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Heterogeneous effects of international migration: evidences from Bangladesh.

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Abstract. Despite the general consensus regarding the important role played by international migration in the development of Bangladesh, little has been done to quantitatively estimate its effects. Within the framework of Rubin's causal model, this paper contributes to the literature estimating the net impact of international migration on the welfare of the members of households with migration experience. By taking advantage of the non-parametric nature of matching estimators, the effect of migration is disaggregated on the basis of expenditure quartiles and length of migration period. Additionally, the estimated counterfactual outcomes of migrant households are used to build a transition matrix showing the effect of migration on social mobility. The effect of migration turns out to be positive and statistically significant, even though its magnitude is considerably affected by technical assumptions regarding household economies of scale. International migration appears to be a risky strategy which, if successful, leads to a substantial increase of the well being of migrant households' members. Finally, moving on to normative considerations, the paper argues that the resources deployed for pro-migration policies do not directly benefit the poorer sections of the population.

Keywords: International migration; Counterfactual framework; Matching estimation; Bangladesh.

JEL codes: F22; O12; O15; O53.

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1. Introduction

Since the beginning of the nineties, Bangladesh recorded significant progress in terms of all main social and economic indicators. The growth of real incomes, along with remarkable improvements in health and food security, induced some scholars to talk about a "Bangladesh surprise" (Asadullah et al., 2014). During this period, the country experienced a profound change and the emergence of international migration can be considered one of the distinguishing features of such transformation. Indeed, over the 2000-2010 period, Bangladesh was the country that registered the highest average number of net emigrants per year (UN, 2013). The surge in migrants' remittances mirrored the increase in the stock of international migrants. Officially recorded remittances outweighed official development assistance in the mid-nineties (Mohapatra et al., 2010) and in 2013 they were worth more than 10% of national GDP. In the recent history of Bangladesh, international migration and economic development appear deeply interconnected. Low domestic wages, overpopulation and environmental vulnerability worked jointly as push factors for outward migration, which has become an increasingly common "livelihood strategy" for households and individuals (Siddiqui, 2003). On the other hand, even though migration is a result of the limited economic opportunities available domestically, it can also be regarded as a key factor for recent social and economic development in Bangladesh (Sadoulet et al., 2014; Bangladesh Bank, 2013; Siddique et al., 2012). Surprisingly, despite the general recognition of the potential contribution of migrants' remittances to the welfare of Bangladeshi households and despite the importance of Bangladesh itself as a "test case for development" (Faaland and Parkinson, 1976), the literature on migration and remittances has not yet produced a specific country-study. This paper contributes to the literature estimating the net impact of international migration on the welfare of the members of households with migration experience. On a methodological level, following the classic approach of welfare economics, the well being of the stayers is measured in terms of their command over goods and services, proxied by per capita expenditure. Migration decisions are interpreted on the basis of the new economics of labour migration approach and, as for the estimates, the study adopts the counterfactual framework based on Rubin's causal model. Whereas most studies employing matching estimation techniques have focused their analysis on the average treatment effect on the treated, this work takes advantage of the non-parametric nature of matching estimators in order to obtain a higher level of disaggregation in the results. Specifically, the impact of migration is disaggregated over time and by quartile of expenditure. In the second place, individual counterfactual outcomes of migrant households are used to build a transition matrix showing the effect of migration on migrant households' position in the Bangladesh's expenditure distribution. The paper finds that, on average, migration has a significant positive impact on the welfare of the household members, allowing them

to substantially improve consumption. The relative magnitude of the impact turns out to be higher for the households belonging to the lower expenditure quartile and it decreases for those in the second and in the third ones. For the households belonging to the richest quartile the impact is negative but not statistically significant. In addition, the impact of migration tends to grow over time, supporting the idea that, at least partially, remittances are directly used for productive investment. Sensitivity checks prove that the results are robust to the introduction of different equivalence scales, even if the technical choices regarding households' economies of scale may considerably affect the magnitude of the impact. Migration turns out to be successful in approximately half of the cases, while in one out of four cases migrant households fall in a lower expenditure quintile. Finally, it emerges that most of the international migrants come from relatively better-off households. With regard to policy implications, even if the impact of migration turns out to be positive, the lack of common support does not allow the results to be extended to the poorest households. Quite the opposite, the analysis shows that most of the factors which influence the probability of migration seem to be beyond the scope of any policy intervention, meaning that the resources allocated in pro-migration policies do not directly benefit the poorest households.

The analysis is based on the data collected during the 15th round of Bangladesh Household Income and Expenditure Survey (HIES), held in 2010/2011. Surveying 12,240 households (1,291 of which can be regarded as migrant households), HIES 2010 gathers a remarkable amount of individual information on both household members and migrants. This information, together with the large sample size and the favourable proportion of treated units, allowed to perform matching on an uncommonly generous number of covariates, mitigating the concerns about the plausibility of the assumptions on which the estimates rely. The rest of the paper is organized as follows. Section 2 explores the literature, sections 3 and 4 describe data and methodology, section 5 illustrates the empirical strategy, section 6 and 7 present the results and some policy considerations; section 8 concludes.

2. Literature review

The economic literature on migration and remittances is vast and the multidimensional nature of the subject, suitable of being investigated from different perspectives, favoured the emergence of several specific strands. Studies might differ on the basis of the fundamental unit of analysis they adopt, a criterion which allows to make a first broad distinction between microeconomic and macroeconomic works. While macroeconomic studies relate the aggregate flows of migrants and remittances to other aggregate variables such as exchange rates (Lartey et al., 2012) and GDP growth rates (Kumar and Stauvermann, 2014; Siddique et al., 2012), microeconomic works can be

further distinguished between those focusing on households and those which choose individuals as their unit of analysis. Another distinction can be drawn between works focusing on the countries of origin and those in which the attention of the authors dwells on the countries of destination. While some strands of the literature evaluate the impact of migration on socio-economic variables, other studies investigate the determinants of migration and remittances choices (Agarwal and Horowitz, 2002; Lucas and Stark, 1985; Sjaastad, 1970) or try to explain who migrants are and in what they differ from stayers (Borjas, 1987). Finally, even if migration and remittances can be conceived as the two faces of a same coin, it is possible to draw another distinction between that part of literature mainly focusing on migration, that part which concentrates on remittances and those works that tend to emphasise the simultaneity of the two phenomena. The great abundance of perspectives from which migration and remittances have been analysed greatly contributed to the understanding of these phenomena but, at the same time, the reader willing to understand the net effect of migration could feel a little bewildered. For instance, since migration and remittances are often treated separately, the strand of literature focusing on remittances tends to highlight their positive developmental impact whilst, viceversa, articles on migration are more likely to pay attention to the potential adverse effects of the phenomenon. However, this ambiguity is also due to the fact that, as pointed out by Hanson (2010), economic literature has still not been able to build a "Washington consensus" on migration and remittances. According to Ratha (2006), workers' remittances constitute the most tangible link between migration and the development of receiving countries, producing micro and macro direct positive effects. Indeed, the empirical evidence produced by several country-case (Bertoli and Marchetta, 2014; Combes et al., 2014; Jimenez-Soto and Brown, 2012; Lokshin et al., 2010; Brown and Jimenez, 2008) and cross-country (Acosta et al., 2008; Gupta et al., 2008; Adams and Page, 2005) studies shows that remittances can play an effective role in reducing poverty. Besides the direct welfare effect on recipient households, Adams and Cuecuecha (2013, 2010), investigating the uses of remittances, found that recipient households exhibit a higher marginal propensity to spend in investment goods. Another influential study, conducted by Giuliano and Luiz-Arranz (2009), proved that remittances flows might also constitute an alternative source of investment financing, especially in countries characterized by a low level of financial development. Moreover, because of their substantial volume and moderate volatility, remittances constitute a safe source of foreign-exchange earnings, increasing recipient countries' creditworthiness and improving their capacity to cope with capital flights (WB, 2006). As anticipated, notwithstanding the mixed finding regarding inequality (Acosta et al., 2008; Brown and Soto, 2008; Barham and Boucher, 1998) and exchange rates (Lartey et al., 2012; Amuedo-Dorantes and Pozo, 2004), literature focussing on remittances seems to have reached a certain degree of

