

The Effects of Remittances on Education in a Post-Conflict Society: Evidence from Bosnia-Herzegovina

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ABSTRACT

This paper analyses the effects of remittances on the educational enrolment of children in Bosnia-Herzegovina, where a process of forced migration made the relocation decision exogenous. Accordingly, this study has no need of methods to address the endogeneity of remittances. Hence, the approach taken means that our measure of educational enrolment is regressed on a set of individual and households level variables. In addition, we introduce a new approach to estimation, whereby the effect of remittances is calculated for each income quintile. We find that the relationship between remittances and educational enrolment is strong among households from the fourth quintile, which includes households immediately outside the risk of poverty, while for those in poorer quintiles the effect is not significant.

Introduction

This study investigates the effects on human capital formation of remittances arising from *forced* migration. The initial original contribution of the research is to forced migration as a field of enquiry, which is often largely neglected within the economics of migration. Secondly, it extends the literature analysing migration effects on human capital formation in the home country. Previous studies have had to grapple with the potential *endogeneity* of households' migration decisions to decisions regarding the education of their children.¹ In contrast, in this study, the migration decision is a brutal and wholly *exogenous* imposition on households. Accordingly, this study approaches the human capital consequences of migration free from the difficulties confronting the estimation of instrumental variables.² In this sense, it offers an identification strategy akin to a natural experiment.

The context of this study is forced migration arising from ethnic cleansing in Bosnia and Herzegovina (BiH) in the mid-1990s. Emigration from the Balkans has a long history³ and the region has traditionally been a source of migrants to Western Europe and the United States since the late nineteenth century. The temporary migration of labour intensified in the early 1960s, during the implementation of the 'Gastarbeiter' (guest-worker) programme created by the governments of West Germany and Yugoslavia, offering temporary jobs in Germany to Yugoslav workers. Most recently, the dissolution of the former Yugoslavia and subsequent war in Bosnia-Herzegovina forced around 50 per cent of the total BiH population into migration. As a direct consequence, BiH is ranked as one of the leading countries in the world in terms of the size of its diaspora compared to the home country population (between 40 and 50%, depending on a source), as well as in terms of remittance inflows as a share of GDP (11%). In the mid-1990s, forced migrants, defined as the need to relocate due to violence and/or the threat of violence came to account for around 75 per cent of the Bosnian diaspora and an even greater share of remittances. This has subsequently made up a large proportion of total income for many households in this country. However, relatively little is known about the use and effect of remittances at the household level. This paper provides specific empirical evidence of the effect of remittances on the school enrolment of children.

As remittances are becoming the most important source of foreign capital for developing countries, outstripping the scale of overseas development aid and foreign direct investment according to the official data of the BiH Central Bank, then the issue of their effects at both the microeconomic and the macroeconomic level have received copious attention from researchers in the area of migration studies. The literature on remittances has recently changed from its traditional focus on the motivation for remitting to analysis of the use of remittances. There are numerous

studies that analyse the effect of remittances on different aspects of a remittance-receiving economy, such as Funkhouser's study⁴ of the effect of remittances on the labour supply of remittance-receiving households in Nicaragua, or Chami et al. on the effect of remittances on growth and productivity.⁵

Besides the research mentioned above, an increasing number of studies analyse the effect of remittances on investments in human capital formation. The first empirical studies on the relationship between remittances and educational attainment simply related remittance receipts to the educational attainment of children and assigned any effect found to the remittances.⁶ These studies argue that remittances positively influence households' educational investment decisions through the relaxation of the liquidity constraint⁷ and reducing children's labour participation.⁸ In this context, remittances, as an additional source of household income, help to alleviate liquidity constraints. As a result, this induces investment in children's' education leading to a positive relationship between remittances and children's' educational attainment and a negative relationship between remittances and child labour supply. This result is known as the 'income effect'. Nevertheless, if household budget constraints are not binding, remittances should not have any significant effect on education expenditures. Consequently, if remittances are received by both households that face a budget constraint and households not having such a constraint, as in the case of BiH, then an empirical specification that does adequately distinguish between these two types of household will likely yield an insignificant effect of remittances on education. In addition, more recent studies attempt to control for parental absence effects, besides the effect of relaxation of liquidity constraints.⁹ This specific effect of remittances, which arises from the effect of a parent's absence, is termed the 'disruption effect'.¹⁰

The evidence on the effect of remittances on the educational attainment of children is mixed, and depends on the approach taken by researchers to the analysis. Several studies found a positive relationship between remittance receipts and educational enrolment.¹¹ Alternatively, some studies found no significant effect of remittances on education, while accounting for the effect of migration of parents. Moreover, several studies controlled for the gender of a child and found that the effect is more significant for female children,¹² while other studies found no significant difference between genders of pupils.¹³ This focussed review of the literature suggests that the results are sensitive to the model specification (i.e. whether the model controls for the type of the household according to its budget constraint), the data used (i.e. whether migration is an endogenous decision or not), and the country analysed. This paper provides the first empirical evidence for BiH, addressing the issues of model specification (using income quintiles to distinguish between budget constrained

households and those that are not constrained) and of the data used (by using data about forced migrants, where the migration decision is exogenously determined).

