

How do remittances affect children's time allocation ?
The indirect effect of negative shocks

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Abstract

By reducing financial constraints and income variability, remittances can increase educational attainment and thereby reduce child labour supply, in the context of imperfect financial markets. This paper aims to analyse the impact of remittances on child labour and educational outcomes in Niger. Our methodology differs from previous ones in important respects. First, we estimate whether there are significant differences due to negative shocks occurrence. Secondly, in order to delineate the effects of remittances from migration, we focus on children residing in non-migrant households. Thirdly, we use a Propensity Score Matching method to calculate the average treatment effect of remittances on child labour force and school participation decisions. Our findings indicate that children from remittance receiving households are more likely to attend school than those from non-recipient households, while remittances also seem to increase the probability of working. However, remittances 'impacts on child labour vary sharply according to shock occurrence.

Key words: Remittances, Children time allocation, Propensity Score matching

J.E.L. Classification.: F24, I25, J22

1. Introduction

The extent of remittances in Africa has recently attracted increasing attention from international organisations and from economic literature. About 30 million Africans, according to official statistics, live today outside their home country and a substantial fraction of these labour migrants send a part of their income back to their families, or relatives, still living in their country of origin. For many poor families, these transfers constitute a vital ‘financial lifeline’, guaranteeing them a sustainable living standard. At the same time, child labour is still persistent in African countries. Recent estimates highlight that 19 per cent of children aged 5 to 17 years old are economically active. As poverty and household vulnerability are the oft-mentioned determinants of child labour (Basu et Van, 1998; Diallo, 2001; Guarcello et al., 2008), remittances are likely to affect children’s time allocation. However, the real impact of remittances on child labour is imprecise and differs whether the transfers are perceived as a complementary or a replacement income. Time horizon makes the relation between remittances and child labour even more complex.

This paper aims to clarify the impact of remittances on child labour and educational outcomes. More specifically, we seek to quantify the potential impact of remittances on children’s time allocation, subdivided into four categories: school only, work only, school and work and inactivity.¹ Our analysis focuses on Niger, an interesting case of study concerning interactions between remittances, school attainment and child labour. Remittances constitute an important financial contribution injected into the Nigerien economy, reaching in 2009 nearly \$53 million (i.e. 1.7 per cent of the GDP, World Bank, 2011). In parallel, Niger is still characterized by huge inequalities in terms of schooling and labour access. The school attendance rate remains relatively low, despite some recent progresses (this rate increased from 37 per cent to 53 per cent between 2000 and 2007), while nearly 60 per cent of the children participate in economic activities (ENBC, 2007).

The links between remittances and children’s time allocation have been recently examined (Acosta, 2006; Dimova et al., 2008, Amuedo-Dorantes et al, 2010, Alcaraz et al, 2012, Bredl, 2011) but these papers have focused their analyses on the Latin American region and thus, their results cannot be generalized to include Africa. Moreover our methodology differs from previous ones in three important respects.

¹ Obviously, this is a simplification that doesn’t take into account, for example, the non-economic activities, i.e. the domestic work. Unfortunately, we cannot exploit this information from the ENBC survey.

First, the endogeneity of migration decisions complicates the analysis as it requires the identification of two separate events that are often driven by similar factors. Nevertheless, consequences of remittances and migrations on children's human capital accumulation can be contradictories. Thus, in order to delineate the effects of remittances from migration, we focus on children residing in non-migrant households, i.e. in households that do not receive remittances from a migrant family member.

Secondly, our estimations take into account the effects of shocks. Child work is indeed a mechanism used to smooth transitory income shocks, and increases significantly in response to income losses. One of the strategies used by Nigerien households when a shock occurs (in 13 per cent of cases) is to 'retire' children from school and send them to work. Potential impacts of remittances on children's activities are likely to differ if the household has recently faced up to a shock or not.

Thirdly, a Propensity Score Matching method is implemented to calculate the average treatment effect of remittances on child labour and on school participation decisions. We use this approach to avoid the identification problem generated by a simple comparison of households that receive remittances and households that do not. This approach requires a rich database, which is provided by the *Troisième enquête nationale sur le budget et la Consommation des ménages* (ENBC, 2007). Indeed, with a sample size close to 28,000 individuals and 4,000 households, this survey contains information on the size of remittances received, the nature of remittances, the country where the cash transfers come from and the frequency with respect to the previous year. Information related to school participation, economic activities and retrospective questions on shocks' occurrence are also available in this survey.

This paper is organised as following: Section 1 outlines the links between child labour, school attendance and remittances. The second section reviews Nigerien characteristics in terms of schooling, child labour and remittance flows. A detailed explanation of the methodology used is provided in the third part, while the last section gauges and analyses the remittances' impact on children's time allocation.

2. The unclear relationship between remittances and children's time allocation

How remittances can affect the household's decisions regarding their children's time allocation, and thereby the incidence of child labour and school attendance? In this section, we explore the links between these phenomena, according to time horizon.

In a short-term perspective, the direct effect of remittances consists of increasing the disposable income for recipient households, by alleviating the familial budget constraint (Lachaud, 1999, Lucas, 2004; Bracking and Sachikonye, 2008). According to the luxury axiom (Basu and Van, 1998), if a household reaches a certain level of well-being, or at least a subsistence threshold, the use of child labour is no more necessary. Based on the parental altruism assumption, this axiom stipulates that children are sent to the labour market with the sole purpose to support the family's needs when household incomes are too low.² However, some households may not consider remittances as an extra income. In this case, they can deliberately choose to substitute others sources of earnings to remittances, in such a way that the household income without transfers would decrease. The incidence of child labour would therefore be unchanged.

