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Following in their footsteps: an analysis of the impact of successive migration on rural household welfare in Ghana

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Abstract

We explore patterns of successive migration within rural households in Ghana and the impact that these successive migrants have on household welfare outcomes. Specifically, we use a household panel survey collected in 2013 and 2015. We exploit the panel nature of the data and a weighting method to overcome sources of bias. Welfare is measured with an index of housing quality. We find that successive migrants face lower migration costs, and few of them remit. We find no effect of sending a new migrant on the housing quality index. We conclude that the different nature of migration of successive migrants implies neither an economic gain for the household nor a loss. The reason is that the successive migration becomes less costly for migrants from households with prior migration experience, but at the same time, these migrants remit less or not at all compared to earlier waves of migrants.

JEL Classification: R23, C38, D10

Keywords: Migration, Ghana, Housing quality index, Multiple correspondence analysis, Entropy balancing weights

1 Introduction

Internal migration is a common and sizeable phenomenon in many developing countries. An estimated 740 million people live outside their region of birth (Bell and Muhidin 2009). Differences in regional economic performance induce people to leave poorer areas and move to those where more and better opportunities are located. In Ghana, around 35% of people in the population Census of 2010 had moved from their place of birth to another location within the country (Ghana Statistical Service 2013a). Many people move from poorer to richer regions, some move with the whole household and others send a member of the household (Litchfield and Waddington 2003; Molini et al. 2016).

Internal migration plays an important role in poverty reduction and economic development at the individual, household and macroeconomic level. On the one hand, it contributes to structural change in the country when rural workers move into non-agricultural work in urban areas (Harris and Todaro 1970). On the other hand, migration of a household member can insure the sending household against income

shocks in the origin. Such insurance can prevent households from falling into poverty. Moreover, the income earned by the migrant member can raise consumption levels at home or even pay for investments in profitable technologies (Stark and Bloom 1985). Additionally, geographic mobility offers young people the possibility to advance in their education and gain new skills if their origins do not provide these opportunities.

Because of its size and relevance for economic development, economists study internal migration, but data limitations and methodological issues remain a challenge. One focus of research is the question whether and how internal migration affects households at origin. This paper contributes to this strand of the literature. We investigate the impact of having a new migrant on the welfare of origin households conditional on their prior migration experience.

The engagement in migration of some village or community members has been shown to significantly reduce migration costs for later migrants from that same network and to improve the probability of successful job search at destination (McKenzie and Rapoport 2007; Munshi 2003). Households themselves can gain migration experience through the engagement of their members in migration, increasing the household's participation in future migration (Bryan et al. 2014). Therefore, the focus on new migrants is relevant for a setting in which households have several migrant members who move at different points in time. This is revealed by the data available in this paper. We use primary data from a new two-wave household panel survey conducted in Ghana in 2013 and 2015. The surveys were designed with the goal to collect as much information as possible about migration.

The impact of migration on household welfare is often drawn from comparisons between households with and without migrants. The econometric challenge this poses is of unobserved heterogeneity. There are unobservable factors that determine both the fact that a household has a migrant and the outcome of interest, for example household income. Any result from a simple comparison of households with and without migrants would be biased. Our analysis uses a baseline of households that all have prior migration experience and data on new migrants in the intervening period in order to reduce selection bias. We apply entropy balancing weights (Hainmueller 2012), similar to matching methods, and exploit the panel nature of our data to overcome remaining selection and omitted variable bias. The outcome variable of interest capturing household welfare is a housing quality index constructed using multiple correspondence analysis (MCA). We use housing quality as our measure of welfare as there is strong body of evidence that suggests that remittances are often invested in the improvement of housing (e.g. Kagochi and Kiambigi 2012, Osili 2004, Durand et al. 1996).

Because there is little existing evidence on the consequences of idiosyncratic migration experience of households, we first describe migrants and their households in our data to explore the dynamic patterns of migration. A comparison of the new migrants to those migrants who left the household earlier documents that new migrants are from a younger generation within households, such as children or grandchildren of the head. Their migration costs are lower, possibly due to family networks and the households' prior engagement in migration. From these observations, we derive hypotheses for the impact assessment. Then, we estimate how the welfare of households with a new migrant changes compared to those without, conditional on the fact that all households have previously had a migrant. We analyse whether there are heterogeneous

effects by sex of the migrant, by reason for migration (family or work) and by destination (within or across regional borders).