consensus regarding their beneficial effects. On the other hand, since the literature on migration produced somewhat mixed results, it tends to be more cautious in associating migration and development. Actually, this strand of literature has identified a number of potential negative effects that migration could produce on sending countries' economic performances. In a study conducted on Mexico over a thirty-years period, Mishra (2007) estimated that workers' migration, while producing a small negative effect on GDP, has a major redistributive effect from capital to labor remuneration. On the other hand, "brain drain" literature tends to point out how migration might actually cause human capital depletion and, thus, could negatively affect long term GDP growth (Wong and Yip, 1999; Beine et al., 2001). In a recent study on Tonga, taking advantage of a natural experiment made possible by a visa lottery program, Gibson et al. (2011) found that migration of individuals produces a negative impact on the household members left behind. Other empirical studies (McKenzie and Rapoport, 2011; Giannelli and Mangiavacchi, 2010) drew attention to the negative effects that migration might produce on children's education through changes in parental care. The psychological costs of migration have also recently attracted the attention of health literature (Graham et al., 2015; Wickramage et al., 2015), which confirmed the existence of a correlation between migration and the incidence of mental problems in the household members left-behind. Moving toward a literature closer to the specific case of Bangladesh, adopting a VAR framework and controlling for reverse causality, Siddique et al. (2012) found a one-way positive causal relationship from remittances to GDP growth while Chowdhury (2011) demonstrated the existence of a similar relationship between remittances flows and financial deepening. The positive effects of remittances on economic growth are somehow consistent with the conclusions of Stahl and Habib (1989), who argued that even though remittances are used by recipient households only for consumption expenditure, nevertheless they can indirectly trigger investment through their boosting effect on aggregate demand. For what concerns the socio-economic implications of migration, gathering data from a survey on eight rural villages in Tangail and Comilla Districts, Mendola (2008) found that household involved in international migration were more prone to invest in modern agricultural technology. On the other hand, using a specific survey on Bangladesh rural households, Hadi (2001) argued that migration and remittances might be viewed as determinants of behavioural change in the traditional rural communities of sending areas, a change that may have prompted a relaxation of *purdah* (a word indicating the women's socially approved habits) and, consequently, the empowerment of Bangadeshi women.

3. Data

This study employs the data collected during the 15th round of Bangladesh Household Income and

Expenditure Survey (HIES), held between February 2010 and January 2011. HIES is a national representative survey conducted by the Bangladesh Bureau of Statistics (BBS) in collaboration with the World Bank and, containing a wide and deep range of socio-economic information both at the individual and household level, is considered the most accurate and comprehensive source of data for what concerns the social and economic accounts of Bangladesh households. In particular, HIES 2010 collects data on 12,240 households, for a total of 55,580 individuals. The questionnaire includes sections on expenditure, income, consumption, education, employment, health, households' assets and – among others – migration. The module on migration gathers a relatively large set of additional information on 1,372 international and 728 domestic migrants who, before migrating, were part of the surveyed households. On the basis of these information, (international) migrant households are defined as those households satisfying at least one of the two following conditions: *(i)* the household has reported to currently have one (or more) member migrated abroad; *(ii)* one (or more) member of the household is reported to have been abroad for more than six consecutive months during the previous five years. Since the aim of the analysis is to evaluate the impact of migration on the welfare of migrant households, condition *(ii)* prevents to discard from the pool of migrant households those families whose welfare is likely to be still affected by the migration experience of their recent past. Following this definition, it results that 10.4% of Bangladeshi households can be considered as "migrant households". It also turns out that, among households satisfying condition *(i)*, the average number of migrants is 1.18 and almost all of them (98.4%) are male. In general, the share of migrant households which received remittances in the previous twelve months is 82.0%, but it raises to 91.7% considering only the subgroup of migrant households which satisfy condition *(i)*. It should also be noted that, adopting households (rather than individuals) as unit of analysis, the present work implicitly adheres the framework on the new economics of labor migration (NELM). This framework, pioneered by Stark (Stark and Levhari, 1982; Lucas and Stark, 1985; Stark and Lucas, 1988) in relation to rural-urban migration, models migration as the outcome of a dynamic contract between migrants and their families, implying that migration decisions are collectively taken at the household level.

Table 1. Households' descriptive statistics

	Overall	Non migrant	Migrant	Matched
Household size	4.65	4.51	5.89	5.96
Kids (aged 6-17)	1.29	1.28	1.40	1.39
Male adults (aged 18-45)	0.98	0.91	1.58	1.63
Male adults (aged 46-65)	0.34	0.33	0.42	0.42
Female adults (aged 18-45)	1.02	1.00	1.19	1.17
Female adults (aged 46-65)	0.30	0.29	0.44	0.46
Adults, old (aged 66+)	0.19	0.18	0.25	0.26
Years of education, adult males	4.36	4.37	4.28	4.66
Years of education, adult females	3.63	3.52	4.50	4.55
Urban (municipality)	26.80%	27.02%	24.94%	24.48%
Urban (metropolitan area)	9.15%	9.48%	6.35%	7.23%
Muslim	87.79%	86.94%	94.97%	95.22%
Landless	6.38%	6.85%	2.40%	2.35%
Semi-landless (<0.05 acres)	23.25%	24.60%	11.85%	11.83%
N	12,240	10,949	1,291	3,873

Source: Author's calculations, HIES 2010.

4. Methodology

The starting point of any well-being analysis regards the choice of a reference welfare indicator. Consistently with economic theory, this research considers the well-being of individuals in terms of their command over goods and services, which can be conceived as the inputs of their utility. Both income and consumption allow to convey individuals' command over good and services into a monodimensional money-metric measure and, among the two, per capita consumption (proxied by per capita expenditure) turns out to be the most appropriate. Indeed, with respect to income, consumption is less subject to measurement errors and it is characterised by a much lower short-term volatility. Since consumption smoothing is the outcome of households' intertemporal utility maximization choices, consumption can be considered a better approximation of households' level of welfare. It is worth noting that, because of households' maximizing behaviour, expenditure should (at least partially) discount for the lumpy cost needed for financing migration. On a theoretical level, per capita consumption can be formalised as

$$Y_i = e(p, u_i) / d(x_i)$$

where $e(.)$ is the household expenditure function, $d(.)$ is the equivalence scale function, p is a n-dimensional vector containing the prices of all the goods and services available in the market, x is a k-dimensional vector of relevant household characteristics and u is the (maximised) level of utility of the household. Total expenditure function is defined as $e : \mathbf{R}^n_+ \times \mathbf{R} \rightarrow \mathbf{R}_+$ featuring all the desirable proprieties of an expenditure function (*nondecreasing*, *continuous*, *concave*, *homogeneous*

of degree 1 in *p*). The equivalence scale function, defined as $d : \mathbf{R}^k \rightarrow \mathbf{R}_+$, is meant to standardises household size on the basis household characteristics, allowing to make comparable the welfare of members belonging to households which differ in size and demographic composition. In practice, per capita consumption is estimated from the consumption section of the household survey. HIES 2010 has modules on daily food consumption, modules on weekly food consumption, a module of monthly non-food expenditure, a module of annual non-food expenditure (including imputed rents) and an inventory of durable goods owned by the household. While only some of them provide information on the quantity and/or the quality of the goods/services consumed, all of the modules provide the money value of the items, a feature that makes the computation of the annual expenditure relatively straightforward. Since the dataset does not provide sufficient information to implement a rental equivalent approach, following Deaton and Zaidi (2002), the consumption flow of durable goods is estimated assuming an annual depreciation rate of 10%. For what concerns the equivalence scale function, the most elementary one simply returns the number of household members (an information contained in *x*). On the other hand, less trivial functions, justified by technical assumptions regarding households' economies of scale and using more of the information in *x* (i.e. the age of members), return positive scalars which are less then or equal to the household size. The equivalence scales adopted in the paper are described in OECD (2013).