In the medium term, remittances can be used as a safety net for mitigating adverse impacts on living standard. Households rely on several means to anticipate or cope when a shock occurs. One of these strategies consists of varying the supply of child labour, depending on needs (Guarcello et al., 2003; Dehejia et al., 2005; Beegle et al., 2006; Duryea et al., 2007, Boutin, 2012). In a context of imperfect capital markets, remittances can play an essential role by enabling poor households to diversify their sources of income. Indeed, migrant transfers constitute a kind of insurance against potential shocks and losses (Yang, 2008; Chami et al., 2009 ; Mohapatra et al., 2009). In fact, remittances could be strongly counter-cyclical (Ratha, 2005). Some observe that remittance transfers increase when a country is hit by natural disasters, conflicts or economic crisis variations (Ebeke, 2010). Less volatile than any other capital flows, remittances arrive directly into the pockets of the household, since transfers are not taxed (Ratha et al., 2007). For the poorest, remittances represent a stable source of funding, that is unaffected by meteorological or labour shocks. Remittances can therefore smooth the educational consumption and release additional funds to cope with shocks. As a consequence, households tend to be less dependent on children income (Calero et al., 2009).

² The negative relationship between parental poverty and child labour, through the luxury axiom, is not always verified: some empirical studies highlight contradictory results (Edmonds, 2005; Beegle, Dehejia, and Gatti, 2006).

In the longer term, remittances modify the consumption and investment behaviour. They create a new distribution of assets that can affect other sources of income and thus impact the total household earnings (Lachaud, 1999). By relaxing financial constraints, remittances are likely to encourage investments in physical capital (Taylor and Lopez-Feldman, 2010; Cox-Edwards and Ureta, 2003; Woodruff and Zenteno, 2007). For example, the extra income from remittance transfers can finance inputs or investments in microenterprises. The effect on child labour is thus imprecise, especially in rural areas. In some cases, increasing the production capability of small household farms leads to a greater children vulnerability to work. Incentives to hire their own children are large in the absence of perfect land and labour markets. If the incentive effect is greater than the wealth effect induced by remittances, the incidence of child labour paradoxically should be higher in remittances recipient households.

The extra income from remittance transfers may also cover the basic needs and free up some money which can be spent on education, particularly to finance direct and opportunity costs of schooling (Giuliano et al., 2009; Ebeke, 2010). Various studies have shown that remittances are associated with an increase in school attendance (Acosta, 2006 ; Calero et al., 2009 ; Dimova et al., 2008). The likelihood for a child to acquire human capital (more specifically through education) increases with the alternative and external funding source that constitutes remittances. However, a greater probability of attending school doesn't necessarily mean a lower probability to work. The relations between school attendance and child labour are complex and far from being antagonist: a significant proportion of African children cumulates both activities (work and study) or is inactive, i.e. doesn't attend school neither goes to work. Besides, the identified behaviours aren't systematically adopted: remittances recipient households have often been accused of behaving as "rentiers", consuming conspicuously without investing in human or physical capital.

To sum up, the impacts of remittances on child labour are ambiguous and require further analysis in this respect. The issue is getting even more complex when the effects of a household member migration aren't separate from the remittances' ones. A valuable evaluation of the impact of remittances on children's outcomes needs to take this distinction into account.

3. Measuring the effects of remittances: econometric methodology

Our methodology differs from previous literature in three different ways. First, the endogeneity of migration decisions with remittances complicates the estimations. These two

separate events are often driven by similar factors, which make their identification more complex. However, remittances and migrations affect the children's human capital accumulation differently. Indeed, by relaxing household income and capital constraints, remittances can help migrants' families improve their living standard and welfare and finance schooling. At the same time, migration can introduce new vulnerabilities since the absence of a family member due to migration is likely to have consequences on children's psycho-social development and their performance at school. Parental absence might also result in family disintegration and less supervision of children (UCW, 2010). In other words, migration might have disruptive effects on the life of a household, with a number of potentially negative consequences on children's schooling and labour supply. The difficulty consists of separating the two events. Fortunately, in Niger, only 14 per cent of the households receive remittances from a family member who has emigrated. Most Nigerien children belong to non-migrant remittance recipient households. Thus, we focus on children residing in non-migrant households, in order to delineate and to isolate the impact of the receipt of remittances from the effect of family migration.³ A second advantage of this method is that the simultaneity problem, frequently observed in remittances and migration studies, is prevented. Indeed, decisions regarding migration, education and labour supply are taken simultaneously, making difficult to establish a causality link. Thus, variables inducing migration may also influence school attendance (Adams, 2011). The simultaneity problem is avoided (or at least attenuated) when households don't have migrant members.

Secondly, our estimations take into account the effects of shocks. As explained in the previous section, households in developing countries adjust the school attendance and labour force participation of their children to absorb the impact of negative shocks. Recent empirical works also bring to light the importance of remittances as a coping mechanism against shocks. Transfers provide insurance against adverse shocks by diversifying the sources of household income (Yang, 2008; Chami et al., 2009; Mohapatra et al., 2009; Ebeke, 2010). Thus, we can reasonably assume that remittances increase the capacity to cope with shocks and induce by this way, a reduction in child labour. To assert this assumption, we test in this paper if the remittances impacts on children's activities differ according shocks occurrence⁴.

³ This method has been recently used by Amuedo-Dorantes and Pozo (2010). The dataset used (ENBC 2007) allows us to focus on non-migrant households, with no actual loss of statistical significance. In Niger, 86% of households receive remittances from a non-member household.