Therefore, this paper makes three important contributions to the empirical study of the relationship between migration and human capital formation in sending countries. First, it investigates the effects of remittances on human capital formation in a country affected by *forced* migration, which allows us to assume *exogeneity* of the migration decision. Second, it introduces a *new model specification*, whereby interactions between the receipt of remittances and income quintiles are used to identify the effect of liquidity constraints, as theoretically described. Finally, it uses equivalence scales for measuring *per child* household consumption of education more precisely.

The paper is structured as follows. The next section describes briefly the scenarios of education and remittances in Bosnia-Herzegovina in order to provide necessary background for the study. The subsequent section presents a short theoretical discussion of the relationship between remittances and education. Then, we describe our empirical model and estimation strategy, followed by the results of the empirical analysis. The final section presents the conclusions.

Background: remittances and education in Bosnia-Herzegovina

Bosnia-Herzegovina is ranked 23rd in the world in terms of receiving remittances as a share of GDP. The remittances amount to more than 2 billion Euros annually, which is around 11% of Bosnian GDP.¹⁴ Moreover, remittances represent the most significant inflow to BiH, as they were six times larger than foreign direct investment and three times larger than development assistance to this country in 2017. These remittance inflows are a significant source of income for a large proportion of the BiH population. The data from the 2004 round of the Living in BiH survey (LBiH) were used to analyse the effect of remittances on poverty and inequality, showing that approximately one third of households in Bosnia-Herzegovina receive remittances.¹⁵ The average value of remittances received is about 100 KM per month.¹⁶

Table 1: Share of households receiving remittances by category (N=7,702)

Criteria	Recipients (% of the sample)	Average amount received per month (KM)
All	33.5	100.54
Poor	28.3	52.98
Non-poor	34.3	105.98
Head of Household		

• Primary education	32.3	83.27
• Secondary education	30.5	105.93
• Tertiary education	26.0	104.92
Rural	36.4	112.24
Other urban	32.4	86.85
Capital (Sarajevo)	31.9	105.22
Female-headed households	44.7	98.39
Male-headed households	29.6	101.69

Note: Poor households are defined as those whose annual household income was below the relative poverty line (60% of median income). Non-poor households are those with an income above the relative poverty line.

Source: Authors' calculations based on the LBiH 2004 survey

The figures presented in Table 1, in the absence of more comprehensive studies on the relationship between remittances and poverty in Bosnia-Herzegovina, were produced by using the LBiH dataset in order to provide background information for the study of the relationship between remittances and educational attainment completed in this paper. Accordingly, the remittances sent to Bosnia-Herzegovina are not pro-poor. A larger proportion of non-poor households receive remittances. Moreover, the average amount received is twice as large as the amount received by poor households. Regardless, a larger proportion of households with a low-educated head receive remittances, albeit a slightly lower average amount compared to those with a more highly educated head. Also, a comparatively larger number of female-headed households receive remittances than do male-headed households.¹⁷ Households in rural areas receive more remittances, both in terms of the proportion of households that receive them and in terms of the average amount, than do households in urban areas. These outcomes tend to suggest that remittances, although not contributing to poverty reduction overall, may be expected to have a positive effect on reducing differences in poverty incidence between rural and urban areas.

Table 2: Recipients of remittances by income decile

Criteria	Decile										Average
	1	2	3	4	5	6	7	8	9	10	
Recipients (% of the sample)	27.4	33.6	30.8	35.2	37.6	36.6	38.2	34.0	35.4	26.3	33.5
Average amount received (KM)	51.7	74.6	62.6	103.5	83.0	106.7	107.3	107.2	140.5	169.6	100.5

Source: Authors' calculations based on the LBiH 2004 survey

Table 2 shows that remittances do not contribute to a decrease in inequality, as the average amount of remittances tends to increase from the poorest to the richest decile. Also, the proportion

of households receiving remittances in each decile, with the exception of the richest quintile, increases as we move from poorer to richer deciles. This information is important for the argument that remittances influence educational investments only of households that fall into a specific income decile, which will be explained in detail later.

To better understand the context of the study, we also briefly describe the educational system in BiH. The main characteristics of the educational system in Bosnia-Herzegovina as a direct result of the war are reluctance to reform the educational system inherited from ex-Yugoslavia and the burden that the political organisation of the country puts on the educational system.¹⁸ According to the Dayton Peace Agreement, Bosnia-Herzegovina is a country organized into two entities, the Federation of BiH (FBiH) and the Republika Srpska (RS), where the Federation of BiH is comprised of ten cantons. Education in RS is organized and controlled at the entity level, whereas in FBiH most education issues are regulated at the canton level. The lack of coordination between cantons and entities make any attempt at meaningful reform tremendously difficult.