The impact of migration and remittances on household welfare can be evaluated by comparing the measures of the reference indicators actually observed with those which would have been witnessed in a no-migration counterfactual scenario. The key assumption behind all the analyses conducted in a counterfactual framework is that every analytical unit belonging to the population of interest has a potential outcome under each treatment state (Morgan and Winship, 2007). Adopting this framework, the impact of the exposure to a treatment (with respect to the exposure to an alternative set of causes) on a given analytical unit is the difference between the potential outcomes associated to the two treatment states. Since it is possible to observe (at most) only one outcome for each unit, causal inference can be conceived as a problem of missing data (Imbens and Rubin, 2015) and such impossibility of observing all the potential outcomes simultaneously is commonly known, in counterfactual literature, as the fundamental problem of causal inference (Holland, 1986). In the case of a binary treatment, the observational rule for the outcome of the variable of interest Y can be analytically formalised as:

$$Y_i^{obs} = D_i Y_i^{(1)} + (1 - D_i) Y_i^{(0)}$$

where $Y_i^{(0)}$ and $Y_i^{(1)}$ indicate the two potential outcomes of the variable of interest of the *i*-th observation and D_i is a binary variable indicating the exposure to one of the two alternative sets of causes, labelled as treatment (D_i=1) and control (D_i=0). In the present analysis, the variable of interest is the logarithm of per capita expenditure (computed on a household-level basis) while the treatment is defined as currently having, or having had in the previous five years, at least one international migrant in the household. It follows that, by definition, treated and migrant households coincide. As the observational rule imposes, for every individual it is possible to observe either $Y_i^{(0)}$ or $Y_i^{(1)}$, depending on whether the *i*-th household has been exposed to the treatment. It follows that, for each household, the effect of the treatment is defined as:

$$\tau_i = Y_i^{(1)} - Y_i^{(0)}$$

Since the research aims to evaluate the impact of migration and remittances on each migrant household, the fundamental quantity of interest is

$$\tau_i^{treat} = (Y_i^{(1)} - Y_i^{(0)} \mid D_i = 1)$$

that can be obtained estimating the unobserved potential outcomes ($Y_i^{(0)}$) of migrant households. The estimator for individual treatment effects is illustrated in section *5.12* . The expected value of τ_i^{treat} is the average treatment effect on the treated (ATET) that, formally defined as

$$\text{ATET} = E\left(Y_i^{(1)} - Y_i^{(0)} \mid D_i = 1 \right) ,$$

represents the average impact of migration and remittances on the welfare of the migrant households members expressed in percentage change of per capita expenditure. In order to estimate the effect of migration on households belonging to different quartiles of expenditure or characterized by a different length of exposure to the treatment, the expected value of the treatment effect is conditioned not only by the exposure to the treatment, but also on the set of condition Θ_i . The estimator is thus defined as

$$\text{ATET}_{|\Theta} = E\left(Y_i^{(1)} - Y_i^{(0)} \mid D_i = 1, \Theta_i \right)$$

where Θ contains the set of additional conditions, e.g. the quartile of expenditure of the household in the counterfactual scenario.

The first attempt to use a counterfactual framework in an empirical analysis on migration and remittances is due to Barham and Boucher (1998), who estimated their effect on income inequality in Nicaragua using Heckman's sample correction to address migrants' self-selection. As pointed out by migration literature, the estimation of the impact of migration and remittances on the welfare of those left behind raises a series of methodological issues. Following the classification provided by Adams (2012), these issues can be summarised as those arising because *(a)* the simultaneity of the decisions regarding migration with other choices (i.e. labor supply, education, fertility, etc.) that also influence the outcome of the variable of interest, *(b)* the self-selection of migrants, whose individual and household characteristics systematically differ from those of non migrants, *(c)* the reverse causality nexus between poverty and migration/remittances (see also Angelucci, 2015) and *(d)* the presence of relevant omitted/unobservable variables. On a theoretical level, a randomised experiment would allow to overcome all these difficulties and to estimate an unbiased average treatment effect (ATE = $E\ (Y_i^{(1)} - Y_i^{(0)})$), but the nature of migration phenomenon makes this solution infeasible. Natural experiments, which allow to fully overcome the problem of self-selection and to estimate an unbiased ATET, can be considered as the first-best feasible methodological solution. Unfortunately natural experiments in this field are rare and the few, as in the case of the New Zealand's visa lotteries for Samoans and Tongans, have been heavily exploited (Gibson et al., 2013, 2011, 2010; Stillman et al., 2009). In addition, even if these studies adhere to the best methodological practice, the very low number of available natural experiments does not allow scholars to focus their analyses on more representative case-studies. In the absence of available natural experiments, regression-based approaches result to be the most common methodological solution. In these cases, the variable of interest is expressed as a linear function of a set of exogenous explanatory variables. Regression-based approaches relate causality with the notion of *ceteris paribus* (Wooldridge, 2010) and, usually, the treatment effect is estimated with the coefficient of the treatment indicator. In order to address the above-mentioned methodological issues, it is usually implemented the Heckman's correction procedure (Heckman, 1979) or, alternatively, scholars resort to instrumental variables (IV) estimator. In practice, since the relevance of the instruments can only be tested from a statistical point of view and their exogeneity can not be tested at all, finding appropriate instrumental variables turns out to be everything but easy (Jalan and Ravallion, 2003). On the other hand, as pointed out by Puhani (2000), the results obtained using a Heckman's two-stage model may be misleading when normality assumption is violated, resulting in the not uncommon situation of a significant correlation between the explanatory variables of the selection rule equation and the dependent variable of the outcome equation.

Matching methods allow to estimate the unobserved potential outcomes of treated observations on

less demanding assumptions. Conditional independence is the fundamental assumption behind these methods and requires that, after controlling for an appropriate set of exogenous covariates *X*, potential outcomes are orthogonal to treatment assignment (the migration status of the household). Formally:

$$(Y_i^{(0)}, Y_i^{(1)}) \perp\!\!\!\perp D_i \mid X_i$$

Conditional independence is a necessary but not sufficient condition to implement matching methods in observational studies, which additionally require the observable nature of the set of covariates *X*. This hypothesis is usually referred to as selection on observables assumption[1]. Under selection on observables, it is possible to estimate the treatment effect matching treated units with untreated ones which exhibit the same value of *X*. Since X_i is a *k*-dimensional vector, the probability of finding a match between treated and untreated units on the basis of X_i exponentially decrease with the increasing of *k* (and falls to zero in presence of continuous covariates). This difficulty, commonly referred to as "curse of dimensionality", has been addressed by Rosenbaum and Rubin (1983), who defined a function $f: \mathbf{R}^j \rightarrow \{ \mathbf{R} \cap (0, 1) \}$ such that

$$f(X_i) = Prob[D_i = 1 \mid X_i]$$

and demonstrated that

$$(Y_i^{(0)}, Y_i^{(1)}) \perp\!\!\!\perp D_i \mid f(X_i)$$

where $f(X_i)$, the propensity scores, represent the unit-level probability of selection into the treatment. Propensity scores can be estimated with a probability model and allow to match households on the basis of a monodimensional measure, overcoming the dimensionality problem. Indeed, each migrant household can be matched with one or more households which share the same characteristics except for the exposure to the treatment. The outcomes of matched untreated households can thus be used to estimate the unobserved potential outcomes of migrant households. Doing this way, it is possible to estimate migrants' counterfactual outcomes, while the validity of the (weak) overlapping condition, given by

1 In observational studies the assignment mechanism is unknown and the researcher cannot assign the treatment. For this reason, there is taxonomic switch from the term "assignment" to the term "selection" (Morgan and Winship, 2007).

$$Prob[D_i = 1 \mid f(X_i)] < 1 \qquad \forall\, i\,,$$

ensures that it is possible to estimate the ATET for the entire subsample of treated units.