⁴ Despite the relevance of this issue, to date only one study links shocks, remittances and human capital accumulation. Calero et al. (2009) estimate how remittances affect human capital investments through relaxing

Thirdly, we use a Propensity Score Matching method to calculate the average treatment effect of remittances on the children's activities decisions (Appendix B). Ideally, a rigorous study of the remittances' impacts on children's time allocation would theoretically be able to observe changes relative to children's work and schooling before and after a household receives remittances. Unfortunately, available data does not allow us to gauge this. To solve this problem, we use a quasi-experimental approach to identify the effects of remittances on children's time allocation, namely the propensity score matching analysis⁵. Its chief purpose is to quantify the average effect related to the receipt of remittances by matching remittance receiving households with households with similar characteristics that do not receive remittances. The basic idea is to assume that receiving remittances is similar to a "treatment", so that we may estimate an average treatment effect on the probability of a child working for example. In this way, we want to compare the probability of working, for a child belonging to a remittance receiving household versus that for a child not belonging to remittance receiving household. The difference will then be attributed to the existence of remittances. The PSM approach is now widely used because it helps to reduce the bias inherent in the non-observation of counterfactual outcomes (Rosenbaum and Rubin, 1983; Deheija et al., 2002).

We use this approach to avoid the identification problem generated by a simple comparison of households that receive remittances and households that do not. Indeed, remittance receipts could be correlated to several unobservable factors. These same factors can determine the decision to send children to school or to work. We follow the Rosenbaum and Rubin approach (1983), by first estimating, with a logit model, the probability of receiving remittances

resource constraints and facilitate households in consumption smoothing by reducing vulnerability to economic shocks. Their study is focused on Ecuador and suggests that households tend to increase economic activities in response to the shocks, whereas remittances are used to finance schooling when the remittance-receiving household faces to adverse shocks.

⁵ When panel data is not available, using estimation strategy to identify remittances' impact can solve the endogeneity bias. Instrumental variables have been used in a number of studies (Acosta, 2006; Hanson and Woodruff, 2002; Mansuri, 2006; McKenzie and Rapoport, 2006; Calero et al., 2009). The main difficulty with the instrumental variables approach is to find a suitable instrument that determines remittances receipt without being affected by the outcomes determinants. We cannot replicate instruments used in the previous literature (such as for example trans-national networks, historical migration rates, presence of migration networks, source countries of the remittances), because this information is not at our disposal. Besides, the regional variation in availability of Western Union bank offices, used by Amuedo-Dorantes and Pozo, (2006) and Calero et al. (2009) means little in the African context, where the majority of remittances flows through informal channels. In the same vein, access to formal banking system is correlated to local economic environment, and thus to child labour (Manacorda and Rosati, 2010). Distinguishing remittances from migration add a second level of difficulties, because we need to find an instrument explaining why a non-migrant household receive more remittances than another non-migrant household. As a result, faced with the impossibility of finding an appropriate instrument, we prefer using in this study the propensity score matching method.

according to individual and household characteristics. We then rank individuals by their propensity score and pair recipients, with other individuals with similar characteristics but non recipients, to finally calculate the average difference in schooling or work participation. The matching procedure uses Epanechnikov kernel weights and different bandwidths have been tried. Besides, standard errors have been corrected via bootstrap techniques⁶. Note that in the survey, remittances are defined at the household level. As a consequence, we assume that a child is affected by remittances as long as the household to whom he belongs is also affected. In terms of propensity score modelling, it implies that the treatment variables have to be assigned at the level of households, even if we want to analyse their effects on children. Summary measures of child labour or school attendance, such as the proportion per household of children going to school and/or to work, is thus appropriate.

4. The influence of remittance on children's time allocation: evidence from Niger

4.1. Remittances, children's activities and shocks occurrence in Niger: a descriptive analysis

Remittances flows to Niger have picked up intensity over recent years, increasing from \$25 million in 2003 to \$79 million in 2007 (World Bank, 2011). The ENBC 2007 survey teaches us that nearly half of households, which have at least one child aged from 7 to 14 years old (46 per cent), receive remittances⁷. Contrary to popular belief, money transfers come mainly from relatives residing in another region in Niger (47 per cent), or in another African country (50 per cent). Only 3 per cent of the remittances come from relatives that have emigrated to Europe. These money flows are mainly irregular (in 75 per cent of cases) but migrant remitters do not claim a repayment (in 97 per cent of cases): the main motivation observed for sending remittances is to support their family's needs (in 75 per cent of cases). It should be said that Niger is an extremely poor country: more than nine million Nigeriens live on less than one dollar a day. This vast landlocked and desert country is highly susceptible to climate hazards. Drought, desertification and insect invasion penalize household income, especially in

⁶ For further details, a complete methodology explains in Appendix B the different steps of the PSM procedure. The theoretical basis on which our empirical estimates will rest is well known, and no new insight is gained by presenting a formal model. We will therefore just refer to the literature cited above for further details.

⁷ The analyses in this and the remaining sections is based on data from the 2007 Niger *Troisième enquête nationale sur le budget et la Consommation des ménages (ENBC 2007)*, a nationally representative household-based survey designed to study living standards and poverty levels.

rural areas. The country has faced on average with one shock in production every five years (WFP, 2010). In 2006, one remittances receiver household out of six has experienced an income shock.

Niger is also characterized by a young population: half of its population is less than 15 years old. Inevitably, the incidence of child labour is high: nearly four children out of ten, aged 7 to 14 years old, worked at least one hour the week before the survey (Table 1). Working appears very time intensive for children: those performing economic activity do so for over 31 hours a week on average. School is often viewed as inaccessible, too costly or of poor, and therefore is not seen as being worth the investment of the children's time. As a consequence, only one child out of two goes to school. Actually a large proportion of children cumulates economic activities and school attendance (20 per cent). Besides, 20 per cent of 7-14 years olds are "inactive", that is to say not involved in economic activities, nor in schooling⁸.

Table 1. Child activity status, by gender and residence, remittances recipients and shocks occurred, 7-14 years old (%).