The legacy of the incumbent Yugoslav system, with highly subsidized education at all levels, but without appropriate reforms in terms of adjustments to the new structure of the economy and labour market needs, along with the lack of coordination between different levels of authority, has resulted in significant mismatch between the skills produced by the education system and those required by the labour market. The phenomena of ‘educated unemployment’ and ‘overeducated’ individuals, as reported in the Labour Market Surveys, seem to be widespread.¹⁹

In a country without a national Census since 1991,²⁰ it is extremely difficult to obtain relevant data on the literacy rates and education structure of the population. According to the Census in 1991, about 10% of the population were illiterate. Small-scale household surveys conducted in the meantime suggest that this rate has declined to about 5%. Also, these surveys suggest that about 9% of the population are without education, more than 30% have primary education only, about 50% have secondary education and 8% higher education. The net enrolment rate in primary school is about 97%, in secondary school about 75% and in higher education about 20%. Around 55% of students enrolled in secondary schools graduate on time. Official statistics about the number of schools, students and teachers in BiH for 2015 are presented in Table 3.

Table 3: Official statistics about educational enrolment in BiH, 2015

Education level	Number of schools	Number of students	Number of teachers	Student/teacher ratio
Primary	1,812	296,842	24,118	12.31

Secondary	311	144,231	12,773	11.29
Tertiary		108,008	9,581	11.27

Source: BiH Agency of Statistics: Education Statistics, 2015

Child labour is relatively uncommon in Bosnia-Herzegovina,²¹ so the drop-out rates are generally very low for children of primary school age (6 to 15 years old), compared to some other countries in which empirical evidence on the remittances effect has been investigated, notably in Latin America. As a result, the focus of this paper is on the educational attainment of young people of age 16 to 24. This age span encompasses young people in secondary and tertiary education where alternatives such as labour market participation are present and where drop-out rates are much more significant compared to primary education. The next section presents the empirical investigation.

Empirical analysis

Data

Our analysis of the effect of migration on the educational attainment of children in Bosnia-Herzegovina was conducted by using the dataset from the LBiH survey, conducted by the BiH Office of Statistics in 2004. The original sample of this survey was 7,702 households, or 22,483 individuals, including 6,169 individuals younger than 25. The number of school age (age 6 to 24) individuals was 5,136, whereas the number of individuals aged between 16 and 24 was 2,758. Additionally, this sample was reduced by excluding observations missing information about the child's enrolment. Hence, the final dataset used for the model estimation contains 1,367 observations. The list of variables from the dataset used in the empirical analysis of the relationship between remittances and education, together with corresponding descriptive statistics, is presented in Table 4. The names of variables prefixed with the letter *c* indicate child-level information, while those with *h* indicate household-level information.

Table 4: Summary descriptive statistics of variables

Variable description	Variable name	N	Mean	Std Dev.
= 1 if child currently enrolled in education	cenr	1,293	0.48	
Monthly amount of household's education expenditure per child, in KM	heepcx	1,367	484.80	2,151.988
Age of child	i.cage	1,367	19.76	2.855
=1 if child is female	cfemale	1,281	0.48	
= 1 if an individual is of tertiary school age	ctedu	1,367	0.16	
=1 if a child lives in the capital city	capital	1,303	0.21	0.408
=1 if female headed households	hfh	1,367	0.01	

Household head's age	hhage	1,272	47.89	9.898
Employment status of a household's head, 1 if employed	hhemp	1,367	0.16	
=1 if a household has a phone	hhphone	1,367	19.76	2.855
=1 if a household owns a house	hhouse	1,303	0.82	
=1 if a household head has primary education	hhprim	1,367	0.21	
=1 if a household head has secondary education	hhsec	1,367	0.47	
=1 if a household head has tertiary education	hhtert	1,367	0.10	
Number of household members within a household	hysize	1,303	4.25	1.414
Household's monthly income per capita, in KM	hincpx	1,367	2,389.66	2,906.268
Number of children in the household	hnoc	1,367	2.11	1.016
Number of school age individuals in the household	hnoc624	1,367	0.15	0.447
Number of secondary or tertiary school age individuals in the household	hnoc1518	1,367	1.67	0.723
=1 if a household receives remittances	hrem	1,293	0.09	
Monthly amount of remittances received by a household (in KM)	hrema	1,367	121.78	632.929

Source: Own calculations

The proportion of households with a child in post-primary education that reported receipt of remittances was 9.2%. This share is in line with other reports about the share of households receiving remittances in BiH.²² Notwithstanding, what is usually being underreported is the amount of remittances, as suggested in previous studies. The average amount of remittances received by a household per is KM 121.78.