We find no effect of sending a new migrant on the change in the housing quality index of origin households compared to those households who do not engage further in migration in the same period. This result is robust to variations in the construction of the index, the matching method applied and community shocks. Our interpretation is that the returns to migration might not show after the short period of our study. Households in our sample use their savings to finance migration. They hence do not experience a drop in their housing quality index. However, they also do not experience an increase in their housing quality index since the new migrant left. This could be, on the one hand, due to their use of savings to cover migration costs instead of investing into more assets and, on the other hand, because new migrants send only rarely and low remittances. We further suggest that due to prior engagement in migration our sample of households does not experience an initial decline in welfare. This could be caused by the migration costs or the loss in labour due to a member leaving (Taylor and Lopez-Feldman, 2010). We document however that migration costs for new migrants are smaller than for prior migration, which indicates that migration experience at the household level reduces the costs of migration. In addition, prior to their move, new migrants are either in school or doing unpaid work. It is thus less likely that their migration implies a loss in labour income for the household.

This study builds on earlier work where we employed propensity score matching at baseline to estimate the welfare effect of migration (Egger and Litchfield 2017). In contrast to the matching approach, entropy balancing weights allow us to further control for time-varying characteristics. In addition, we previously adopted factor analysis to construct the housing quality index, while MCA fits the data better. Extending from that previous work, we provide a more comprehensive discussion of the sensitivity of results and explore possible channels of the results in the data.

The paper is structured as follows. In the next section, we discuss the literature on impacts of migration on households left behind with respect to methodological challenges, knowledge gaps and evidence for our context. This is followed by the analytical framework for this study in Section 3. Then, we present the data used for the analysis (Section 4) followed by a description of the migrants, migrant households and their prior migration experience (Section 5). In Section 6, we explain the methodology to estimate the impact of sending a new migrant on the welfare of origin households. In Section 7, we provide the results and robustness checks. Section 8 concludes.

2 Literature review

The research interest of this paper is the short-term relationship between having a new migrant and the welfare of origin households in rural Ghana conditional on prior migration experience. Many studies explored the more general question looking at the impact of having a migrant or not on some measure of well-being of the origin household. Antman (2012) and Mendola (2012) review this evidence. Both summarize mixed results from the literature. The following examples illustrate the inconclusive findings.

Empirical evidence from China by De Brauw and Giles (2012) documents an increase in consumption growth as well as 'increased accumulation of housing welfare and

consumer durables' (p.3). Quisumbing and McNiven (2010) consider the impact of migration and remittances on assets, consumption and credit constraints in the rural Philippines. They find that a larger number of migrant children reduces the values of non-land assets and total expenditures per adult equivalent in the origin households. However, remittances have a positive impact on housing, consumer durables, non-land assets and total (per adult equivalent) and educational expenditures. They find no effect on status of credit constraint. Mendola (2008) finds an increase in investments in agricultural production among the left behind households in Bangladesh with international migrants, but she does not find an effect of internal migration. Taylor and López-Feldman (2010) provide evidence of a positive effect of migration to the USA on land productivity of migrant-sending families in Mexico. They also document an increase in per capita income via remittances. Damon (2010) finds only weak increases in asset accumulation in El Salvador and no impact of migration and remittances on investments in agricultural production.

Only a few studies consider migration experience at the household level. De Brauw and Harigaya (2007) and De Brauw (2010) provide evidence about the impact of seasonal migration on household welfare or agricultural production in Vietnam. While seasonal migration is most likely a repeated event, the authors do not specifically account for the repetition and potential learning process of the household. Bryan et al. (2014) conduct a randomized control trial in a region in Bangladesh that is seasonally affected by famine to understand underused seasonal migration. Their intervention was a cash transfer to vulnerable households conditioned to finance seasonal migration of one household member. The results show significant improvements of consumption levels for the treated households. According to the authors' model, migration results in success or failure in terms of finding a job at destination and sending remittances. Households learn from this experience, and it predicts their future engagement in migration. Further evidence for the role of migration experience within the family is provided by Giulietti et al. (2014). The authors develop a model that differentiates between 'weak' and 'strong' network ties and their role for migration decisions. Their findings suggest that networks at community level (weak ties) and prior migration of a family member (strong ties) act complementary, but weak ties have a higher impact on the migration decision. No further analysis is conducted to investigate how such different networks might influence migration and household outcomes.

In Ghana, internal migration is highly correlated with economic conditions (Castaldo et al. 2012). Many researchers have studied the impacts of migration in Ghana with mixed results due to the different data sources used and different methodologies applied (Ackah and Medvedev 2010; Adams 2006; Adams et al. 2008; Adams and Cuecuecha 2013; Litchfield and Waddington 2003; Mahé and Naudé 2016; Molini et al. 2016).

What gives rise to these mixed results? Theoretical models such as from the New Economics of Labour Migration (NELM, Stark and Bloom 1985) cannot predict the direction of the impact of migration on origin households. The reason for this is that the impact depends on counteracting factors. For example, De Brauw and Harigaya (2007) model the impact of migration on consumption growth and find that the impact depends on both the loss of farm production incurred by migration and the increase in consumption due to remittance receipt as well as the costs of moving. One explanation for mixed results therefore is that the counteracting factors of costs and rewards to

migration materialize at different speeds (Taylor and López-Feldman 2010). The loss of labour is felt immediately as are the costs of moving. The returns to migration in the form of remittances contribute to higher consumption levels. They delay, however, until the migrant has arrived at the destination, found a job and earned enough income to send some of it back home. It might take even longer for remittances to accumulate enough to invest in assets. Other aspects that contribute to the mixed results are the different data, definitions for migration and methodologies used. Migrants, or migrant households, are not a random sample of the population, but observable and unobservable factors determine their participation in migration. These factors can affect the outcomes of interest at the same time. In addition, the outcome itself can affect the migration decision. This is especially an issue in cross-sectional data.