It is worth stressing that, if selection on observables holds (which is equivalent to say that issue (*d*) is not a cause of concern), matching methods based on propensity score provide a solution for issues (*a*) and (*b*). Indeed, they allow to correct for the self-selection of migrant households and, on the other hand, the estimations take into account the effect that remittances and changes in household's composition may have on the opportunity costs faced by household members (and which can affect, *inter alia*, individual labor supply).

After the seminal contribution of Rosenbaum and Rubin (1983), methods based on propensity score gained momentum in social sciences after the studies of Dehejia and Wahba (1999, 2002), finding application also in a number of migration studies (Bertoli and Marchetta, 2014; Möllers and Meyer, 2014; Jimenez-Soto and Brown, 2012; Ham et al., 2011). As further explained in section *5.11*, a difference of this study is that units are not directly matched on the estimate propensity scores but on a monotonic transformation of them.

Finally, it is worth stressing that, relative to regression-based econometric methods, matching estimation lies on a quite different theoretical ground. The main theoretical difference between the two approaches is on the notion of causality that, in turn, comes from a different interpretation of the covariates. Indeed, according to Imbens and Rubin (2015), linear regression models only rely on observed outcomes and often fail in drawing a distinction between potentially causal treatments and intrinsic attributes of the units under examination. They also argue that the ATET estimated following these two approaches coincide only in the special case of a linear regression without additional covariates in the context of a completely randomised experiment. On a practical level, vis-à-vis regression-derived approaches, matching methods based on propensity score present three advantages. Firstly, because of their semi non-parametric nature, the estimates of the counterfactual outcomes do not directly rely on the specification of any particular functional model. Secondly, the estimated treatment effect is not constant among observations, as it would result in the case of the coefficient of a treatment dummy in the specification of a linear model. Thirdly, the balance of the covariates ensures that the measured confounders are equally distributed between treatment and comparison groups, meaning that matched observations, with respect to the information contained in *X*, really resemble the treated ones. On the other hand, as explicitly recognized, the robustness of the estimates crucially relies on the assumption of selection on observables. In this regards, HIES 2010 presents two features which contribute to mitigate the concern about this hypothesis which, however, cannot be tested. Firstly, since the questionnaire covers a wide range of topics, it allows to

gather an uncommonly large set of household information, ranging from the basic individual characteristics (sex, age, educational attainment) of each member (including migrants) to asset endowment, before-migration entrepreneurial activity, past migration episodes, religious belief and access to public facilities, that can be conveniently used for the estimation of propensity scores. Secondarily, the relatively large number of observations and the favourable proportion between treated and untreated units (1,291 vs. 10,949) allows to avoid much of the problems arising when the sample size is too small and/or the proportion between treated and untreated observations is less fair.

5. Empirical strategy

This section illustrates in detail the empirical strategy pursued in the study. The following paragraphs explain each of the main steps made to obtain the final results, from the inclusion of the covariates to the choice of the estimator and the check of overlapping and balance conditions.

5.1. Choice of the probability model and general rules for the inclusion of covariates. Estimation of propensity scores requires the choice of a probability model and the selection of the identifying variables. A binary treatment calls for a binary response model and literature recommends the use of either a probit or a logit model (Caliendo and Kopeinig, 2008). Since the normal cumulative density function has systematically provided a slightly better statistical fitting, the paper opted for a probit model. Therefore, the probability of selection into the treatment is given by

$$\widehat{Prob}[\mathrm{D}_i=1 \mid X_i] = \hat{f}(X_i) = \Phi(X_i'\beta)$$

where Φ(.) is the c.d.f. of a standard normal distribution. The choice of the set of covariates X that identifies the probability model is a crucial step because, in theory, they are the observable conditioning variables which ensure the independence between potential outcomes and selection into the treatment. In practice, being conditional independence an abstract concept, the covariates of observational studies should not be conceived as the real conditioning variables but rather as proxies, defined in a way that allows to capture the maximum amount of households' relevant conditioning information. For this reason, and because of the lack of direct interpretation of probit coefficients, as long as it improves the quality of the estimates, there is no need to avoid the inclusion of interaction terms or nonlinear transformations of the covariates (Imbens and Rubin, 2015). On the other hand, flexibility in the specification possibilities does not mean theoretical

inconsistency and the inclusion of every covariate needs to be theoretically justified on the basis of the criteria of relevance and exogeneity. Included predictors should be relevant in the sense that they simultaneously influence both the probability of the selection into the treatment (probability of migration) and the outcome of the variable of interest (per capita expenditure). On the other hand, exogeneity is meant as the absence of any causal relationship moving from the exposure to the treatment to the predictors of the probability model. Since the concept of causality is intrinsically related to time (Holland, 1986), covariates whose value is already determined before the exposure to the treatment can be reasonably considered as exogenous. Without going into too much details (the inclusion of the specific covariates is discussed in the following paragraphs), it is worth noting that the final set of covariates used in this study considerably differs from those adopted in other works which used similar methods. Such differences arise both because of theoretical considerations and of the structure of the dataset, which makes available an uncommon amount of information. Finally, it needs to be specified that the sets of covariates on which propensity scores have been estimated do take into account the effect of migration on household composition. In other words, before running the probability mode, "missing" migrants members have been reintroduced in their original households.

5.2 Complex survey issues. Before the discussion of the predictors included in probability the model, it is worth to spend some words to illustrate how the complex nature of HIES 2010 has been handled. As observed by Zanutto (2006), the use of sample weights should be avoided in the estimation of probability model. Indeed, matching methods are strictly based on individual characteristics and, consequently, all the information needed for the estimation of each score is entirely contained in the correspondent unit. On the other hand, following DuGoff et al. (2014), sample weights have been included among the predictors of propensity scores. This choice is justified by the fact that sample weights, for their very nature, contain relevant information on the observation. Finally, sample weights should be used when it comes to generalise the results to the targeted population rather than to the survey sample only (DuGoff et al., 2014).

5.3 Demographic characteristics. Adopting a NELM theoretical framework, the demographic structure of the household is of a major importance and should be adequately captured by the covariates. Hence, the set of covariates describing household demographic structure included in this study is wider and more detailed than the ones adopted by similar works. On the other hand, since migration affects post-treatment fertility choices, all the covariates which reflect the demographic characteristics of the household should be carefully computed in order to avoid this source of

endogeneity. Following this line of reasoning, neither household dimension nor age dependency ratio, used respectively by Jimenez-Soto ans Brown (2012) and Bertoli and Marchetta (2014), have been included among predictors. By contrast, the predictors included in the model are the number of working age male and female adult members (divided in two age groups, 18-45 and 46-65), the number of elderly members and the number of kids between six and seventeen years old (under the hypothesis they are old enough to be exogenous to migration). These covariates are expected to take account of the main household demographic characteristics as size, sex composition and age structure but, at the same time, are not influenced by the exposure to the treatment.

