effect to between -12 and -15 hours (-1 to -4 hours in the OLS) per week (columns (2)-(5)). However, this effect is again insignificant. When comparing the OLS and IV regressions using a Hausman test, we cannot reject consistency of OLS (i.e. both models might estimate the same parameters consistently). Regardless of this, we observe that results change once we control for the number of brothers of the husband (as part of our conditioning variables) in both the OLS as well as the IV regressions. This indicates that this variable, together with the other two conditioning variables, is important to control for and that it would not be suitable as a separate instrument in our context.

### 3.3 Channels

We find that co-residing with parents-in-law does not significantly affect female labour supply in Kyrgyzstan. If anything, the effect appears to be negative. On the one hand, this finding is surprising because it contradicts the evidence established for China and Japan. On the other hand, it is not implausible given that co-residence may affect female labour supply through different channels, some of which predict a negative impact. To the extent possible, we here shed light on the four channels mentioned in Section 1: financial contribution of parents-in-law to the household (channel 1); in-kind services such as housekeeping and child care provided by parents-in-law (channel 2); care needs of parents-in-law (channel 3) and preferences of parents-in-law (channel 4).<sup>8</sup>

As a first step, we focus on channels 2 and 3, for which we can conduct a causal analysis. The idea of channel 2 is that co-residing parents-in-law facilitate the engagement of women on the labour market through providing in-kind services such that women need to spend less time on housekeeping and child care. Channel 3 suggests that if co-residing parents-in-law need to be taken care of, the labour supply of women is likely to be reduced as it is

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<sup>8</sup>Descriptive statistics of the channel variables can be found in Table A.10 in the Appendix.

typically the women who spend time on elderly care. We exploit information on the time use of the women in our estimation sample. We run an IV estimation (in line with equations (1) and (2)) in which we use the amount of time spent for housekeeping, child care and elderly care as outcome variables. We investigate whether co-residing with parents-in-law leads to less time spent on housekeeping and child care and more time spent on elderly care as would be predicted by channels 2 and 3. Time use for the different activities is measured in hours per day. Among all women in our estimation sample, 96 percent report to spend time on housekeeping (among these, 5.6 hours per day), 64 percent spend time on child care (among these, 2.8 hours per day), and 10 percent spend time on elderly care (among these, 1.2 hours per day).

[INSERT TABLE 5 ABOUT HERE]

Table 5 reports the results. Co-residence does not bring about a significant reduction of time spent by women on housekeeping and child care (columns (1) and (2)). Note that this does not necessarily imply that co-residing in-laws do not take over such tasks at all. We explained above that women who co-reside with in-laws have significantly more small children to take care of. Hence, the housekeeping and child care burden should be larger in these households. In contrast, co-residing with parents-in-law leads to one more hour spent per day on elderly care, on average (column (3)). Taken together, women who co-reside with in-laws spend a similar amount of time on housekeeping and child care but more time on elderly care compared to women who do not co-reside. It seems reasonable that co-residing women consequently do not supply more labour to the market.

As a second step, we provide additional, though only descriptive, evidence for channels 1 and 4. According to channel 1, parents-in-law contribute to household income through income earned or pensions and thereby influence female labour market outcomes. Channel 4 indicates that co-residing parents-in-law impose their preferences with regard to female labour market behaviour on the women in their household. We exploit variation in income provided to the household by in-laws and in gender attitudes of in-laws. Because we rely on information provided by the parents-in-law themselves, we restrict our sample to those households where women do actually co-reside. We analyze whether 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.<sup>9</sup> Note that this exercise merely serves as a plausibility check for channels 1 and 4; the results have no causal interpretation. Estimation results can be 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 in-laws' 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-in-law; and 301 (63%) from pension income. In households with labour income, the average earned per month is 7,990 Som. In households with pension income, the average monthly pension is 4,450 Som. As expected, we observe a negative correlation between parent-in-law's labour income and the labour supply of the co-residing women (columns (1) and (4)). However, the estimate is only statistically significant for labour force participation, not for working hours. Women whose in-laws have zero labour income are 7.2 percentage points more likely to participate in the labour force than women whose in-laws earn the average of 7,990 Som per month. In contrast, pension income is not significantly associated with female labour supply (columns (2) and (5)), possibly because pensions are much lower than labour income. They may be too low to make a difference.

We measure the gender attitudes of 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.11 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 in-laws' gender attitudes are unrelated to female labour force 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.

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<sup>9</sup>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.