This study contributes to the understanding of internal migration in Ghana and its consequences for origin households by using novel data. We exploit the panel nature of the data and apply a new method from the evaluation literature to reduce concerns of bias. We condition the analysis on prior migration experience. Thus, we contribute to the literature aiming to understand whether households learn from migration and what the implications are for future migration at household level and consequent welfare impacts, specifically for investments in housing quality.

3 Analytical framework

This paper investigates whether having a new migrant is related to a change in the welfare of the migrant's household at origin conditional on migration experience. The analysis is set in two periods, baseline and follow-up. All households have at least one member who is a migrant in the baseline period. Thus, they have previously engaged in migration, which we define as 'migration experience'. A migrant is defined in the surveys as a member of the household who is currently absent, left at least 3 months ago, but not more than 5 years.

A new migrant is defined as a household member who is present in the household in the baseline period and who then moves at least to another community and is still away in the follow-up period.[1] We look at new migrants, because it appears to be common for households to have more than one migrant and to see them move at different times. Thus, we are not interested in just the number of migrants, but in the dynamic aspect of another member migrating. Furthermore, it removes some of the selection bias of households into migration. To give an example, imagine a household as depicted in the following table (Table 1).

Table 1 Example household with baseline and new migrant

Household member	Migrant in baseline	Migrant in follow-up
A	1	1
B	0	0
C	0	0
D	1	0
E	0	1
Total	2	2

Source: Authors' compilation

This household has five members. At baseline, member A and member D are away as migrants. In the follow-up period, member A is still away as a migrant, while member D has returned to the household. Now, member E is away as a migrant. If we were to compare only the total number of migrants away, we would see no difference between these two periods for this household. However, member D might have returned with money for the household and will now contribute again to the household production (farm or business), and he or she potentially returned with new skills that could improve the returns to her or his labour. At the same time, for member E to migrate, the household had to incur some costs, maybe by selling assets or using savings. These factors have different impacts on the household welfare, so we focus on new migrants instead of the total number of migrants. Thus, this example household would be defined as a household with migration experience and a new migrant. Member E would be this new migrant.

Different aspects determine the impact of having a new migrant. Firstly, migration is costly and can initially lead to a decline in welfare due to the costs incurred as well as the loss in labour. Secondly, migration is beneficial when migrants send money back to their origin household and thus create another source of income. Thirdly, migration can be beneficial for the migrant him or herself directly. There might be more and better opportunities to earn an income or pursue further education at destination than at origin. Moreover, the household has one member less to care for and it might derive utility from the fact that the migrant can find a better livelihood somewhere else.

However, it is not clear in which direction the effect should work and which factor dominates. The aforementioned factors work in different directions. Additionally, in our specific case, households have migration experience at baseline before they have a new migrant, which can influence the effect. While sending a new migrant can incur costs, these might be lower conditional on prior migration experience of the household.

Following this discussion, we look at the impact of sending a new migrant conditional on migration experience. The sample is therefore first restricted only to households with migration experience at baseline. Then, households are assigned to a group called 'treated' and another one named 'control'. Households are in the treated group if they have at least one new migrant between the two periods. The remaining households without a new migrant between the two periods are in the control group.[2] This definition implies that households can have more than one new migrant and they can have several baseline migrants. Our sample is restricted to those households whose new migrants were present members of the household in the baseline period.

4 Data

The data used for this analysis is a household survey collected in April/May 2013 and again of the same households in April/May 2015.[3] In this way, the households are interviewed during the same season to avoid issues of seasonality between survey waves. We call this data set MooP Ghana panel study from here on.

In the first wave, around 1400 households were surveyed, and in the second wave, the team was able to follow up with around 1100 of them.[4] Based on the 2010 Ghana

Population and Housing Census (Ghana Statistical Service 2013), five major source regions of migration were identified as survey regions, the Northern region, the Upper East, Upper West, Brong Ahafo and Volta region. Consequently, the household sample is not nationally representative. In a two-stage stratified sampling design, enumeration areas (EA) were randomly selected to be proportional to the number of migrants from each region. Within each EA, households were then randomly selected from a list categorized by migrant and non-migrant households, oversampling households with migrants. With this approach, we achieved a feasible sample of migrants, which in most nationally representative surveys remains difficult.