5.4. Information on the household head. The individual characteristics of household head (as sex, age, martial status and education) are likely to be relevant in explaining both the economic performance and the migration decision of the household and, not infrequently, they have been included among the covariates (Möllers and Meyer, 2014; Jimenez-Soto and Brown, 2012; Calero, 2009). Yet, as pointed out by Cox-Edwards and Oreggia (2009) and echoed by Bertoli and Marchetta (2014), in absence of adequate pre-treatment information, household headship should be considered endogenous to migration and thus excluded from propensity scores' predictors. Endogeneity of headship to migration clearly emerges from Bangladesh data: on average, the percentage of female headed household is 13.9%, but it raises to 44.7% among migrant households and falls to 10.3% in the subsample of the non migrants. Clearly, such a remarkable difference can be only explained by the fact that, when the husbands emigrate, headship is inherited by wives.

5.5. Education. Economic theory recognizes a fundamental importance to human capital formation (Acemoglu, 2008) and the educational attainment of household members is likely to be a key predictor for both household consumption and migration propensity. In the case of Bangladesh, since the returns on education and the average level of education differ between males and females, this information has been disaggregated according to a sex-wise criterion. The level of education is thus captured by two variables indicating the average years of education of female and male adult members, while the educational attainment of younger members is excluded in order to avoid usual concerns about endogeneity. HIES data on individual educational achievements have been converted into years of schooling following the information on Bangladesh education system provided by UNESCO (2011).

5.6. Households' environment. Besides the variables which capture information on households' demographic structure and human capital endowment, literature has stressed the importance of

households' local environment. These information are captured by a set of regional dummies, by a dummy for households living in urban areas and by another dummy for households living in one of the four metropolitan areas (Dhaka, Chittagong, Khulna and Rajshahi).

5.7. Religion. Since almost nine out of ten households are Muslim, since Islam is a pillar of national identity and since, except for the "secularist" parenthesis of the rule of Mujibur Rahman, the country has historically pursued policies inspired by a moderate islamism (Lewis, 2011), it is possible to conceive the existence of a correlation between the average economic performance of the families and their religious beliefs. On the other hand, since Muslim oil countries have traditionally been the destination countries, household religion might also affect probability of migration. For these reasons – and because its exogeneity – the religious belief of households has been included among the predictors of the propensity scores including a dummy variable for Muslim household.

5.8. Entrepreneurship. Entrepreneurial attitude of household members could be relevant in determining the economic performance of the household they belong as well as the probability of migration. It can also be considered as a proxy for other relevant unobservable characteristic. HIES 2010 has a section on non-agricultural enterprise activities which contains information about the type of business the household is involved in and when the activity started. This information allows to create dummies for household's involvement in formal and informal non-agricultural business. In order to avoid endogeneity, the case of treated household, these dummies signal if the household started a business before the migration of a member.

5.9. Other predictors. As discussed before, according to DuGoff et al. (2014), sample weights should be included among the predictors. Other variables, as the access to public electricity network, might be used as predictors, even though their exogeneity is less clear. The same goes for land ownership: on the one hand, it surely affects both the well-being of household and the migration decision but, on the other hand, it could be endogenous to migration (land could have been sold for financing migration or, viceversa, could have been purchased with the remittances). Anyway, given the extreme scarcity of land, the Bangladesh's land market is characterized by a low volume of transactions (Mendola, 2008) and the dummies inserted into the set of covariates only account for the two extremes of land ownership: landlessness/semi-landlessness and the ownership of a large sized farm.

Table 2. Specifications of the probability model

Specifications		A	B	C	D	E	F	G
Demographic structure	Male adults (18-45)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Male adults (46-65)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Female adults (18-45)	0.193	0.014	0.015	0.013	0.015	0.101	0.003
	Female adults (46-65)	0.000	0.000	0.000	0.000	0.000	0.420	0.002
	Old adults (65+)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Kids (6-17)	0.000	0.000	0.001	0.016	0.006	0.004	0.004
Education	Male adults average education		0.000	0.000	0.000	0.000	0.000	0.000
	Female adults average education		0.000	0.000	0.000	0.000	0.000	0.000
Geographical variables	Regional dummies (χ^2)			0.000	0.000	0.000	0.000	0.000
	Urban area			0.000	0.000	0.025	0.018	0.020
	Metropolitan area			0.000	0.000	0.000	0.000	0.000
Land ownership	Landless				0.000	0.000	0.000	0.000
	Semi-landless (<.0.05 acres)				0.000	0.000	0.000	0.000
	Landlord (>4 acres)				0.469	0.750	0.588	
Other variables	Religious belief (Muslim)					0.000	0.000	0.000
	Entrepreneurship (formal)					0.000	0.000	0.000
	Entrepreneurship (informal)					0.000	0.000	0.000
	Access to electricity network					0.000	0.000	0.000
	Sample weights					0.000	0.000	0.000
Interactions / Nonlinear transformations	Squared male adults (18-65)						0.000	0.000
	Squared female adults (18-65)						0.253	
	Male adults*Male education						0.000	0.000
	Female adults*Female education						0.283	
	Squared male education						0.861	
	Squared female education						0.001	0.000
	McFadden's pseudo-R^2	0.1109	0.1509	0.2103	0.2191	0.2747	0.2935	0.2932
	Log-likelihood	-3667	-3502	-3257	-3221	-2991	-2914	-2915

Note: the table reports coefficients' p-values. For coefficients and standard errors see Appendix, Table A1.

5.10. Specification of the probability model. The choice of the final specification of the probability model has been made following a stepwise approach. Specifically, in the light of previous paragraphs' considerations, in each of the first six steps it has been included an additional group of covariates. Table 2 reports coefficients' p-values, the McFadden's pseudo-R^2 and the log-likelihood of each specification (coefficient have no causal interpretation and has been omitted; see Appendix Table A1). As expected, it emerges that almost all the variables discussed in the previous paragraphs turn out to be significant in predicting the probability of selection into the treatment, and every groups of variables significantly improves the statistical fit of the model. Final choice has been on specification (G) and it is the one that will be used thereafter. On the basis of the assumptions of the model and following Imbens and Rubin (2015), (G) mimics the unit-level assignment probability function which, theoretically speaking, depends itself by the assignment mechanism that rules the migration in Bangladesh.

5.11. Choice of the matching variable. The choice of the matching variable is a crucial step and can substantially affect final results. Whereas most of the studies (Bertoli and Marchetta, 2014; Möllers and Meyer, 2014; Jimenez-Soto and Brown, 2012; Mendola, 2007) match on the estimated propensity scores $\hat{f}(X_i)$, in the present case matching is performed on the logit of the scores (the logarithm of the odds), defined as

$$\hat{\ell}(X_i) = \log\left(\frac{\hat{f}(X_i)}{1-\hat{f}(X_i)}\right)$$

and conceivable as a linearised propensity score (*lps*). The main advantage of matching on this monotonic transformation of propensity scores is due to the fact that it makes comparable the distances between observations irrespectively of their position in the distribution, making the matching procedure more precise. Moreover, on a practical level, it simplifies the identification of the region of common support and ensures the theoretical consistency of the imposition of a caliper (see below).