The model and estimation strategy

Equation 1 is a probit regression estimating the determinants of enrolment.²³

$$\begin{aligned}
cenr = & \beta_0 + \beta_1 hrem + \beta_2 \sum_{i=16}^{24} cage + \beta_3 female + \beta_4 houseown + \beta_5 phoneown + \\
& \beta_6 hhprim + \beta_7 hhsec + \beta_8 hhtert + \beta_9 hhage + \beta_{10} hhemp + \beta_{11} hysize + \beta_{12} capital + \\
& \beta_{13} \sum_{i=1}^4 quintiles + \beta_{14} \sum_{i=1}^4 hrem * quintiles + u_i
\end{aligned} \tag{1}$$

The dependent variable in Equation (1) is dichotomous, indicating whether a child is currently enrolled in a school (*cenr*). The data used for the estimation of the model arise from exogenous selection into migration, which avoids the potential problem of an endogenous relationship between remittances and education.²⁴ A pupil's age (*cage*; years $i=16 \dots 24$) and the household income quintiles (*quintiles*; $i=1, 2, 3, 4$) were entered as sets of dummy variables for each individual individual category, with age 24 and the first quintile as omitted (benchmark) categories, respectively. A pupil's gender (*female*) is also included in the model, as a standard

dummy or indicator variable that controls for differences in enrolment between boys (=0) and girls (=1).

The main variable of interest in this model is receipt of remittances by a household. Given that migration from BiH was predominantly a migration of entire families as refugees, the receipt of remittances can be considered as an exogenous income gain for households and captured by the remittances receipt variable.²⁵ There are three alternative variables for the receipt of remittances: first is a dummy variable for receipt of remittances (*hrem*); second is a continuous variable for the average monthly amount of remittances received in a year (*hrema*); third is a variable for the amount of remittances per month relative to a household's budget (*hremarel*). Since initial analysis revealed that the continuous variables (*hrema* and *hremarel*) did not appear to be statistically significant, the dummy variable *hrem* is used in further analysis. The use of the dummy variable instead of the amount is justified by the experience reported in previous studies, which tends to suggest that remittance-receiving households are likely to underreport the amount of remittances received.²⁶

The main argument of the 'brain gain' literature regarding the positive effect of remittance receipts on educational investment is that remittances have a positive effect via relaxation of liquidity constraints faced by households. However, this effect should not be expected for all households receiving remittances. The liquidity constraint is binding for low-income households only. Conversely, households at higher levels of income distribution may not face a liquidity constraint, in which case the receipt of remittances is not expected to change their education investment decisions. In addition, any receipt of remittances by households at the bottom of the income distribution might not change their education investment behaviour, as the amount of remittances received may not be sufficient to allow such investment. Remittances sent to such households are usually purely altruistically driven and are completely spent on basic needs and current consumption.²⁷ Therefore, the receipt of remittances is expected to have an impact on education investments only among households that are within a limited range of the income distribution; namely, those where the pre-remittances level of income is sufficient for current consumption and the receipt of remittances is thus an addition to income that enables education investments. Accordingly, the empirical model to be estimated includes a list of dummy variables for the income distribution quintiles ($\sum_{i=1}^4 \text{quintiles}$), as well as a set of interactions between the remittances receipt and each consumption quintile ($\sum_{i=1}^4 \text{hrem} * \text{quintiles}$). Specification of our model with these variables enables us to capture the difference in the effect of remittances between households at different levels of the income distribution.²⁸ The strongest effect of remittances receipt on education is expected for households that are in a specific quintile, where they are not

rich (and still face liquidity constraint), but are not so poor as to be forced to spend all the remittances received on basic needs. This model specification is another original contribution of this paper.

We also included a set of control variables about the household's and household head's characteristics that may affect a child's school enrolment. The household head's education level (*hhedu*) is considered as a proxy for household wealth. Parents with higher education are expected to have a higher probability of wage employment and to earn higher wages than do less educated parents. Consequently, households with more educated parents may be less likely to face liquidity constraints and therefore they are more likely to invest in their childrens' education. As the majority of studies investigating poverty incidence and inequality between male- and female-headed households in BiH²⁹ suggest a positive relationship between being a female-headed household and household income, a dummy variable for the gender of the household head (*hfh*) is included. The household size (*hhsiz*) variable is expected to have a negative effect on investment in childrens' education. The larger is the household, the lower is the household budget per capita and thus the stronger is the liquidity constraint, all else remaining equal. Furthermore, the number of school-age children (*hnoc624*) also affects educational investments as the reservation income for education is lower per capita in households having more school-age children. A household's employment status (*hhemp*) is also included. The type of area (*capital*) is considered to capture both the effect of cultural and infrastructural differences and the effect of economic differences. Since previous studies³⁰ have shown that poverty is present even more in non-capital urban areas than in rural areas, the actual welfare gap in BiH is between people living in the capital city and people living in other areas. All else remaining equal, households living in rural areas are expected to invest less in the educational achievement of children.