The questionnaire was directed at the household head and asked about the demographics of each household member, their education and employment status, as well as their migration history. Migrants are members who are currently not living in the household and who have been away for at least 3 months, but less than 10 (in 2013) or 5 years (in 2015). Sixty percent of households in the treatment group for this analysis have only one new migrant, 25% have two and the remaining 15% have three or more new migrants in the study period.

After cleaning the data and making sure that the main variables of interest are available for all households in both survey waves, we are left with a balanced panel of 960 household-year observations. One hundred thirty-one migrant households are in the treated group, and 349 in the control group.

5 Descriptive statistics

Table 2 provides an overview of the basic demographic characteristics of the migrants by migrant status (baseline or new migrant) and sex. Of the 2013 migrants, 38% are female, and in 2015, we observe an increase in the share of migrants who are women.

New migrants are on average younger, and relatively more of them are single. They are from a younger generation within the household, often sons or daughters of the household head or even from the third generation. Relatively more of the new migrants have no or only primary education compared to baseline migrants.

Figure 1 presents the modes of financing migration. The most common way to finance migration in 2013 was savings, indicating that migration is an investment under credit constraints. Savings are also the most common source of financing migration for new migrants in 2015. The category 'Others' is in most cases money from a parent and in some cases from the migrant her or himself. Other modes of financing appear less important.

In terms of costs of migration, new migrants pay on average less than baseline migrants do as presented in Table 3. Using the information on previous migration, we find that migrants who move the first time—independent of whether they are new or baseline migrants—pay on average two times more than those who moved the second time or more often.

These observations suggest that costs can be reduced through migration experience within the household. This is not owed to a general decline in migration costs. Looking only at migrants who moved in 2015 from a household without any migrants in 2013, we find that they pay around 203 Ghanaian Cedi, similar to the average moving costs of baseline migrants. Despite lower costs of migration, the new migrants moved

Table 2 Demographic information of migrants, by year and sex

	Baseline (2013)		New (2015)	
	Male	Female	Male	Female
Observations (N)	592	359	107	108
Age (in years)	32.4	30.7	25.6	26.8
Marital status				
Single	44.6	42.7	68.4	47.8
Married/living with partner	54	50.6	30.5	48.9
Separated/divorced/widowed	1.5	6.7	1.1	3.3
Relation to head				
Head	8.3	1.9	3.7	1.9
Spouse/partner	3.4	11.4	2.8	3.7
Child/adopted child	52.4	49	49.5	51.9
Grandchild/niece/nephew	10.3	13.7	27.1	25.9
Other relatives	25.4	23.9	15.9	15
Not related	0.3	0	0.9	1.9
Education				
None	14	18.6	23.7	31.5
Primary	16.7	18.6	22.7	15.7
Middle/junior	31	30.4	27.8	22.5
High/senior	21.5	19.3	15.5	16.9
College/technical	16.7	13.2	10.3	13.5

Source: Authors' calculations based on MooP Ghana panel study

relatively more often to another region in Ghana than remaining in their own district or region which normally is associated with higher moving costs.

Remittance sending behaviour in the 12 months preceding the survey is different between baseline and new migrants (see Table 4). Among new migrants, fewer remit and they remit lower amounts and less frequently compared to baseline migrants.
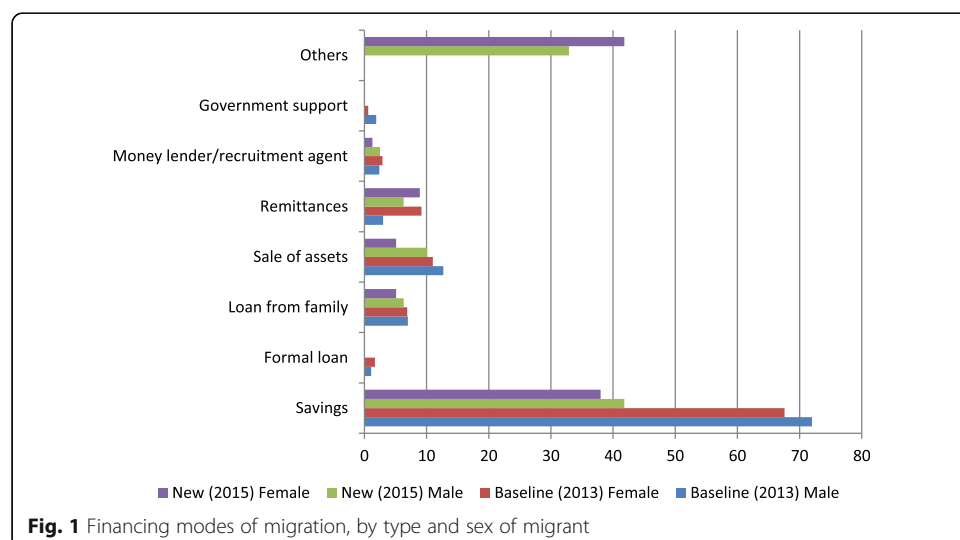