5.12. Matching estimator. The analysis makes use of a nearest neighbour matching (NNM) algorithm with replacement and imposing a caliper (discussed in the following paragraph). With NNM, the counterfactual outcome of each treated unit is estimated taking the average of the closest M untreated observations (in the present analysis, $M = 3$). Formally, building on Abadie et al. (2004), $I_M(i)$ is defined as the set of the indices for the matches of the i-th unit that are at least as close as the M-th match (distance d_M) and, in any case, not more distant than d_{caliper}

$$I_M(i) = \{l = 1,\dots,N \mid D_l = 0,\ \text{abs}[\hat{\ell}(X_i) - \hat{\ell}(X_l)] \leqslant \min[d_M(i),\ d_{caliper}]\}$$

and the estimator for $Y_i^{(0)}$ results

$$\widehat{Y_i^{(0)}} = \frac{1}{\#I_M(i)} \sum_{l \in I_M(i)} Y_l$$

where $\# I_M(i)$ is the number of the matches of the i-th unit. As pointed out by Smith and Todd (2005), the increase of M reduces the variance of the estimator (it uses more information) at the expenses of the bias (incremented, since the average quality of the matches will be lower). For what concerns replacement, as in the case of Dehejia and Wahba (2002), it results necessary because, for high values of the logit, there is a relative abundance of treated observations.

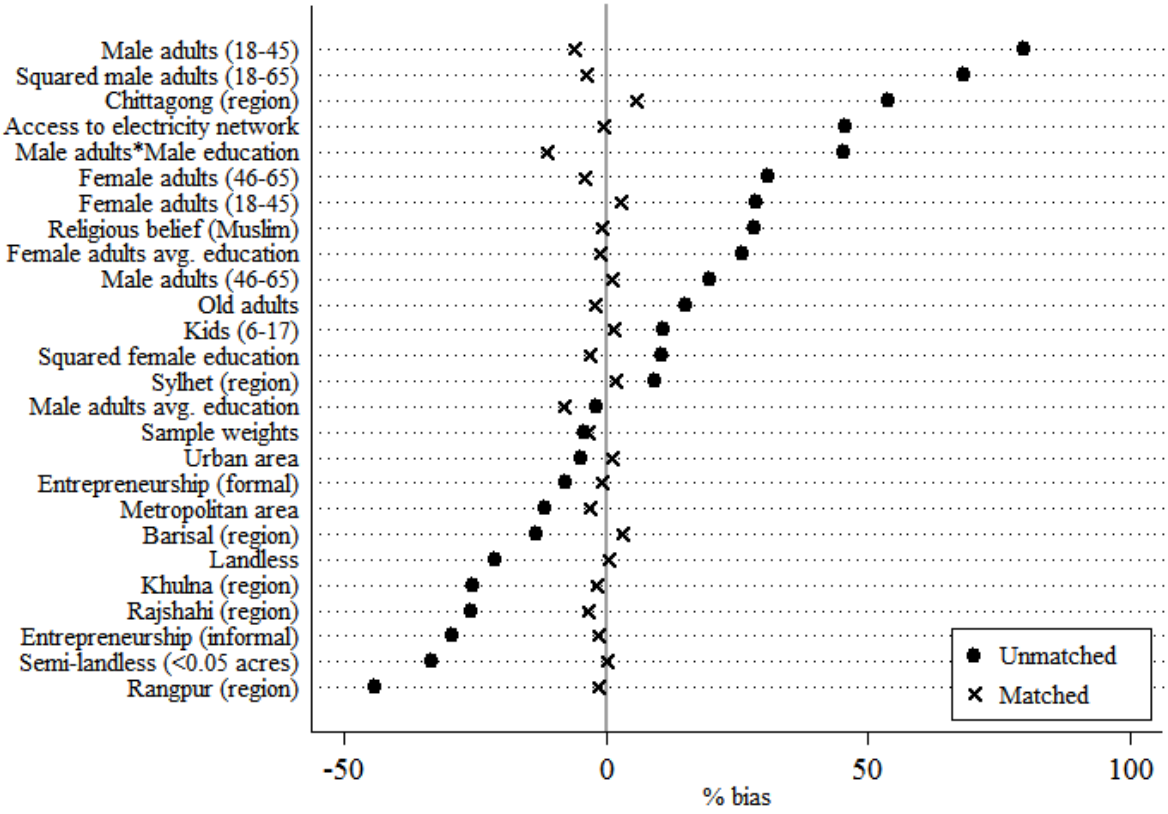
5.13. Common support. The estimation of all the counterfactual outcomes requires that every treated unit is matched with at least one unit exposed to the control treatment. This condition is satisfied when the region of common support, the overlapping region between the p.d.f. of the logit for treated and untreated units, coincide with the region in which the p.d.f. of the logit of treated units assumes positive values. The imposition on a caliper, a maximum distance between two logit in order to be considered "close enough" for matching, offers a straightforward solution to the common support problem. According to Austin (2011), when at least one of the predictors is not binary, the optimal caliper width should range between 0.2 and 0.55 the standard deviation of the estimated logit. Choosing the specification (G) of the probability model and imposing a caliper of 0.5 times the standard deviation of the logit, the caliper width (d_{caliper}) turns out to be 1.159, large enough to match all the treated units.

5.14. Balance. From a certain perspective, matching can be seen as a method of strategic subsampling (Morgan and Winship, 2007) based on the observables relevant covariates contained in X and aimed to pick up, among untreated units, a counterfactual group which shares the same characteristics of the treated one. In the present case, balance is achieved if the condition

$$D_i \perp\!\!\!\perp X_i \mid \hat{\ell}(X_i)$$

is verified. When the estimand is the treatment effect on the treated, the subsampling is among the untreated observations. Hence, the quality of the estimates crucially depends on the balance of the conditioning covariates among the treated and matched control groups. Getting a look at the distribution of the *lps* before and after the matching can provide a first insight of balance achievement [Appendix, fig. A1]. Secondly, following Sianesi (2004), the regression of the probability model has been repeated excluding the unmatched observations and none of the predictors turns out to be significant and the McFadden's pseudo-R^2 is virtually zero, confirming balance. Thirdly, balance is confirmed checking Rubin's standardised bias (Rosenbaum and Rubin, 1985), a weighted difference of the mean of the covariates between treatment and matched control groups.

Figure 1. Standardised bias of the covariates



Source: Author's calculations

5. Results and discussion

What is the impact of migration and remittances on the welfare of the household members left behind? Adopting average per capita expenditure as a measure for the welfare of the household members and assuming that selection on observables holds, the counterfactual framework allows to provide a comprehensive answer to the question. The clearest and less disputable result emerging from the analysis is that, on average, migration and remittances have a positive and significant impact on the welfare of migrants' household members. At the first sight, this finding could even seem self-evident: if migration was detrimental to welfare, why should rational people – after the early waves – continue to emigrate? Anyway, since HIES 2010 does not contain any information on migrants' well-being, this deduction is not correct. On the other hand, the finding is consistent with the fundamental assumption of the NELM approach, namely the idea that migration can be modeled as part of a household strategy. Indeed, whereas a negative or not significant effect would have suggested that migration is an individual decision, a situation which clearly benefits those left-behind is in line with the idea that the decisions regarding migration are taken at the household level.

Table 3. Average Treatment Effect

Equivalence scale	Sample ATET	Population ATET
No equivalence scale	30.89%*** (0.022)	28.82%
OECD (Oxford) scale	30.69%*** (0.021)	28.62%
OECD (modified) scale	28.67%*** (0.021)	26.68%
Squared root scale	18.96%*** (0.021)	17.48%

Notes: SE in parentheses; SE of Sample ATET are computed following Abadie and Imbens (2006); Equivalence scales described in OECD (2013).