Results and discussion

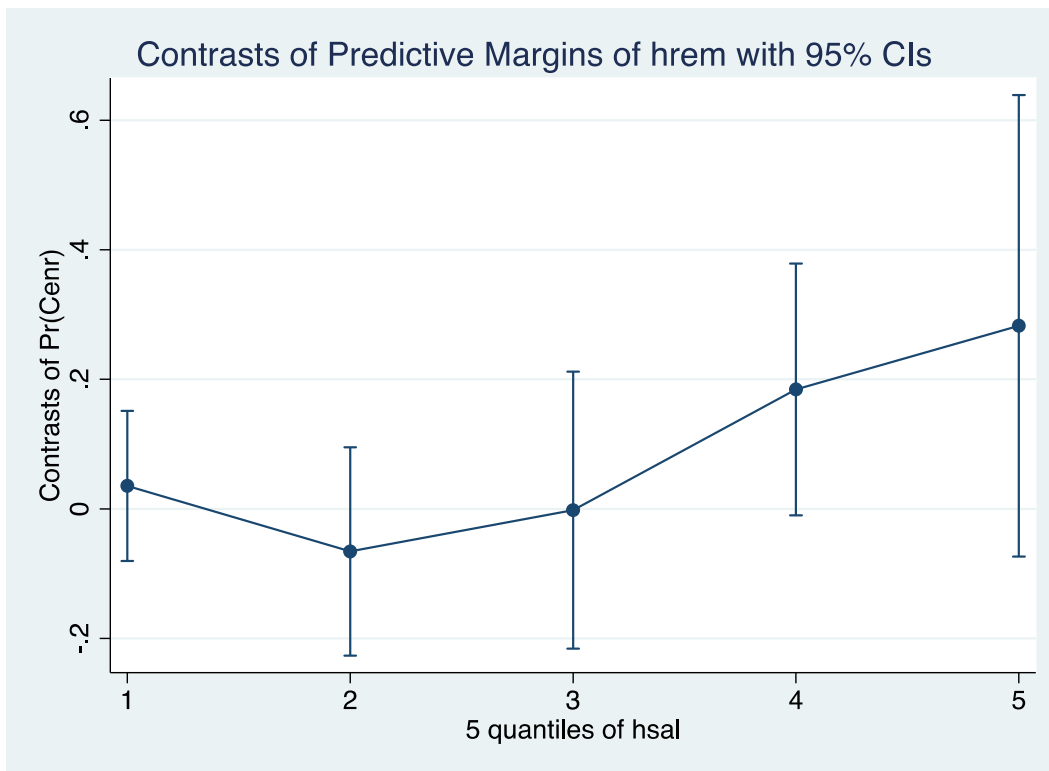
The results of probit estimation of Equation (1) are reported in full in Appendix 1. First, we comment briefly on our control variables. Then, we discuss the impact of remittances on school enrolment in more details.

The main demographic factors influencing enrolment are the age of the child, gender and the economic situation of the household. Compared to children age 24 (the omitted category), children of secondary school age (16-18) are much more likely to be enrolled, while others of tertiary age (19-23) are equally likely to be enrolled. The positive sign on the gender dummy (*female*) in the estimates from the survey suggests that girls are more likely to be enrolled in school, *ceteris*

paribus, than are boys. This is consistent with the fact that female persons from the sample (age 15 to 24) face much less favourable labour market conditions,³¹ thus employment opportunities have less of a diverting influence on their enrolment choice. The positive effects of parental education after primary level (estimated by the two dummy variables for, respectively, secondary and tertiary education – *hhsec* and *hhtert*) are also in line with theoretical predictions and previous studies. The negative effect of a household's size on pupil enrolment may capture the effect of intra-household allocation of income, where a child's education competes with other needs. In addition, residence in the capital city and owning a phone are also statistically significant and positively associated with enrolment. The apparently perverse effect of house ownership on enrolment may reflect the predominance of house owners in the sample (82%), and – with the exception of quintile 5 (97%) – their relatively equal distribution across income quintiles (Q1 – 78%, Q2 – 72%, Q3 – 76%, Q4 – 86%).

The estimated coefficients from probit regression do not have any intuitively appealing quantitative interpretation. For the control variables discussed above, it is sufficient to comment on their qualitative effect. Conversely, for our variables of interest we need to provide quantitative interpretation. In other words, we need to know not just whether our estimates are statistically significant and of one or other sign, but also whether they reveal effects that are large enough to matter in practice. To this end, for households in each income quintile we use the regression results to derive the *average marginal effects* of receipt of remittances on the probability of childrens' enrolment in education.³² For households in each income quintile, after taking into account the average values of all the covariates, we compare the average probabilities of enrolment for households in each income quintile (i) receiving remittances and (ii) not receiving remittances.³³ Figure 1 reports these estimated comparisons: for households in each income quintile, the respective dot depicts the average marginal effect of remittances on the probability of school enrolment; and the vertical bars depict the associated confidence intervals (such that the shorter the bar the more precise the estimate, and estimates with bars overlapping the zero reference line indicate an estimate that cannot be statistically distinguished from zero). These comparisons are given in terms of the probabilities of enrolment (e.g. an estimate of +0.2 is to be interpreted as a remittances effect increasing the probability of enrolment by 20%).