<i>Activity status</i>	<i>Eco. act. exclusively</i>	<i>School exclusively</i>	<i>Both activities</i>	<i>Neither activity</i>	<i>Total eco. active^(a)</i>	<i>Total school ^(b)</i>
Boys	23,6	40,4	22,2	13,9	45,8	62,5
Girls	27,3	30,8	16,6	25,2	43,9	47,4
Niamey	7,7	62,6	21,2	8,5	28,9	83,8
Urban area (except Niamey)	10,5	66,3	14,4	8,9	24,8	80,7
Rural area	28,5	30,5	19,6	21,4	48,1	50,1
Household receiving remittances	26,5	34,4	20,2	18,8	46,8	54,6
Household non receiving remittances	24,2	37,2	18,6	20	42,8	55,8
Household faced with at least one shock	27,8	33	20,1	19,2	47,8	53,1
Household never faced with a shock	22,7	38,9	18,8	19,7	41,5	57,7
Total	25,4	35,7	19,5	19,4	44,9	55,2

Notes: (a) Refers to all children in economic activity, regardless of school status; (b) Refers to all children attending school, regardless of work status

Source : *Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger*

⁸ Inactivity may contain children engaged in non-economic activities, and specifically household chores, or children working in the "informal" sector or as unpaid family workers, which are complex to capture in this survey.

While there is surprisingly little difference between working boys and girls in the 7-14 years age group, girls are less likely to attend school than boys (47 per cent versus 63 per cent). However, a high proportion of girls may perform household's chores. Unfortunately, the ENBC 2007 survey doesn't allow us to take into account this type of activity. Children's time use patterns are also influenced by the area of residence. Children's involvement in economic activity and in schooling is largely a rural phenomenon. Moreover, the proportion of inactive children reaches 21 per cent in rural areas, that is to say two or three times higher than in urban zones. As a consequence, children living in cities and towns are more likely than their rural counterparts to attend school, at every age and for both sexes. Table 1 details also the time use patterns of children, according to remittances received and shock experienced. Differences by remittances receipt in enrolment and economic participation of children are large: children belonging to remittances recipient households are less likely to attend school than those belonging to non-recipient households (difference of one percentage point), but they are more likely to participate in the labour market (47 versus 43). Besides, enrolment rates are relatively lower among children from households that have experienced a shock recently (58 per cent versus 53 per cent), while the proportion of working children is higher in households that have experienced a shock. These results confirm that the withdrawal of children from school is one of the most used resilience strategies in Niger.

The descriptive statistics presented above provide an overview of children's activities according some household characteristics, but don't allow us to assert a causal relationship between remittances and children's time allocation. The following sub-sections present the estimates from the PSM implementation.

4.2. Remittances 'impacts on human capital accumulation and child labour

Results presented in Table 2 suggest that remittances influence human capital investment. Receiving remittances increases the proportion of children attending school by about 5 per cent. The household, thanks to the extra money provided by remittances, is able to finance direct and indirect schooling costs. These results are consistent with those generally observed in other countries⁹. However, the expected negative effect of remittances on labour market participation is not verified here: the estimates show that the average effect of

⁹ A growing body of studies has shown that remittances are often associated to an increase in school attendance (Acosta for El Salvador, 2006; Yang for the Philippines, 2005 ; Calero et al. for Ecuador, 2009 ; Dimova et al. for Tanzania, 2008 ; Bayot for Mexico, 2007; Amuedo-Dorantes for the Dominican Republic, 2010; Parinduri et al. for Indonesia, 2011).

remittances on the decision to send a child to work is positive (+ 3 per cent). Indeed, the proportion of working children is higher in a remittances recipient household. More specifically, we observe that remittances influence in a positive way the participation to both activities (schooling and working, + 15 per cent), whereas the average proportion of inactive or working exclusively children is lower than in the control group (respectively -14 per cent and -10 per cent). The effect of remittances is less important on children attending school exclusively, suggesting that remittances recipient households decide to put their children to work without automatically retiring them from school.

Table 2. Remittances impact on children's time use pattern (kernel matching)

Activity Status	Treated group N=1204	Control group N=1503	ATT	Relative difference (%)	St. Dev. (boots.)	t
Work exclusively*	19,8	23,1	-0,03	-14,2	0,01	-2,4***
School exclusively*	19,8	22,1	-0,02	-10,1	0,01	-1,89*
Both activities*	38,4	33,5	0,05	14,8	0,02	3,11***
Inactive*	13,7	13,5	0	1,1	0,01	0,14
Total eco. activities*	58,3	56,6	0,02	2,9	0,02	0,91
Total schooling*	63,5	60,3	0,03	5,3	0,02	1,95**

* Note that the propensity score estimator is defined at the household level. Thus, these outcomes variables are as well defined at this level. For example, the variable "work exclusively" refers to the proportion in the household of working children aged 7 to 14 years old that are not attending school.

Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

To summarize, children belonging to remittances recipient households are more likely to attend school, but also to participate in economic activities¹⁰. These findings are robust regardless of gender or place of residence (Appendix C). Several reasons can be found to explain why parents do not retire their offspring from work, despite the extra money provided by remittances. One possible explanation is that the amount of remittances is not considered high enough by the household to substitute it for the child's work income contribution. Besides, the frequency of the remittances receipt can be viewed by households as too irregular to substitute the children income. Only one quarter of households receive remittances in a regular way. The irregularity of remittances can encourage the household to diversify his risk prevention and coping strategies and therefore explain why parents let children work.

¹⁰ Consequently, time dedicated to leisure or to domestic work should decline. Unfortunately, we are not able to measure it with the available data.

Moreover, episodic inflows of money foster investments, either in human capital or in household enterprises (Adams, 1998). But child labour tends to increase when a household owns a business, especially in African rural areas (Boutin, 2012). In the absence of perfect land, labour and credit market, households show a clear preference for their own children. Children are an easy and cheap way to face market failures, and incentives to hire their own children are numerous. For example, work in farms is seasonal and households, especially those holding large areas of land, may regularly be confronted by a lack of labour supply. It is easier for poor households to engage their own children, a workforce still at their disposal. Even for richer households, moral hazard concerns may induce a preference for the familial workforce. In fact children are often considered as easier to manipulate, to supervise and less likely to commit thefts (Deolalikar and Vijverberg, 1987).