Fig. 1 Financing modes of migration, by type and sex of migrant

Table 3 Migration costs

	Baseline (2013)		New (2015)	
	In GHS of 2015	N	In GHS of 2015	N
All migrants	209	331	128	123
First-time movers	331	137	160	74
Moved at least once before	142	132	78	41

Source: Authors' calculations based on MooP Ghana panel study

6 Methodology

6.1 Empirical strategy

We estimate the impact of having a new migrant on household welfare in the following specification:

$$y_{it} = \beta_1 2015_t + \beta_2 \text{NewMig}^* 2015_{it} + \beta_3 X_{it} + \beta_4 \text{LM}_{ct} + H_i + \varepsilon_{it} \qquad (1)$$

Our interest is to see how the welfare of households changes when they have a new migrant. With two time periods, we regress the outcome variable y_{it} for household i on the treatment status of a household, NewMig_i, interacted with a dummy indicating the second survey year, 2015_t. NewMig_i is a dummy indicating whether the household has a new migrant or not. We also control for the general change of welfare over time by including the dummy for the second survey year separately. We include household fixed effects, γ_i, that automatically discard any unobservable characteristics of the households that do not vary between the survey waves.

The parameter of interest is β_2, the coefficient of the interaction. It measures the effect of having a new migrant between the two survey waves on the welfare of the origin household compared to those households that did not see another member migrate.

The time-varying household characteristics, X_{it}, are the dependency ratio, whether the household has a returned migrant and the employment status of the household head (unemployed/unpaid work, self-employed, employed or inactive). These can all affect household welfare, and they can change within the period under investigation. If a household has another child or if one of the older members becomes too old to work, then welfare might decline, as per capita income declines. Similarly, if a household head

Table 4 Remittances

	Baseline (2013)		New (2015)	
	Male	Female	Male	Female
Percentage remitting cash	63.8	53.7	40.5	38.6
Amount in GHS of 2015 (US$)	788.7	655.1	607.9	515.2
Frequency of remitting (%)				
Weekly/fortnightly	2.2	1.7	0	7.4
Monthly	24.3	19.2	17.2	11.5
Every couple of months	43.1	40.8	13.8	15.4
Every 6 months or more	11.6	15.9	17.2	15.3
Only on special occasions or emergencies	18.7	22.5	51.7	50
Percentage remitting goods	44	49.6	28.4	26.8
Observations	592	359	107	108

Source: Authors' calculations based on MooP Ghana panel study

becomes unemployed, this affects household welfare negatively. Finally, a migrant who returns to the origin household can, on the one hand, bring home money and invest it in assets to increase welfare or, on the other hand, the returnee might have failed at destination and now presents an additional burden to the household.

The local labour market variable, LM_{ct}, is the employment rate in a community c. It is measured as the share of individuals who work as wage employees relative to the local labour force. This is included because a household seeking to diversify its income sources will consider local opportunities, where household members could earn a wage.[5]

We estimate the fixed effects model in a weighted least squares regression applying entropy balancing weights. These weights are used to make the control group look comparable to the treated households in terms of household characteristics at baseline, in 2013. This reduces the selection bias that can challenge the analysis of migration impacts.

6.2 Dependent variable: housing quality index
The outcome variable is an index of housing quality constructed using multiple correspondence analysis (MCA) and includes the number of rooms, dwelling ownership, the presence of a bathroom and a toilet, main source of drinking water and the floor and wall material. Additional file 1: Table S1 provides a detailed overview of asset ownership in the sample.

The empirical literature suggests that households with migrants often use remittances to improve their housing (Kagochi and Kiambigi 2012, Osili 2004, Durand et al. 1996). However, these studies do not differentiate between first and successive migrants. It is possible that households who already have migrant members might have already used their remittances to improve their housing and consequently do not require more investments. This is unlikely to be the case in rural Ghana: comparing households in our sample at baseline, households which have already received remittance from first migrants, we see that they still have low levels of basic amenities, e.g. toilets or potable water. These levels are comparable to those seen among rural households in the lower consumption quintiles according the 2013 Ghana Living Standards Survey (see Additional file 1: Table S1. Hence, the data suggest that our household sample could substantially improve their housing through investment financed through remittances.

Figure 2 presents the housing quality index in 2013 of households with a new migrant and of those without, and Fig. 3 depicts the same for 2015.

These figures illustrate that the distributions of the housing quality index overlap in 2013, but they shift apart in 2015. It seems that households without a new migrant have a higher distribution of the index.

6.3 Identification strategy
Several issues challenge the empirical identification of the impact of migration on households left behind.