Figure 1. Difference in the marginal effects of receiving remittances compared to marginal effects of not receiving remittances



Source: Author's calculations using Stata 14 (see Footnote 33).

Figure 1 shows that, as we hypothesised, at the lower income quintiles (1, 2 and 3) there is no enrolment effect of remittances; not only are the estimated differences tiny, but each of them lack statistical significance (in each case, the confidence intervals are almost symmetric around zero). In contrast, households receiving remittances in income quintile 4 are 18% more likely to enrol their children in education ($p=0.063$, i.e. borderline at the conventional 5% level of significance). Likewise, consistent with our hypothesised effects, the evidence for a remittance effect in the highest income quintile is statistically weaker ($p=0.120$, i.e. somewhat beyond the 10 per cent threshold for statistical significance), which interpreted strictly indicates that the effect is not significantly different from zero.

Of course, the statistical significance of econometric estimates is to be interpreted in the light of sample size. The number of households receiving remittances in income quintiles 1, 2, 3 and 4 is, respectively, 48, 28, 18 and 20. Hence, the lack of statistical significance of the tiny remittance effects for quintiles 1, 2 and 3 compared to the (borderline) significant and large effect for quintile 4 is not an artefact of the different numbers of observations supporting the estimates. Accordingly, we argue that the contrast between our estimated effects for quintiles 1, 2 and 3 and our estimated effects for quintile 4 is valid. Conversely, our sample includes only five households

receiving remittances in income quintile 5. This makes it likely that the relatively imprecise estimate of the remittance effect on school enrolment for the highest income quintile reflects very limited sample size. We conclude that our hypothesised variation of remittance effects on enrolment by income receives strong support from comparison between the zero effects for quintiles 1, 2 and 3 and the large effect for quintile 4, but less robust support from comparison of the quintile 4 and quintile 5 effects.

These outcomes are consistent with the presence of differential liquidity constraints at different levels of income, as explained above. Statistical insignificance and the negligible size of the average marginal effects of receiving remittances (compared to not receiving remittances) in the first to third income quintiles suggest that remittances are not sufficiently strong to remove liquidity constraints from households below average income. Moreover, (borderline) statistical significance of the large average marginal effect of receiving remittances in the fourth quintile shows that for relatively richer households' remittances make a substantial difference to a child's probability of enrolment. However, for the highest income households in quintile 5, we find weak evidence that liquidity constraint may not be a binding influence on school enrolment, so remittances make no difference.

Conclusions

This paper presents empirical evidence regarding the effect of remittance receipts on enrolment into secondary and tertiary education in Bosnia-Herzegovina. The approach provides an empirical contribution to the literature by using data in which the migration decision is exogenous, consequently producing empirical results by estimating a model free of the difficulties confronting instrumental variables estimation. Moreover, the model specification introduces a new way of localizing the liquidity constraint effect per income quintile.

The findings presented in this paper suggest that remittances have a significant effect on educational attainment. However, the positive effect of remittances is limited to a specific group of households; namely, relatively well-off households facing a liquidity constraint that can be relaxed by remittances to an extent sufficient to increase substantially the probability of school enrolment. Poorer households cannot afford education even when they receive remittances, as they tend to use these receipts for covering basic needs, while the richest households can afford education even if they do not receive remittances. The model specification used in this paper, where quintiles of income distribution were used to capture the effects of remittances on educational enrolment at different levels of income, is more consistent with the theoretical predictions about remittance

effects than are the specifications used in previous empirical studies.³⁴ Model misspecification by not including income distribution (quintiles) might be a reason why some previous studies did not find any influence of remittances on the education of children.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Notes