Another reason can be found to explain the fact that the probability to have working children increases if the household is remittances recipient. As child labour is a part of a strategy aimed at minimising adverse income fluctuations (Guarcello et al., 2003; Grootaert and Kanbur, 1995), the remittances effects on children should be different if the household has recently experienced a shock. In order to assert this hypothesis, new estimations have been made according to the shocks occurrence¹¹.

Table 3 indicates that when a household has not recently experienced a shock, receiving remittances stimulates in great proportion child participation in economic activities, while school attendance increases thinly. In other words, the average effect of remittances on child work is positive in the absence of shocks. Economic activities are also performed in a more intensive way (one more hour on average) when children belong to remittances receiving households that have not recently experienced a shock. Surprisingly, the proportion of inactive children and that of children attending school exclusively decline drastically (-11 per cent and - 24 per cent respectively). From all accounts, it seems that, in the absence of shock, remittances aim at stimulating investments in familial businesses. These trends hold when a distinction by gender and place of residence is established, which meant that for numerous households, employment opportunities are created thanks to remittances (figure A1 in Appendix C).

¹¹ The “shock experienced” variable includes any type of shock (collective and idiosyncratic) experienced the year before the survey (i.e. in 2006), that leads to a welfare or an income losses, or a decline in household consumption.

Table 3. Remittances ' impacts on children's time allocation according to the occurrence of shocks (kernel matching method)

Activity status	Treated group	Control group	ATT	Relative difference (%)	St. Dev (Boots.)	z
No shock experienced		N=462	N=537			
Work exclusively*	25,1	23,7	0,01	6,0	0,02	0,61
School exclusively*	17,4	22,7	-0,05	-23,6	0,02	-2,42
Both activities*	31,4	25,3	0,06	24,2	0,02	2,7
Inactive*	16,4	18,4	-0,02	-10,9	0,02	-1,02
Total eco. activities [†]	56,5	49	0,08	15,4	0,03	3,01
Total schooling [†]	54,6	54	0,01	1,1	0,03	0,18
Intensity eco. act.	19,3	18,4	1,0	5,3	0,85	0,61
At least one shock experienced		N=411	N=528			
Work exclusively*	20	27,7	-0,08	-28,0	0,02	-3,67
School exclusively*	20,2	19,1	0,01	6,0	0,02	0,5
Both activities*	33,8	31	0,03	8,9	0,03	1,08
Inactive*	16,9	13,9	0,03	21,1	0,02	1,32
Total eco. activities [†]	53,7	58,8	-0,05	-8,5	0,03	-1,69
Total schooling [†]	59,3	55,5	0,04	6,8	0,03	1,41
Intensity eco. act.	19,1	20,4	-1,2	-6,1	1,07	-1,25

* Note that the propensity score estimator is defined at the household level. Thus, these outcomes variables are as well defined at this level. For example, the variable "work exclusively" refers to the proportion in the household of working children aged 7 to 14 years old that are not attending school.

Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

Estimates highlight another interesting results: children participation in economic activities decline when households have recently faced to a shock, whether in intensity (of one weekly hour) or in incidence (-8,5 per cent). School attendance rises (+7 per cent), as increases the number of inactive children. These results emphasize the insurance role of remittances, which allow keeping children at school, even when a shock is experienced. Besides, remittances are used as an alternative risk-coping strategy to child labour. The high increase of inactive children may hide a more complex reality: children can be employed in informal activities or can replace parents in performing household chores. The substitution mechanism, between child labour and remittances, in risk-coping strategy, affects as girls as boys but is more flagrant in rural areas. When a shock has occurred, urban differences in labour market participation between remittances receiving households and non-remittances receiving household are minimal. The explanation lies in the different nature of shocks experienced according the geographical area.

5. Conclusion and political recommendations

This paper aimed at analysing remittances' impact on Nigerien children's time allocation, using a recent (2007) national survey. Important methodological considerations affect the impact evaluation of remittances on children's time use patterns. To isolate the effect of remittances from those of migration, we exclude in the analysis households that receive remittances from a migrant family member. Propensity score matching technique was implemented to estimate the remittances' impact on the children's time outcomes, without having identification problems. Finally, we estimate different regressions, according to the sex of the child, the place of residence and the occurrence of shocks.

Results highlight the positive role of remittances on schooling in every scenario selected (with or without recent shocks experienced) and for various children's characteristics (gender and place of residence). Receiving remittances increases the probability of attending school by almost 5 per cent. By relaxing household incomes and capital constraints, remittances are likely to increase the opportunity for children to acquire human capital, which is consistent with results found in other studies (Amuedo et al., 2010; Yang, 2008; Calero et al., 2009). If remittances are seen as an exogenous income, thus results suggest that the main reason for non-attendance in Niger is financial-based. These findings provide valuable teachings in terms of policies aiming at expanding school attendance, which should focus efforts on transferring exogenous income and/or reducing direct and opportunity costs of schooling.

The remittances' effects on children's participation in economic activities are however much more complex: the net impact of remittances is positive, that is to say, the proportion of working children is higher in remittances recipient households. Why these findings are so different from intuition? We suggest that remittances received are re-invested in familial business, where the majority of child labourers are found. From a program effectiveness standpoint, every incentive aiming at promoting remittances' productive investments or at incorporating networks and remittances services within microfinance institutions (as in Ethiopia for example¹²) may induce adverse effects on child labour. A last estimation has revealed that the impacts of remittances on child labour vary sharply according to the

¹² IFAD, Oxfam Novib, the Microfinance International Corporation and the Association of Ethiopian Microfinance Institutions, have established a remittance network between three MFIs in Ethiopia and financial institutions overseas (mainly with the United States). The main objective was to develop innovative and productive rural investment channels and opportunities for migrants and community-based organizations through linking remittances to other financial services. <http://www.migration4development.org/fr/content/enhancing-microfinance-and-remittance-services-ethiopia>.

occurrence of shocks. Remittances mitigate cyclical tensions and are used as shocks absorbers. In this way, remittances appear to be a substitute for child labour as a coping strategy in an uncertain environment. Based on these results, we suggest that expanding social protection or others resilience mechanisms should curve the child labour incidence in Niger.