Firstly, we can think of factors that simultaneously affect both the migration decision and the outcome. For example, risk aversion of a household might prevent it from engaging in migration or in more profitable but riskier technologies in their farm or
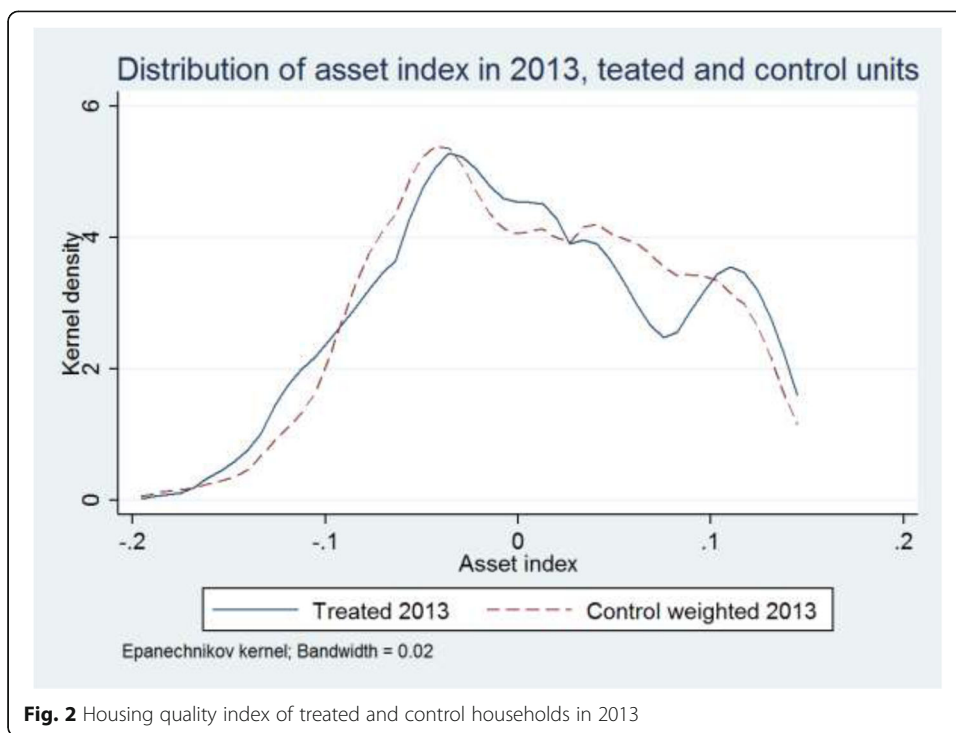
Fig. 2 Housing quality index of treated and control households in 2013
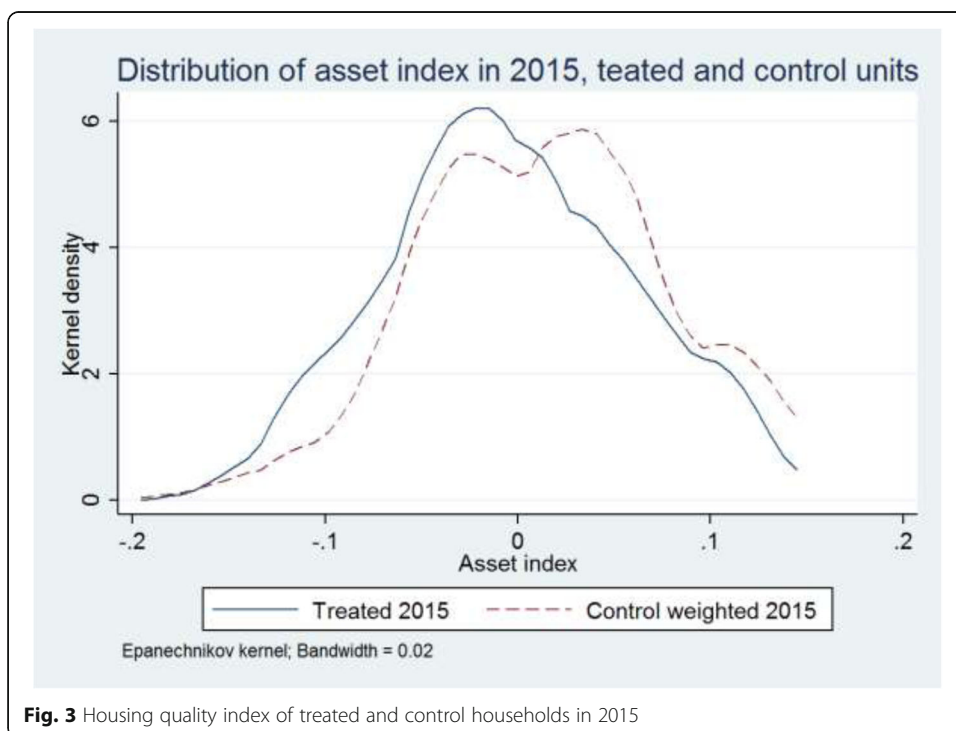

Fig. 3 Housing quality index of treated and control households in 2015

business. Hence, such households would be less likely to have a new migrant and would remain at a lower welfare level. Such omitted variables would bias the coefficient of interest. In the given example, we would overestimate a negative effect of having a new migrant. We cannot foresee the direction of the effect, but it would be biased upwards. By modelling a fixed effect model, we capture any unobservable time-invariant factors at the household level.