- 1 More discussion on the issue of potential endogeneity in studies of migration is provided in the empirical analysis section later in the paper. For now, we just note that endogeneity refers to the possibility that, for example, the dependent variable (enrolment) and the independent variable of interest (remittances) may simultaneously determine each other (i.e. because households make simultaneous and mutually conditioning decisions regarding their children's' education and decisions to migrate resulting in remittances). Ignoring such a relationship between variables in the model may result in biased estimates. However, in our case, migration is forced onto the household, which means that migration and its consequences (including remittances) can be regarded as exogenous to the household rather than as an endogenous outcome of household decision making.
- 2 Previous studies on the effect of remittances on education have long dealt with the endogeneity of the migration decision as one of the main issues, although instruments widely used in earlier studies were later found to be invalid. For an example of earlier studies see the historical migration account by G. Hanson and D. Woodruff, *Emigration and Educational Attainment in Mexico*. National Bureau of Economic Research Working Paper, Cambridge MA, 2003. For later, corrective studies see C. Calero, A.S. Bedi and R. Sparrow, *Remittances, Liquidity Constraints and Human Capital Investments in Ecuador*, IZA Discussion Paper 3358, Bonn, 2008; and the discussion in M.R.V. Borromeo, *Remittances and the Educational Attainment of Children in the Philippines*, SLU Uppsala, Department of Economics, 2012.
- 3 For example, refer to B. Repe, 'Les migrations sur le territoire de l'ancienne Yougoslavie de 1945 a nos jours', Séminaire européen d'enseignants 'Etre migrant(e) en Europe', 6-9 March 2002, Faculté des Lettres et Sciences Humaines, Université de Neuchâtel. Neuchâtel.
- 4 E. Funkhouser, 'The effect of emigration on the labor market outcomes of sender households: a longitudinal approach using data from Nicaragua', *Well-Being and Social Policy*, 2(2), 2006. pp. 5–25.
- 5 R. Chami, C. Fullenkamp, and S. Jahjah. *Are Immigrant Remittance Flows a Source of Capital for Development?* IMF Staff Papers 52(1), Washington, DC.
- 6 See, for instance, A. Cox-Edwards and M. Ureta, *International Migration, Remittances, and Schooling*, NBER Working Papers 9766, 2003.
- 7 'Liquidity constraint' in the context of remittances should be interpreted as the inability of households to borrow and to invest in productive activities, including education, due to a lack of financial resources and corresponding lack of ability to collateralize loans.
- 8 See, for example: Hanson and Woodruff, op. cit.; Cox-Edwards and Ureta, op. cit.; also D. McKenzie and H. Rapoport, *Can Migration Reduce Educational Attainments? Depressing Evidence from Mexico*, Stanford Center for International Development, Working Paper 274, 2006; C. Amuedo-Dorantes, A. Georges and S. Pozo, *Migration, Remittances and Children's Schooling in Haiti*, IZA Discussion Paper 3657, 2008.
- 9 For instance, C. Amuedo-Dorantes and S. Pozo, *International Migration, Remittances and the Education of Children: The Dominican Case*, Working Paper, Western Michigan University, 2006.
- 10 Y. Lu and D.J. Treiman, *The Effect of Labor Migration and Remittances on Children's Education among Blacks in South Africa*, California Center for Population Research Online Working Paper CCPR-001-07, 2007.
- 11 As examples: Cox-Edwards and Ureta, op. cit.; Calero et al., op. cit.
- 12 For instance, P. Acosta, *Labor Supply, School Attendance and Remittances from International Migration: the Case of El Salvador*, World Bank Policy Research Working Paper 3903, Washington DC, 2006.
- 13 See A. Cuecuecha, *The Effect of Remittances and Migration on Human Capital: Evidence from Mexico*, ITAM Working Paper, 2008.
- 14 Annual inflow of international remittances in 2016, according to the BIH Central Bank, was KM 2.4 billion, while the World Bank estimates KM 3.3 billion. On the other hand, the World Network of Bosnian Diaspora estimates the total net inflow as at least 6 billion. Divide by 2 to convert to euros.

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- 15 There are more recent rounds of the BiH Household Budget Survey (in 2007, 2011 and 2015). However, the share of remittance-receiving households with post-primary age children in these datasets is below 5%, while in 2004 the share is 10%. For that reason we decided to use the 2004 data.
 - 16 The BiH currency, KM, is a ‘convertible mark’, with a fixed exchange rate of approximately 2KM to one euro.
 - 17 We might hypothesize this as being due to two circumstances: female-headed households have husbands working abroad who send remittances to support their families back home; or single-person widow households supported by adult children working abroad. These mechanisms have been found to be widespread in the gendered remittance dynamics of Albania. See J. Vullnetari and R. King, *Remittances, Gender and Development: Albania's Society and Economy in Transition*, I. B. Tauris, London, 2011.
 - 18 For example, EU reports on the progress in implementation of the Bologna process as well as other reports provide evidence on the lack of effort and commitment on the part of successive Bosnian governments to reform and improve the effectiveness of the country's educational system.
 - 19 C.S. Fan and O. Stark, ‘International migration and “educated unemployment”’, *Journal of Development Economics*, 83(1), 2007, pp. 76–87.
 - 20 The latest BiH Census was taken in 2013, but the data are not yet available.
 - 21 UNICEF, Child Labour Statistics based on their Multiple Indicators Cluster Survey (MICS), accessed on 15 January 2018.
 - 22 See N. Espinova, J. Ray and A. Pugliese, *Gallup World Poll: The Many Faces of Global Migration*, IOM Research Series, 43, 2011; I. Gedeshi and E. Jorgoni, *Social Impact of Emigration and Rural-Urban Migration in Central and Eastern Europe: Albania*, European Commission DG Employment, Social Affairs and Inclusion, Brussels.
 - 23 Besides estimating the effect of remittances on the child's school enrolment, as is done in previous studies, we initially intended to go a step further and estimate the relationship between remittances receipt and educational investments by a household while controlling for selection bias by using Heckman's two-stage procedure. However, the number of observations for children from remittance-receiving households was not sufficient to estimate this model.
 - 24 As indicated already, the endogeneity problem in research into the effects of remittances is well-known and has been addressed in different ways depending on the context of the particular research setting. For example, ‘reverse causality’ (or simultaneity) may arise when households strategically send a household member to work abroad in order to raise the finance needed for education of another household member through remittances. In this case, it is not only that remittance receipts affect education, but also that educational investment intentions can affect remittances. Alternatively, unobservable household characteristics such as ambition, ability, risk preferences, and attitudes towards investing in the future can affect both remittances and educational enrolment.
 - 25 To correctly assess the effect of relaxing liquidity constraints, it is not sufficient to include a variable on remittance receipt. In fact, it is necessary to take into account that, in households with an absent member, remittances are not an exogenous addition to income, but the alternative source of household income to the situation when the absent member would stay within a household and earn a wage. Accordingly, absence of a member in a household that does not receive remittances may be considered as an income loss. As a result, besides accounting for receipt of remittances, the distinction between households that do and those that do not have absent members is necessary. To this end, counterfactual income for households that have absent members, compared to households without migrants, should be estimated. However, although it may be very important in the case of voluntary migration, it is not necessarily important in the context of forced migration. The migration decision in the context of forced migration can be considered as exogenous, and not based on any household's income gain strategy. Moreover, there is evidence that many households in Bosnia-Herzegovina receive remittances from relatives, which thus may be considered as an exogenous source of income. It is also supported by the idea that conflict-induced migration differs from voluntary migration in the sense that it is predominantly a migration of entire families, instead of one or two members. Also, this affects the amount of remittances sent, as interfamily links are expected to be weaker than intrafamily links.