## 4 Conclusion

We investigate the role of family structure for labour market outcomes of married females in Kyrgyzstan. The effects of intergenerational co-residence on both labour force participation and working hours are estimated to be non-negligible. Co-residence reduces labour force participation of females by between 5 and 10 percentage points and working hours by between 3 and 14 hours per week. However, these estimates lack precision, possibly due to the small estimation sample, which prohibits drawing strong conclusions. Importantly, though, our results are not in line with the positive effects found in the previous literature.

Our study also differs from this prior literature in other dimensions. First, our analysis exclusively focuses on co-residence with parents-in-law, while the previous literature also or only examines co-residence with own parents. While there may be differences between living with own parents and living with parents-in-law (as shown by Oishi and Oshio, 2006), we do not expect them to be so large that positive effects turn into negative effects. Second, we use a different identification strategy. Our instrument, being married to a youngest son, is simple but relevant and plausibly valid. We take great care to ensure the exclusion restriction is fulfilled. We do so by controlling for variables that are correlated with our instrument and may also be related with female labour supply, by *not* controlling for the number of children because this appears to be a consequence of the instrument, and by showing that there are no differences in pre-marriage characteristics and marital stability between couples that include a youngest son and couples that do not include a youngest son. Third, Kyrgyzstan is a culturally different and much poorer country than China and Japan. Our analysis of effect channels suggests that Kyrgyzstani parents-in-law do not significantly reduce the women's burden of housework and child care as they seem to do in the other countries. Higher fertility in Kyrgyzstan in general and among youngest sons in particular may be the decisive explanation. Our findings emphasize that there is no universal relationship between co-residence and female labour market outcomes; consideration of the underlying channels is crucially important.

Our findings have implications for policy-making in Kyrgyzstan. In the light of decreasing female labour force participation, it is important to understand what keeps women from entering or staying in the labour force. We provide suggestive evidence that intergenerational living arrangements matter. All Kyrgyzstani women shoulder a substantial amount of housework coupled with child care and elderly care. Compared to women who do not

co-reside with in-laws, those who co-reside spend more time on elderly care and therefore seem to provide less time to the labour market. It may thus be desirable to expand the opportunities for institutionalised elderly care or to develop a market for professional carers who work inside the elderly's households. This is not to say that elderly care in general should be organised outside families, it merely implies that a larger choice set for how women spend their time would be preferable. Women who wish to supply labour to the market should have the opportunity to do so.

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## Tables and Figures

Table 1: Descriptives: 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) <sup>a</sup>	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.

<sup>a</sup> The mean working hours are calculated based on the sample of employed women.

Table 2: Difference of Pre-Marriage Characteristics for Youngest Sons

	(1) Coefficient/Marginal Effect	(2) S.E.	(3) Z-Stat/T-Stat
<b>A. Wife</b>			
Years of education <sup>c</sup>	0.24	0.18	1.33
More than 11 years of education	0.05	0.04	1.28
Age Women <sup>c</sup>	-0.04	0.24	-0.16
Age at Marriage <sup>c</sup>	0.47	0.24	1.93
Total number of siblings <sup>c</sup>	-0.07	0.16	-0.47
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
Love Marriage	0.03	0.04	0.92
Arranged Marriage	-0.02	0.03	-0.44
Captured Marriage	-0.02	0.02	-0.78
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
<b>B. Husband</b>			
Years of education <sup>c</sup>	-0.03	0.18	-0.18
More than 11 years of education	-0.002	0.04	-0.07
Age at marriage <sup>c</sup>	0.52	0.31	1.69
Total number of siblings <sup>c</sup>	0.07	0.11	0.60
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

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

*Notes:* <sup>c</sup> 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 estimation results) or t-statistic (for OLS estimations). Critical values of t-distribution:  $t_{\infty,0.95} = 1.645$ ,  $t_{\infty,0.975} = 1.96$ ,  $t_{\infty,0.995} = 2.576$ . Non-parametric results can be found in Table A.4 in the Appendix.