Secondly, the migration decision could be influenced by the outcome variable. This is especially a problem with cross-sectional data (Antman 2012). The change in asset ownership in the period preceding our baseline could affect the treatment status of households. We cannot exploit previous data to control for this, but by balancing households on baseline characteristics, we only compare those that look similar and thus capture any effect the prior welfare change had on households.

We apply a weighting method that makes the comparison group look like the treated group in terms of observable characteristics at baseline. This approach assumes selection on observables. It means that conditional on observable characteristics, having a new migrant is as good as random (Wooldridge 2010). This balance is achieved for observable characteristics that are expected to influence the likelihood to be a treated household and the outcome variable (Imbens 2015). Once these observables are balanced, the selection bias is reduced (Heckman et al. 1998).

6.3.1 Entropy balancing weights

The weighting method applied is called entropy balancing developed by Hainmueller (2012). This approach defines weights for each observation that ensure a predefined balance of covariates. The balance can be defined in terms of the first, second and even higher order moments of observables. The main advantages of this method are that balance checks become redundant, the majority of observations are retained, the computation of the weights is fast and the method can be combined with many other matching and regression methods, similarly to inverse probability weighting methods and regression adjustment procedures (Imbens 2015).

Entropy weights, w, minimize the entropy distance metric, which is defined as:

$$\min_{w_i} H(w) = \sum\nolimits_{i|D=0} w_i \log\left(\frac{w_i}{q_i}\right) \tag{3}$$

and which is subject to balance (Eq. 4) and normalizing constraints (Eqs. 5 and 6 respectively):

$$\sum\nolimits_{i|D=0} w_i c_{ri}(X_i) = m_r \quad \text{with} \quad r \in 1, \ldots, R \quad \text{and} \tag{4}$$

$$\sum\nolimits_{i|D=0} w_i = 1 \quad \text{and} \tag{5}$$

$$w_i \geq 0 \quad \text{for all} \quad i \quad \text{such that} \quad D = 0 \tag{6}$$

q_i is a base weight defined as 1 over the number of control units. $c_{ri}(X_i)$ are 'a set of R balance constraints [that are] imposed on the covariate moments of the reweighted control group' (Hainmueller and Xu 2013, p. 4). Finally, it computes a set of weights that minimize the first Eq. (3) subject to the balance constraint, the normalization constraint and the non-negativity constraint. Once the weights have been computed, they

are applied to estimate Eq. 1 with weighted least squares (WLS). This approach works like any regression adjustment method (Wooldridge 2010).

6.3.2 Variables to balance

We include all variables that we consider substantive for having a new migrant or for the outcome. We also include squared terms of continuous variables (Imbens and Rubin 2015; Smith and Todd 2005). Region dummies should capture any such factors that relate to migrant networks, regional development and economic opportunities. Most importantly, we control for the household size and dependency ratio of elderly and children to adult members to capture the household structure. These variables are important for the household decision about migration as well as the household's welfare. Another important characteristic is the main household income source, that is, whether the household earns its living from agriculture, wage employment, its own business and public or private transfers. We also control for the employment status of the household head (employed, self-employed, unemployed or inactive) to capture economic activity. As a measure for human capital in the household, we include the highest level of education of adult members in the household. Many studies show that education is an important predictor for households' welfare. It is also related to migration decisions as higher educated people have higher expected incomes at home as well as at possible destinations (Sjaastad 1962). We include a dummy for female household heads, shown to be a strong predictor for household welfare in the rural context as well as reflecting households' options for migration decisions (Adams and Cuecuecha 2013). In addition, age and marital status of the household head are added to control for the life cycle of a household (Lipton 1980). Ethnicity was found to be an important factor in creating and maintaining migrant networks in Ghana (Awumbila et al. 2016). Such networks are important determinants for migration decisions as they reduce the risk and costs associated with migration (Carrington et al. 1996), which is why we include the ethnicity of the household head. We also include our measure of community employment rate. We choose this measure, because if a household seeks to diversify its income sources, it will also consider other opportunities in the community where household members could earn a wage (Bazzi 2017).

In a credit constraint context, only households at a certain level of wealth are able to afford migration (McKenzie and Rapoport 2007). Thus, only households with a similar level and distribution of welfare should be compared. While we do not have information on economic welfare pre-dating our baseline as suggested by Smith and Todd (2005), we include a rich set of asset indicators and information on asset purchases in the computation of balancing weights. These are the components used to construct the housing quality index and dummies that are equal to 1 if a household has purchased a specific asset within the past 5 years before the baseline survey, 0 otherwise.[6] In this way, we can capture a certain level of wealth and investment behaviour of the household that pre-dates the baseline.