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Appendix A: Descriptive statistics

Table A1. Descriptive statistics of some variables used (Household having at least one child aged 7 to 14 years old)

Variable	Nb. Obs	Mean	Sd Dev	Min	Max
Household characteristics					
Poor household	3824	0,5	0,5	0	1
In land value (FCFA)	2590	7,9	1,5	3,4	13
Farmer	3824	0,4	0,5	0	1
Pastoralist	3824	0,4	0,5	0	1
Food vulnerable	3824	0,5	0,5	0	1
Shocks	3824	0,5	0,5	0	1
No access to social program	3821	0,2	0,4	0	1
Send remittances	3824	0,4	0,5	0	1
Nb of women	3824	1,8	1,3	0	12
Household head characteristics					
Age	3824	45,7	13,9	15	98
Age*âge	3824	2284,8	1389,2	225	9604
Woman	3823	0,1	0,3	0	1
Employed	3824	0,7	0,4	0	1
Low education level	3823	0,5	0,5	0	1
Localisation					
Rural	3824	1,5	0,5	1	2
Agadez	3824	0,1	0,2	0	1
Diffa	3824	0,1	0,3	0	1
Dosso	3824	0,1	0,4	0	1
Maradi	3824	0,1	0,3	0	1
Tahoua	3824	0,1	0,3	0	1
Tillabéri	3824	0,1	0,3	0	1
Zinder	3824	0,2	0,4	0	1

Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

Appendix B: The PSM approach

The propensity score matching approach defines a causal effect, by comparing Y^0 , the value of the outcome variable Y if the household is exposed to the treatment $T = 0$, and Y^1 , the value of Y if exposed to treatment $T = 1$. In our case of study, the treatment variable corresponds to receiving remittances. In other word, the dependent variable T is 1 if the household receives remittances and 0 otherwise. Let I index the households with at least one child aged 7 to 14. Y_i^1 is the value of the variable of interest when the unit i is subject to treatment (1), i.e. when the household receives remittances, and Y_j^0 is the value of the same variable when the unit is exposed to the control (0), i.e. when the household does not receive remittances. The approach consists of estimating the average treatment effect $ATT = E(Y^1 - Y^0)$, or more exactly the average treatment effect for subpopulations of individuals defined by the value of some variable, most notably the subpopulation of the treated individuals $ATT = E(Y^1 - Y^0 | T=1)$ ¹³. Denoting the number of controls matched with treated observation i by N_i^T , then the matching estimator of ATT is:

$$\Delta^{ATT} = \frac{1}{N^T} \sum_{i^T} \left[Y_i^1 - \sum_{j \approx i} \frac{1}{N_i^T} Y_j^0 \right]$$

More practically, the first step in the empirical exercise is the estimation of the propensity score, that is, the estimation of the propensity to be treated, where the treatment is receiving remittances. We use a logit model to estimate the probability to receive remittances¹⁴. We reduce our sample to household that have at least one child aged 7 to 14 years old. We also exclude household that receive remittances from a family members that has emigrated, to isolate the effect of remittances from those of migration¹⁵. The independent variables in the logit model, X , include factors that might affect whether or not the household receives remittances, as well as the children's time allocation. Variables used to determine the probability of receiving remittances are related to the household characteristics (poverty level,

¹³ We omit further details here for brevity and refer to the growing literature on matching methods (e.g., Rosenbaum and Rubin, 1983; Dehejia and Wahba, 2002; Heckman et al., 1997).

¹⁴ Results of the logit estimation are available upon request.

¹⁵ As explained in this paper, we look for separating the negative effect of the migration of a parent on children, and the expected positive effects of remittances.

land value in FCFA, farmer or pastoralist, food vulnerable, occurrence of shocks, access to social program, remitters and number of women in the household), to household head characteristics (sex, age, occupation and education level) and to the area of residence (regions)¹⁶. The second step consists of matching household in pairs and computing the difference of each pair of matched units, to finally obtain the average of all these differences (=the ATT). An estimator of the propensity score is pertinent only if it is possible to create a control group with similar characteristics. As far as the matching procedure is concerned, in the paper we use Epanechnikov kernel matching¹⁷. After estimating the propensity scores for the treated and for the comparison group, we plotted them to check the common support condition. We found that there were regions of no-overlapping support in the region of [0,083 ; 0.982].

Two conditions have to be established in order to be able to estimate the *Average Treatment on the Treated* (ATT) effect based on the propensity score (Rosenbaum and Rubin; 1983). Firstly, the *Balancing Hypothesis* means that for observations with the same propensity score, the distribution of pre-treatment characteristics must be the same across control and treated groups. That is, conditional on the propensity score, each individual has the same probability of assignment to treatment, as in a randomized experiment. Secondly, the *unconfoundedness* conditional on the treatment variables establishes that assignment to treatment is *unconfounded* given the propensity score. Thus, exposure to treatment and control is random for a given value of the propensity score. This second assumption is equivalent to the absence of selection bias based on unobservable heterogeneity. It is therefore a crucial issue to ensure that the balancing condition is satisfied, because it reduces the influence of confounding variables. Following Dehejia and Wahba (2002), we apply the method of covariate balance, i.e., the equality of the means on the scores and equality of the

¹⁶ In the estimation of the propensity score, we are not interested in the effects of covariates on the propensity score since the purpose of our work is to assess the impact of remittances on schooling and working outcomes. However, the choice of covariates to be included in this first step is an issue. Heckman et al. (1997) show that omitting important variables can increase the bias in the resulting estimation. Bryon et al. (2002) however recommended against over-parameterized models because including extraneous variables in the model used to characterize the likelihood of facing a shock will reduce the likelihood of finding a common support. As there are no guidelines on how to choose conditioning variables (Smith and Todd 2005), we selected X variables that affect both the outcomes and the participation in programs (i.e. receiving remittances) intuitively.