Even if the impact of migration on migrant households' welfare appears unambiguously positive, the precise quantification its magnitude results sensitive to the assumptions regarding households' economies of scale. Specifically, if the effect is measured in relative terms, equivalence scales always reduce the magnitude of positive impacts and, viceversa, magnify the negative ones. On the contrary, when the effect is measured in absolute terms, they can affect the results in both directions. If the impact is negative, its negative effect is always amplified. If the impact is positive, equivalence scales reduce its magnitude up to a certain point. After this point, which depends positively on the equivalence elasticity of the scale and negatively on net impact of migration and remittances on total household expenditure, the estimated impact results bigger than the impact that would have been estimated without introducing the scale.

Table 4. Quartile ATET

Quartile	Number of units	Sample Quartile ATET	Population Quartile ATET
I	55	64.88%*** (0.094)	65.10%
II	323	55.24%*** (0.045)	52.23%
III	546	32.80%*** (0.034)	29.47%
IV	367	-6.76% (0.050)	-8.05%

Notes: SE in parentheses; SE of Sample ATET are computed following Abadie and Imbens (2006); Modified OECD scale (OECD, 2013).

By estimating quartile ATET, the impact of migration turns out to be higher for the relatively poorer households, while for the households belonging to the richer quartile it is negative but not

statistically significant. This result can be interpreted both on the basis of the lower base level of expenditure of poorer households and on the basis of the different opportunity costs faced by migrants characterised by different backgrounds.

Since the net impact of remittances is given by the difference between the amount remitted and the income of migrants if they had not migrated, if the expected income (at home) of poorer migrants is lower than the ones of richer migrants, the impact for poorer households results – *ceteris paribus* – higher. On the other hand, it is also possible to imagine that migrants coming from poorer households might have stronger incentives to remit than those migrants whose families are less in need.

Table 5. ATET over time

Years since migration	Number of units	Sample ATET over time	Population ATET over time
Less than 2	210	14.21%*** (0.060)	15.15%
2	228	16.06%*** (0.037)	17.09%
3	170	21.42%*** (0.046)	20.37%
4	105	30.36%*** (0.116)	23.60%
5	88	33.48%*** (0.128)	25.90%
6 or more	355	44.08%*** (0.048)	41.45%
Returned (currently, no migrants in the HH)	135	35.35%*** (0.049)	34.90%

Notes: SE in parentheses; SE of Sample ATET are computed following Abadie and Imbens (2006).

By disaggregating the results with respect to time, it emerges that the effect of migration tends to increase along with the length of the treatment period. This finding is consistent with the idea that recipient households use at least part of the remittances for investment purpose and, consequently, that remittances play a *direct* role in development. Indeed, if remittances were entirely spent for consumption, the standard of living of recipient households should not grow over time. However, there is a series of alternative explanations that contends this view. For example, migrants' capacity to remit could be positively correlated with the length of the period they stay abroad. Alternatively, it is arguable that time operates a positive selection of successful migration experiences, or that a similar selection mechanism works for migrants who moved towards high-income countries. These explanations make sense but, on the basis of the available data, their joint explanatory power is able

to account for only a part of the increasing effect. In any case, at least two additional considerations might concur to explain the progressive increase of per capita expenditure of the individuals belonging to treated households: consumption smoothing and fertility choices. On the one hand, the agents' preference for a relatively stable path of consumption might reduce the immediate effect of remittances on expenditure. On the other, since post-treatment fertility decisions are endogenous to migration and also affect per capita expenditure, it is possible that a part of the progressive increase of the impact is due to the increasing difference in the cumulate probability of having a new child in the household. However, this effect should not arise any concern about the effectiveness of the causality nexus: if there is a the reduction in the probability of having a child, it can be considered, in all respects, an effect of migration.

Table 6A. Variation of migrant households' ranking in the expenditure distribution: transition matrix from counterfactual (no migration) to observed scenario

Counterfactual scenario quintile (no migration)	Observed scenario quintile (migration)				
	I	II	III	IV	V
I	0.5%	0.5%	0.4%	0.3%	0.7%
II	0.9%	1.7%	4.0%	4.6%	6.9%
III	0.7%	3.6%	4.5%	9.7%	11.9%
IV	1.0%	2.9%	6.7%	9.9%	13.7%
V	0.3%	2.2%	2.5%	3.7%	6.1%

Notes: Modified OECD scale (OECD, 2013); sample weights included. Source: Author's calculations.

Percentage on diagonal: 22.7%
Percentage that moved up by at least one quintile (migration success): 52.6%
Percentage that moved down by at least one quintile (migration failure): 24.7%

Table 6B. Distributions of migrant households

Expenditure quintiles	Quintile to which migrant HH belong (marginal distributions of transition matrix)		Relative frequency of migrant HH	
	Observed	Counterfactual	Observed	Counterfactual
I	3.2%	2.6%	1.6%	1.4%
II	10.6%	16.5%	5.5%	8.5%
III	18.1%	27.2%	9.3%	14.1%
IV	28.1%	37.7%	14.5%	19.5%
V	40.2%	15.9%	20.8%	8.3%

Notes: Modified OECD scale (OECD, 2013); sample weights included. Source: Author's calculations.

The estimation of counterfactual outcomes also allows to investigate the impact of migration on social mobility. This effect can be captured building a transition matrix which links migrant households' observed outcomes to their estimated counterfactuals. The matrix shows that migration is a risky strategy but, when successful, it seems to guarantee a great improvement of the living

conditions of migrant households' members. On average, it results that, thanks to migration and remittances, about half of migrant households have been successful in climbing the social ladder, "migrating" to a higher expenditure quintile. On the other hand, in one out of four cases migration seems to have worsened the economic condition of the households. Finally, looking at the marginal distributions, it emerges that international migration is a phenomenon which does not directly regards the most disadvantages sections of Bangladesh's population. Quite the opposite, about four out of five international migrants come from relatively better-off households while less than three percent of them originates from household belonging to the poorest quintile. Having an emigrated member is common among relatively wealthy families, but it's quite rare among the households belonging to the first quintile.

Before moving on to policy considerations, it is worthwhile stressing again the assumptions behind the estimation method adopted in the analysis. In the first place, matching estimation crucially relies on the untestable hypothesis of selection on observables. Even if HIES 2010 provides a remarkably wide set of information both on households and household members which can be used to estimate the propensity scores, it is likely that some unobservable and/or not proxiable conditioning characteristics have not been captured by the specification of the probability model. The bias introduced by departures from selection on observables depends on the relative importance and on the distribution of these characteristics. Secondly, considering two potential outcomes for each unit (independently from the treatment state of the others) implicitly introduces the stable unit treatment assumption (SUTVA). In economic terms, it means that the estimates only account for partial equilibrium effects and do not consider the effects that migration and remittances may produce, for example, on aggregate demand, exchange rate, wages and unemployment. Consequently, the estimates can be considered robust for the marginal migrant household but the counterfactual scenario should rather be considered as a nuanced benchmark. Finally, two more potential issues needs to be mentioned, both related with the cross-sectional nature of the dataset. On the one hand, it should be noted the analysis does not consider those households which fully emigrated. Anyway, they are beyond the scope of the research question and do not represent an issue. On the other hand, the survey does not account for the endogenous recomposition which might potentially regards some migrant households. For instance, this phenomenon may take place when the head of a household composed by three people (head/husband, wife and a child) emigrates and the two left-behind members, looking for a more efficient household dimension, find convenient to join the wife's brother family. When this newly-formed household is surveyed, it is recorded as a migrant household and the migrant is registered as the brother-in-law of the head. Even in presence of longitudinal data or of specific questions regarding the dynamics of household recomposition, this

situation would be challenging to handle. Indeed, the bifurcation introduced by the causal exposure does not regard the outcomes of the households but the population of the units of analysis itself. A change in the unit of analysis, from households to individuals, does not seem a feasible solution. On a theoretical level, finding a definition of the treatment would be extremely difficult and, on a practical level, it would require an excessive amount of information. To misquote Eraclitus, it is not possible to step twice in the same river, but sometimes it could be convenient to assume so.