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- 26 F. Borraz, 'Assessing the impact of remittances on schooling: the Mexican experience', *Global Economy Journal*, 5(1), 2005, pp. 1–30.
- 27 D. Cox, B. Hansen and E. Jimenez, 'How responsive are private transfers to income? Evidence from a laissez-faire economy', *Journal of Public Economics*, 88(9), 2004, pp. 2193–2219.
- 28 The average amounts of remittances received by households at different levels of the income distribution in BiH are given in Table 3.
- 29 See S. Smajic-Ermacona, Poverty among female-headed households in Bosnia and Herzegovina: an empirical analysis, *South East European Journal of Economics and Business*, 2(1), 2007, pp. 69–88.
- 30 See UNDP, *Human Development Report*, UNDP, 2013.
- 31 The unemployment rate among the female workforce in Bosnia-Herzegovina is higher than it is for males.
- ³² See Mitchell, M (2012). *Interpreting and Visualising Regression Models Using Stata*. Stata Press: College Station, Texas, pp.27, 460 and 468.
- 33 We implemented the procedure as follows:
- a) We estimated the probit regression reported in Appendix 1. All variables were entered in factor form, which is necessary to compute the marginal effects using Stata's Margins command. Our variables of interest – remittances and income quintiles – are specified both individually and in interaction.
 - b) We used Stata's post-estimation **Margins** command to obtain the remittances effect at each income quintile, using the following syntax: `margins hrem, at(quintile = (1(1)5)) contrast(effects)`
 - c) We used **Marginsplot** to obtain a graphical display that plots the difference in the probability of enrolment between households receiving remittances and households not receiving remittances for each income quintile.
- 34 Notably Cox-Edwards and Ureta, op. cit.; Amuedo-Dorantes and Pozo op. cit.; Cuecuecha op. cit.

Appendix 1. Table with results of model estimations, marginal effects

Dependent variable is a dummy variable taking value of 1 if child is currently enrolled in education	Name	Marginal effects
=1 if a household receives remittances	hrem	0.166*
Age of child	cage	-1.311***
Age of child squared	cagesq	0.030***
=1 if child is female	cfemale	0.145***
=1 if household owns a house	houseown	-0.101*
=1 if household owns a phone	own_phone	0.126**
=1 if household head has primary education	hhprim	0.101
=1 if household head has secondary education	hhsec	0.260***
=1 if household head has tertiary education	hhtert	0.352***
Age of household head	hhage	0.009***
=1 if household head is employee	hemp	-0.514***
Household size	hhsz	-0.091***
=1 if household lives in the capital city	capital	0.182***
Quintile 2	q2	-0.035
Quintile 3	q3	0.014
Quintile 4	q4	0.246***
Quintile 5	q5	0.236***
Quintile 1 x hrem	q1xhrem	0.061***
Quintile 2 x hrem	q2xhrem	-0.121**
Quintile 3 x hrem	q3xhrem	-0.07***
Quintile 4 x hrem	q4xhrem	0.217***
Quintile 5 x hrem	q5xhrem	0.299***
Number of observations		1,173
Pseudo R ²		0.455
Pearson chi ² (1130)		1351.57
Prob>chi ²		0.000
Correctly classified (%)		83.63

Note: statistically significant at: *** 1% level, ** 5% level, and * 10% level of significance

Source: Own calculations