¹⁷ In fact, we use various matching procedure (nearest neighbor with and without replacement), kernel (Gaussian, bi-weight and Epanechnikov). As ATT weren't significantly differ according the matching procedure used, we choose to present only the Epanechnikov kernel results, as this matching procedure is more precise than the others.

means on all covariates, between treated and non-treated. The following table presents results of overall covariate balancing tests before and after matching. The standardized bias measure results show that the difference in propensity score of unmatched treated and control sample is close to 100% ($p < 0.001$). After matching the bias significantly reduced well below two per cent¹⁸. The bias is also significantly reduced for each covariate after matching compared to before matching. The balancing property of the estimated propensity score is thus satisfied.

Table A2. Balancing test and biases reduction before and after matching (kernel matching):

Variables	Before Matching				After Matching				Total bias reduction %
	Mean Treated	Mean Control	t-test	% bias	Mean Treated	Mean Control	t-test	% bias	
Household Characteristics									
Niamey	0.20	0.26	-3.54***	-13.90	0.20	0.20	0.57	2.20	84.10
Rural areas	0.54	0.52	1.15	4.50	0.54	0.55	-0.54	-2.20	51.10
Nb of women	2.23	2.04	3.46***	13.40	2.23	2.16	1.09	4.70	64.70
Send remittances	0.45	0.33	6.39***	24.90	0.45	0.44	0.66	2.80	88.80
Food vulnerable	0.26	0.23	1.78*	6.90	0.26	0.24	0.76	3.20	54.40
Income	0.55	0.52	1.55	6.10	0.55	0.56	-0.29	-1.20	80.40
Land owner	0.42	0.35	3.94***	15.40	0.42	0.46	-1.58	-6.60	56.90
Pastoralist	0.55	0.43	6.16***	24.10	0.55	0.53	0.62	2.60	89.40
Shocks	0.55	0.59	-1.93**	-7.60	0.55	0.54	0.54	2.20	70.50
Household Head characteristics									
Age									
Age * Age	49.68	46.21	7.08***	27.50	49.68	49.88	-0.35	-1.60	94.30
Woman	2650.10	2272.50	7.55***	29.20	2650.10	2670.30	-0.35	-1.60	94.70
Low education level	0.84	0.93	-7.47***	-28.60	0.84	0.84	-0.17	-0.80	97.20

Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

To assert the robustness of our regressions, we also performed a sensitivity analysis as proposed by Rosenbaum and Rubin (1983). This method allows us to assess the sensitivity of the causal effects with respect to assumptions about an unobserved binary covariate that is associated both with the treatments and with the response. We estimate the ATT for different

¹⁸ Although, we do not have a clear indication for the success of the matching procedure, in most empirical studies a bias reduction below 3% or 5% is seen as sufficient (Caliendo and Kopeining, 2008).

combinations of values for π , α and δ_{ti} (Table A3), where π represents the proportion of individuals with $U=0$ in the population. The distribution of U is assumed to be independent of X . This should render the sensitivity analysis more stringent, since, if U were associated with X , controlling for X should capture at least some of the effects of the unobservables. The sensitivity parameter α captures the effect of U on treatment receipt, while the δ_{ti} 's are the effects of U on the outcome. Given plausible but arbitrary values to the parameters π , α and δ_{ti} , we estimated the parameters γ and β_j by maximum likelihood and derived estimates of the ATT.

Table A3. Average Treatment Effects for “receiving remittances” for different values of the sensitivity parameters:

	$\alpha=0$ $\delta_{0W}=\delta_{1W}=0$ $\delta_{0S}=\delta_{1S}=0$ $\delta_{0WS}=\delta_{1WS}=0$	$\pi=0.1, \alpha=0.1$ $\delta_{0W}=\delta_{1W}=-0.1$ $\delta_{0S}=\delta_{1S}=0.1$ $\delta_{0WS}=\delta_{1WS}=0.1$	$\pi=0.5, \alpha=0.5$ $\delta_{0W}=\delta_{1W}=-0.1$ $\delta_{0S}=\delta_{1S}=0.1$ $\delta_{0WS}=\delta_{1WS}=0.1$	$\pi=0.1, \alpha=0.1$ $\delta_{0W}=\delta_{1W}=-0.5$ $\delta_{0S}=\delta_{1S}=0.5$ $\delta_{0WS}=\delta_{1WS}=0.5$	$\pi=0.5, \alpha=0.5$ $\delta_{0W}=\delta_{1W}=-0.5$ $\delta_{0S}=\delta_{1S}=0.5$ $\delta_{0WS}=\delta_{1WS}=0.5$
ATT					
Work exclusively	0,016	0,015	0,012	0,014	0,018
Study exclusively	-0,036	-0,039	-0,036	-0,037	-0,039
Work and study	-0,032	-0,030	-0,028	-0,026	-0,031
Inactive	0,056	0,060	0,061	0,055	0,058

Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

As can be observed the results are not very sensitive to a range of plausible assumptions about U . Setting the values of the association parameter to bigger numbers may change the obtained results. However, given the number of observed covariates already included in the models, the existence of a residual unobserved covariate so highly correlated with T and Y appears implausible.