7. Policy considerations

Moving from a positive analysis to some brief normative considerations, the results may seem to call for development policies aimed at making the migration strategy available also to poor households. On the contrary, the results of this study cannot be taken as evidence in support of such policy conclusions. Firstly, nearly all of the families belonging to the lowest expenditure quintile are outside the overlapping region and, consequently, the analysis has not much to say of the effect of migration on the welfare of this group of households. Secondly, as clearly emerges from Figure 1, almost none of the relevant households' characteristics (e.g. all the variables related to the demographic structure) can be directly influenced by governmental policies. In any case, as a matter of fact, the Government of Bangladesh has moved in such direction. Governmental policies included, among others, the establishment of the Ministry of Expatriates' Welfare and Overseas Employment and of the Probashi Kallyan Bank, a financial institution aimed to deliver subsidized financial services to migrants (Bangladesh Bank, 2013). Besides the legitimate concerns regarding the effectiveness of these institutions in achieving their formal objectives, the analysis suggests that – from a partial equilibrium perspective – the resources deployed in these policies mostly benefit relatively better-off households.

8. Conclusions

This research explores the impact of migration in Bangladesh, focusing on the welfare of the members of the households with experience in international migration. Migration is explained adopting the NELM approach, while inference is made on the basis of Rubin's counterfactual framework and using a matching estimator based on propensity score. The analysis indicates that, on average, migration and remittances have a significant and substantial positive impact on migrants' family members, a result which has proved to be robust to different assumptions regarding households' economies of scale. Quartile ATET shows that the welfare effect is stronger for the households belonging to the first quartile, while it is not statistically significant for the households

belonging to the fourth. The disaggregation of the results with respect to time reveals that the impact tends to grow with the length of migration, suggesting that households make a productive use of part of the remittances they receive. Looking at the expenditure distribution, it emerges that households engaged in migration are concentrated in the third and fourth quintiles, while only 2.6% originate from the first. This finding suggests that the direct benefits of migration and remittances are unbalanced in favour of relatively wealthy households, even though the poorest sections of the population may benefit from some general equilibrium effect (not estimated). In general, international migration appears to be a household strategy characterised by high expected return and significant risk. By adopting social mobility as a yardstick for the success of migration, it turns out that in about half of the cases migrant households are able to climb the social ladder but, on the other hand, one out of four migration experiences ends up with the households falling in a lower expenditure quintile. As regards policy implications, the analysis does not provide any information regarding the effect of migration on the poorest 20% of households. In any case, since most of the characteristics that determine migration choices cannot be influenced by policymakers, it is likely that any policy aimed to make migration easier, if effective, would directly benefit relatively better-off households.

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Appendices

Table A1. Specifications of the probability model (detailed)

Specifications		A	B	C	D	E	F	G
Demographic structure	Male adults (18-45)	0.4950	0.5941	0.5802	0.5698	0.6188	1.1726	1.1637
		(23.5700)	(0.0224)	(0.0232)	(0.0233)	(0.0247)	(0.0727)	(0.0699)
	Male adults (46-65)	0.2491	0.3929	0.4036	0.3621	0.4015	0.9151	0.8998
		(7.2200)	(0.0366)	(0.0381)	(0.0386)	(0.0405)	(0.0727)	(0.0703)
	Female adults (18-45)	0.0356	-0.0710	-0.0727	-0.0752	-0.0756	-0.1549	-0.0939
		(1.3000)	(0.0290)	(0.0300)	(0.0302)	(0.0312)	(0.0944)	(0.0321)
	Female adults (46-65)	0.1785	0.2028	0.1752	0.1538	0.1577	0.0725	0.1332
		(4.8800)	(0.0376)	(0.0393)	(0.0396)	(0.0412)	(0.0899)	(0.0423)
	Old adults (65+)	0.1668	0.2566	0.2327	0.1988	0.2207	0.1712	0.1638
		(4.6300)	(0.0371)	(0.0385)	(0.0389)	(0.0407)	(0.0450)	(0.0434)
	Kids (6-17)	0.0762	0.0859	0.0480	0.0365	0.0435	0.0461	0.0466
		(5.5400)	(0.0143)	(0.0150)	(0.0151)	(0.0158)	(0.0161)	(0.0161)
Education	Male adults average education		-0.0813	-0.0760	-0.0795	-0.0827	-0.1497	-0.1456
			(0.0050)	(0.0052)	(0.0053)	(0.0055)	(0.0159)	(0.0102)
	Female adults average education		0.0879	0.0895	0.0862	0.0776	0.1377	0.1259
			(0.0056)	(0.0059)	(0.0060)	(0.0063)	(0.0173)	(0.0140)
Geographical variables	Regional dummies (χ^2)			yes	yes	yes	yes	yes
	Urban area			-0.1222	-0.0448	0.2142	0.2266	0.2229
				(0.0417)	(0.0430)	(0.0954)	(0.0961)	(0.0960)
	Metropolitan area			-0.3964	-0.2816	-0.8713	-0.8519	-0.8546
				(0.0688)	(0.0708)	(0.1371)	(0.1374)	(0.1372)
Land ownership	Landless				-0.5210	-0.5096	-0.5011	-0.5008
					(0.0959)	(0.0990)	(0.1013)	(0.1012)
	Semi-landless (<.0.05 acres)				-0.3303	-0.3397	-0.3362	-0.3379
					(0.0494)	(0.0516)	(0.0526)	(0.0524)
	Landlord (>4 acres)				0.0461	0.0212	0.0367	
					(0.0637)	(0.0666)	(0.0677)	
Other variables	Religious belief (Muslim)					0.6454	0.6326	0.6323
						(0.0721)	(0.0729)	(0.0729)
	Entrepreneurship (formal)					-0.5988	-0.6225	-0.6257
						(0.0843)	(0.0854)	(0.0854)
	Entrepreneurship (informal)					-0.6236	-0.6239	-0.6260
						(0.0575)	(0.0577)	(0.0575)
	Access to electricity network					0.5391	0.5360	0.5360
						(0.0432)	(0.0438)	(0.0437)
	Sample weights					0.0002	0.0002	0.0002
						(0.0000)	(0.0000)	(0.0000)
Interactions / Nonlinear transformations	Squared male adults (18-65)						-0.1635	-0.1605
							(0.0148)	(0.0146)
	Squared female adults (18-65)						0.0241	
							(0.0211)	
	Male adults*Male education						0.0354	0.0342
							(0.0052)	(0.0049)
	Female adults*Female education						-0.0081	
							(0.0076)	
	Squared male education						0.0002	
							(0.0012)	
	Squared female education						-0.0045	-0.0044
							(0.0013)	(0.0013)
	Constant	-2.1478	-2.2440	-2.0075	-1.8754	-3.2703	-3.5836	-3.6050
		(49.1800)	(0.0474)	(0.0542)	(0.0564)	(0.1661)	(0.1875)	(0.1771)
	McFadden's pseudo R-squared	0.1109	0.1509	0.2103	0.2191	0.2747	0.2935	0.2932
	Log likelihood	-3667	-3502	-3257	-3221	-2991	-2914	-2915

Source: Author's calculations.

Figure A1. P.d.f. of linearised propensity score