Table 3: Estimation Results: Labour Force Participation

	(1)	(2)	(3)	(4)	(5)
	b/se	b/se	b/se	b/se	b/se
<b>A. OLS Estimation Results</b>					
<b>(Co-Residence exogenous)</b>					
Co-Residence	-.168*** (0.03)	-.057 (0.036)	-.023 (0.037)	-.049 (0.037)	-.050 (0.037)
<b>B. Two-stage Least-Squares Estimation Results</b>					
<b>(Co-Residence endogenous)</b>					
<b>First Stage</b>					
Youngest Son	0.316*** (0.031)	0.204*** (0.032)	0.21*** (0.031)	0.216*** (0.03)	0.214*** (0.03)
<b>Second Stage</b>					
Co-Residence	-.196* (0.101)	-.084 (0.185)	-.106 (0.175)	-.097 (0.169)	-.102 (0.171)
Observations	1,048	1,048	1,048	1,048	1,048
F-statistic	104.104	41.637	46.865	51.254	50.192
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. Their inclusion makes sure that the exclusion restriction of the instrument holds (see discussion in Section 3.1).

Wife characteristics: age, educational level, ethnicity.

Residence characteristics: community is located in the south of the country, community is urban or rural, availability of kindergarten.

Husband characteristic: educational level.

The full estimation results can be found in Table A.5 in the Appendix for the OLS estimation and in Table A.6 and Table A.7 in the Appendix for the two-stage least-squares estimation.

Table 4: Estimation Results: Working Hours

	(1)	(2)	(3)	(4)	(5)
	b/se	b/se	b/se	b/se	b/se
<b>A. Tobit Estimation Results</b>					
<b>(Co-Residence exogenous)</b>					
Co-Residence	-14.241*** (2.672)	-4.388 (3.131)	-1.264 (3.179)	-2.700 (3.244)	-2.820 (3.254)
<b>B. IV Tobit Estimation Results</b>					
<b>(Co-Residence endogenous)</b>					
<b>First Stage<sup>a</sup></b>					
Youngest Son	0.316*** (0.031)	0.204*** (0.032)	0.21*** (0.031)	0.216*** (0.03)	0.214*** (0.03)
<b>Second Stage</b>					
Co-Residence	-19.731** (8.874)	-12.161 (16.120)	-15.299 (15.519)	-14.115 (15.041)	-14.417 (15.212)
Observations	1,048	1,048	1,048	1,048	1,048
F-statistic	104.104	41.637	46.865	51.254	50.192
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. Their inclusion makes sure that the exclusion restriction of the instrument holds (see discussion in Section 3.1).

Wife characteristics: age, educational level, ethnicity.

Residence characteristics: community is located in the south of the country, community is urban or rural, availability of kindergarten.

Husband characteristic: educational level.

The full estimation results can be found in Table A.8 in the Appendix for the Tobit estimation and in Table A.9 in the Appendix for the IV Tobit estimation.

<sup>a</sup> The first stage is identical to the first stage in Table 3.



Table 5: Channel Analysis I: Time Use Woman

	<b>Channel 2:</b>	<b>Channel 3:</b>	
	<b>Housekeeping</b>	<b>Child Care</b>	<b>Elderly Care</b>
	<b>(in hours)</b>	<b>(in hours)</b>	<b>(in hours)</b>
	(1)	(2)	(3)
	b/se	b/se	b/se
<b>Two-stage Least-Squares Estimation Results</b>			
<b>(Co-Residence endogenous)</b>			
Co-Residence	-1.449 (1.906)	-0.046 (0.167)	0.959*** (0.339)
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) Housekeeping (in hours per day): Total time of woman spent for housekeeping (e.g. cooking, washing, laundry, cleaning, shopping, repairs, other household tasks).

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

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

Table 6: Channel Analysis II: Labour Force Participation and Working Hours

	Labour Force Participation			Working Hours		
	(1)	(2)	(3)	(4)	(5)	(6)
	b/se	b/se	b/se	b/se	b/se	b/se
<b>Channel 1: Financial contribution to the Household</b>						
Income Parents (in 1000 Som)	-0.009*			-.990		
	(0.005)			(0.719)		
Pension Income (in 1000 Som)		0.006			0.307	
		(0.007)			(0.771)	
<b>Channel 4: Preferences of Parents</b>						
Gender Attitudes (std.)			0.003			1.095
			(0.022)			(2.184)
Observations	501	501	490	501	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 couples.

(1) Income parents (in 1000 Som): Total income of all co-residing parents earned as employees.

(2) Pension Income (in 1000 Som): Pension Income (for elderly) of the household.