Appendix C: Others estimations tables

Table A4. Remittances impacts on children's time allocation according to the child's gender (kernel matching method)

Activity status	Treated group	Control Group	ATT	Relative diff. (%)	Sd. Dev (Boots.)	z
Girls		N=656	N=788			
Work exclusively*	24,1	26,4	-0,02	-8,8	0,02	-1,2
School exclusively*	17,6	19,8	-0,02	-11,0	0,02	-1,2
Work and school*	31,4	27,4	0,04	14,5	0,02	2,2
Inactive *	16,6	16,3	0,00	1,7	0,02	0,1
Total eco. active *	55,5	53,8	0,02	3,1	0,02	0,9
Total study *	54,6	53,3	0,01	2,4	0,02	0,6
Boys		N=646	N=810			
Work exclusively*	19,9	23,3	-0,03	-14,9	0,02	-1,5
School exclusively*	19,9	21,0	-0,01	-5,2	0,02	-0,6
Work and school*	34,3	30,2	0,04	13,6	0,02	2,1
Inactive *	15,9	15,9	0,00	-0,5	0,01	-0,1
Total eco. active *	54,2	53,6	0,01	1,2	0,02	0,3
Total study *	60,3	57,5	0,03	5,0	0,02	1,4

* Note that the propensity score estimator is defined at the household level. Thus, these outcomes variables are as well defined at this level. For example, the variable "work exclusively" refers to the proportion in the household of working children aged 7 to 14 years old that are not attending school.

Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

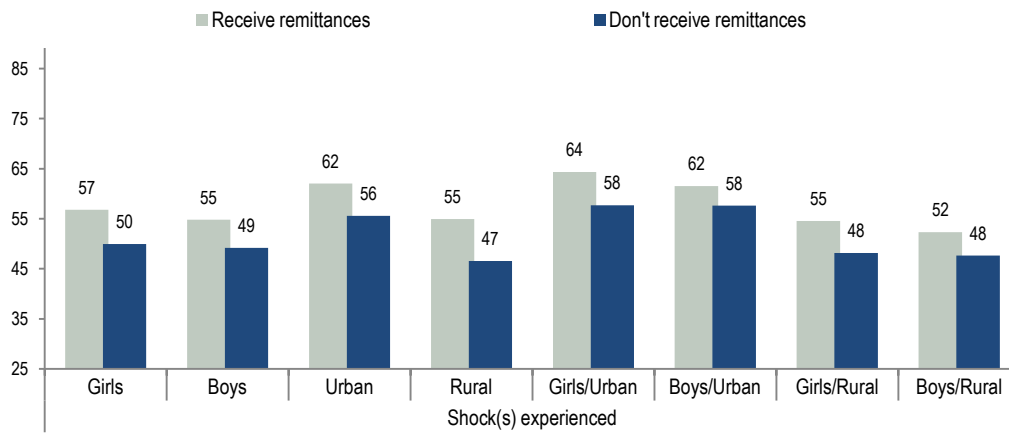
Table A5. Remittances impacts on children's time allocation according to the place of residence (kernel matching method)

Activity status	Treated group	Control Group	ATT	Relative diff. (%)	Sd. Dev (Boots.)	z
Urban		N=553	N=736			
Work exclusively*	11,8	13,9	-0,02	-14,8	0,02	-1,00
School exclusively*	22,8	27,1	-0,04	-15,7	0,02	-1,91*
Work and school*	52,3	48,3	0,04	8,2	0,03	1,46
Inactive *	6,4	5,3	0,01	20,5	0,01	1,00
Total eco. active *	64,1	62,2	0,02	3,1	0,03	0,66
Total study *	81,0	79,6	0,01	1,7	0,02	0,61
Rural		N=624	N=733			
Work exclusively*	27,1	29,6	-0,03	-8,6	0,02	-1,02
School exclusively*	17,4	19,2	-0,02	-9,1	0,02	-1,09
Work and school*	25,8	22,2	0,04	16,6	0,02	2,07
Inactive *	19,9	19,6	0,00	1,2	0,02	0,12
Total eco. active *	52,9	51,8	0,01	2,2	0,02	0,47
Total study *	48,2	46,5	0,02	3,6	0,02	0,79

* Note that the propensity score estimator is defined at the household level. Thus, these outcomes variables are as well defined at this level. For example, the variable "work exclusively" refers to the proportion in the household of working children aged 7 to 14 years old that are not attending school.

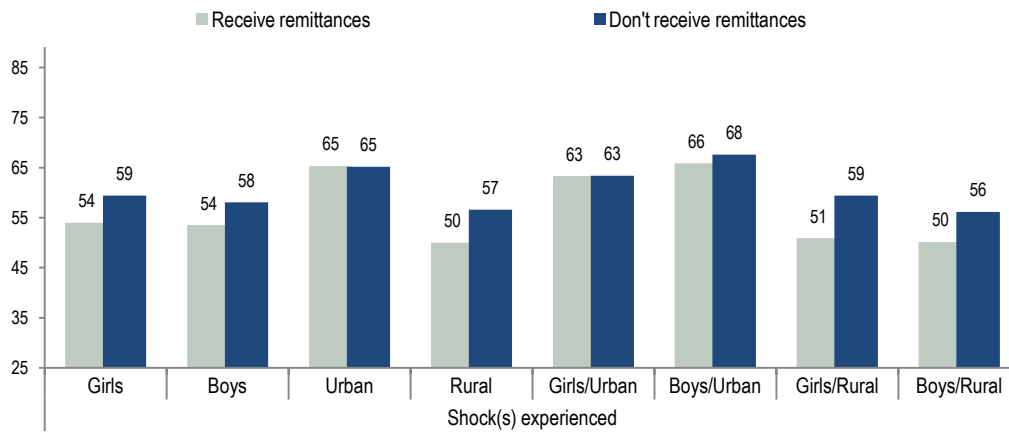
Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

Figure A1. Remittances impacts on child labour incidence for households that don't have experienced any shock (kernel method):



Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger

Figure A2. Remittances impacts on child labour incidence for households that have experienced at least one shock (kernel method):



Source : Enquête Nationale sur le budget et la consommation des ménages 2007, Institut National de la Statistique Niger