(3) 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: Summary Statistics of Explanatory Variables

	(1)	(2)	(3)	(4)
	mean	sd	min	max
<b>Conditioning Variables</b>				
Age (husband) <sup>c</sup>	36.46	(8.50)	19.00	61.00
Number of brothers (husband) <sup>c</sup>	2.09	(1.40)	0.00	8.00
Age oldest living parent (husband) <sup>c</sup>	65.85	(10.28)	42.00	98.00
<b>Wife Characteristics</b>				
Age <sup>c</sup>	32.83	(8.49)	20.00	50.00
Low school education (ref.)	0.10	(0.30)	0.00	1.00
Medium school education	0.58	(0.49)	0.00	1.00
High school education	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
<b>Residence Characteristics</b>				
Oblast in south	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
<b>Husband Characteristics</b>				
Low school education (husband, ref.)	0.09	(0.28)	0.00	1.00
Medium school education (husband)	0.58	(0.49)	0.00	1.00
High school education (husband)	0.29	(0.45)	0.00	1.00

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

*Notes:* <sup>c</sup> denotes continuous variable.

Table A.2: OLS: Married to Youngest Son

	(1)
Number of children up to age 5	0.032** (0.016)
Age Husband	-.027*** (0.002)
No. of brothers (husband)	-.154*** (0.009)
Age oldest living parent (husband)	0.026*** (0.002)
Const.	-.124 (0.088)
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.3: Estimation Results: Number Of Children Up To Age Five

	(1)	(2)	(3)	(4)	(5)
	b/se	b/se	b/se	b/se	b/se
<b>A. OLS Estimation Results</b>					
<b>(Co-Residence exogenous)</b>					
Co-Residence	0.334*** (0.051)	-0.046 (0.057)	-0.031 (0.056)	-0.024 (0.057)	-0.029 (0.057)
<b>B. Two-stage Least-Squares Estimation Results</b>					
<b>(Co-Residence endogenous)</b>					
<b>Second Stage</b>					
Co-Residence	0.596*** (0.171)	0.573* (0.307)	0.579** (0.282)	0.557** (0.272)	0.552** (0.275)
Observations	1,048	1,048	1,048	1,048	1,048
F-statistic	104.104	41.637	46.865	51.254	50.192
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. Their inclusion makes sure that the exclusion restriction of the instrument holds (see discussion in Section 3.1).

Wife characteristics: age, educational level, ethnicity.

Residence characteristics: community is located in the south of the country, community is urban or rural, availability of kindergarten.

Husband characteristic: educational level.

Table A.4: Non-Parametric Difference of Pre-Marriage Characteristics

	(1)	(2)	(3)	(4)	(5)
	Treated	Controls	Difference	S.E.	T-Stat
<b>A. Wife</b>					
Years of education <sup>c</sup>	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
Age Women <sup>c</sup>	30.28	29.90	0.38	1.42	0.27
Age at Marriage <sup>c</sup>	21.35	20.84	0.51	0.82	0.62
Total number of siblings <sup>c</sup>	3.36	3.88	-0.52	0.47	-1.11
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
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
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
<b>B. Husband</b>					
Years of education <sup>c</sup>	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
Age at marriage <sup>c</sup>	25.32	25.49	-0.16	1.10	-0.15
Total number of siblings <sup>c</sup>	3.64	3.85	-0.21	0.40	-0.52
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

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

*Notes:* <sup>c</sup> 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) to non-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.5: OLS Estimation Results: Female Labour Force Participation

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

	(1)	(2)	(3)	(4)	(5)
Youngest Son	0.316*** (0.031)	0.204*** (0.032)	0.21*** (0.031)	0.216*** (0.03)	0.214*** (0.03)
Age Husband		-.033*** (0.002)	-.014*** (0.004)	-.013*** (0.004)	-.013*** (0.004)
No. of brothers (husband)		-.006 (0.011)	-.006 (0.01)	-.007 (0.01)	-.009 (0.01)
Age oldest living parent (husband)		0.004** (0.002)	0.004** (0.002)	0.004** (0.002)	0.005** (0.002)
Age Women			-.104*** (0.013)	-.102*** (0.013)	-.103*** (0.013)
Age Women <sup>2</sup>			0.001*** (0.0002)	0.001*** (0.0002)	0.001*** (0.0002)
Medium school education			0.073 (0.045)	0.055 (0.044)	0.077* (0.046)
Higher school education			0.086* (0.048)	0.098** (0.048)	0.13*** (0.05)
Kyrgyz			0.081 (0.07)	-.018 (0.071)	-.025 (0.071)
Uzbek			0.143* (0.075)	0.007 (0.078)	-.009 (0.079)
Other ethnicities			0.134* (0.078)	0.068 (0.077)	0.055 (0.077)
Oblast in south				0.12*** (0.028)	0.117*** (0.028)
Community in urban area				-.116*** (0.032)	-.112*** (0.032)
Kindergarten in community				0.047* (0.028)	0.051* (0.028)
Medium school education (husband)					-.058 (0.04)
Higher school education (husband)					-.097** (0.045)
Const.	0.368*** (0.018)	1.358*** (0.082)	2.477*** (0.219)	2.465*** (0.216)	2.506*** (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.7: Two-stage Least-Squares Estimation Results: Labour Force Participation (Second Stage)

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

	(1)	(2)	(3)	(4)	(5)
Co-Residence	-14.241*** (2.672)	-4.388 (3.131)	-1.264 (3.179)	-2.700 (3.244)	-2.820 (3.254)
Age Husband		1.118*** (0.258)	-.014 (0.467)	-.048 (0.468)	-.040 (0.469)
No. of brothers (husband)		0.29 (0.964)	0.443 (0.97)	0.355 (0.972)	0.345 (0.974)
Age oldest living parent (husband)		-.082 (0.195)	-.114 (0.194)	-.083 (0.195)	-.081 (0.195)
Age Women			5.102*** (1.439)	5.021*** (1.442)	5.024*** (1.445)
Age Women <sup>2</sup>			-.056*** (0.019)	-.055*** (0.02)	-.055*** (0.02)
Medium school education			14.432*** (5.202)	13.605*** (5.228)	14.974*** (5.477)
Higher school education			22.755*** (5.512)	23.155*** (5.583)	23.992*** (5.857)
Kyrgyz			1.859 (7.318)	-1.544 (7.540)	-1.339 (7.553)
Uzbek			7.431 (7.893)	3.458 (8.360)	3.571 (8.406)
Other ethnicities			-9.901 (8.297)	-12.711 (8.420)	-12.659 (8.439)
Oblast in south				3.119 (2.979)	2.984 (2.981)
Community in urban area				-6.473* (3.448)	-6.881** (3.486)
Kindergarten in community				4.056 (3.013)	3.977 (3.018)
Medium school education (husband)					-3.956 (4.362)
Higher school education (husband)					-1.861 (4.861)
Const.	6.661*** (1.871)	-34.123*** (9.708)	-113.060*** (25.309)	-110.261*** (25.499)	-108.637*** (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.9: IV Tobit Estimation Results: Working Hours (Second Stage)

	(1)	(2)	(3)	(4)	(5)
Co-Residence	-19.731** (8.874)	-12.161 (16.120)	-15.299 (15.519)	-14.115 (15.041)	-14.417 (15.212)
Age Husband		0.816 (0.666)	-.279 (0.552)	-.260 (0.545)	-.251 (0.543)
No. of brothers (husband)		0.003 (1.130)	-.067 (1.124)	-.077 (1.125)	-.114 (1.143)
Age oldest living parent (husband)		-.009 (0.245)	0.023 (0.246)	0.031 (0.245)	0.039 (0.249)
Age Women			3.660* (2.127)	3.867* (2.071)	3.833* (2.103)
Age Women <sup>2</sup>			-.039 (0.027)	-.042 (0.026)	-.042 (0.026)
Medium school education			15.635*** (5.407)	14.390*** (5.353)	16.047*** (5.678)
Higher school education			24.170*** (5.771)	24.441*** (5.857)	25.709*** (6.293)
Kyrgyz			2.332 (7.402)	-2.251 (7.637)	-2.141 (7.666)
Uzbek			8.744 (8.092)	3.063 (8.423)	2.963 (8.491)
Other ethnicities			-8.631 (8.479)	-12.422 (8.473)	-12.511 (8.487)
Oblast in south				4.392 (3.416)	4.239 (3.403)
Community in urban area				-7.802** (3.870)	-8.175** (3.881)
Kindergarten in community				4.621 (3.117)	4.597 (3.140)
Medium school education (husband)					-4.694 (4.490)
Higher school education (husband)					-3.104 (5.145)
Const.	9.289** (4.442)	-23.599 (23.480)	-78.264* (45.350)	-82.056* (44.314)	-79.463* (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.10: Summary Statistics of Variables used in Channel Analysis

	(1)	(2)	(3)	(4)	(5)
	n	mean	sd	min	max
<b>Woman</b>					
Elderly 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
<b>Parents-in-Law</b>					
Labour Income (in 1000 Som)	501	1.37	(4.34)	0	60.00
Pension (in 1000 Som)	501	2.81	(2.89)	0	30.00
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-in-law are restricted to only co-residing couples.

Table A.11: 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.