In Additional file 1: Table S2, we show the mean and variance of the variables that were included in the construction of the entropy balancing weights with the weights applied to the control group. Using the weights leads to identical means and variances

of all variables. The entropy balancing weights construct a comparable sample of households to reduce the selection bias.

7 Results

7.1 Main results

Table 5 presents the results. The coefficient of interest is the dummy variable of having a new migrant interacted with the second survey wave indicator, 2015. This estimates the average effect on the change in the housing quality index for households with a new migrant between the baseline and the follow-up survey compared to households without a new migrant.

In column 1, we show results without applying entropy balancing weights, suggesting that they might be biased due to selection. The effect of migration on household welfare could be driven by the fact that only households who are less likely to improve their welfare due to household characteristics sent a new migrant because of these same characteristics. We then apply balancing weights to the regression in column 2. The coefficient becomes larger but remains insignificant. In column 3, time-varying household and local labour market characteristics are included that we consider

Table 5 Effect of having a new migrant on housing quality index, weighted least squares

| | Wealth index | | |
	(1)	(2)	(3)
New migrant * 2015	− 0.011	− 0.017	− 0.016
	(0.007)	(0.011)	(0.011)
2015 (= 1)	0.001	0.007	0.012
	(0.005)	(0.009)	(0.009)
Household has return migrant (= 1)			− 0.015*
			(0.008)
Dependency ratio			0.002
			(0.004)
Occupation of household head (base = inactive/others)			
Employee			0.014
			(0.015)
Self-employed			− 0.001
			(0.016)
Unpaid work/unemployed			− 0.003
			(0.018)
Local employment rate			0.138
			(0.104)
Entropy balancing weights	No	Yes	Yes
Household fixed effects	Yes	Yes	Yes
Observations	960	960	960
Adjusted R^2	0.584	0.522	0.528
Number of clusters	93	93	93

Notes: Significance levels *10%, **5%, and ***1%. Fixed effects estimator. S.E. clustered at community level. Column 1 runs model 1 without further control variables and without applying entropy balancing weights. In column 2, these weights are applied. In column 3, time-varying control variables are added to the model. Source: Authors' calculations based on MooP Ghana panel study

relevant for the welfare of households. Of all control variables, only that indicating whether a household had a return migrant or not is significant.[7] Households are on average slightly worse off if they had a migrant return to their home. The majority of these return migrants states to have returned due to reasons such as homesickness, illness, family issues or unsuccessful job search which could explain the negative welfare effect of returnees.

The inclusion of time-varying covariates improves the precision of the estimates minimally, as indicated by a higher adjusted R-squared statistic. The coefficient of interest becomes minimally smaller. On average and everything else constant, sending a new migrant does not change the housing quality index of households significantly compared to those who do not send another migrant.

We now look further into the role of migrant characteristics. Table 6 lists the coefficients of the main estimation, each time interacting the treatment dummy with a migrant feature. These characteristics are whether the new migrant is female, a seasonal migrant or whether they moved within the same region compared to another region. None of these interactions shows a significant effect on the housing quality index.[8]

There are three possible explanations for the fact that we do not find an impact of having a new migrant on households' housing quality index. One refers to the outcome variable used, one to the role of migration experience and the third one to the sample investigated.

First, considering that asset indices are less volatile than for example consumption measures, it might be due to their stable nature that we do not find a significant effect in the short period of 2 years. We emphasize that the estimated effect is that of households sending a new migrant compared to those who do not. Hence, even a zero effect does not imply that there was no change in the housing quality index, but it means that the index of treated households changed in the same direction and magnitude as that of the control group. The distributional graphs of the welfare index (Figs. 2 and 3 in Section 6.2) indicated some changes in the welfare of households. It appears, however, not to be significantly different between the groups once we control for observable and unobservable household characteristics. Booysen et al. (2008) also point out that

Table 6 Interaction of treatment with the characteristics of new migrants

Migrant characteristics	Dependent variable: wealth index		
	Female migrant	Seasonal migrant	Moved within region
New migrant *X* 2015	− 0.009	0.010	− 0.013
	(0.011)	(0.014)	(0.021)
New migrant * 2015	− 0.010	− 0.017	− 0.005
	(0.014)	(0.012)	(0.022)
Entropy balancing weights	Yes	Yes	Yes
Other controls	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes
Observations	960	960	960
Adjusted R^2	0.528	0.528	0.528
Number of clusters	93	93	93

Notes: Significance levels *10%, **5%, and ***1%. Fixed effects estimator. S.E. clustered at community level; other controls include whether the household has a returned migrant, occupation of the household head, dependency ratio and community employment rate. Source: Authors' calculations based on MooP Ghana panel study

because assets are more durable than other consumption goods, they tend to show an increase in asset wealth more than a reduction of the same. As our coefficients are negative, it is possible that we cannot find a significant effect due to this issue.

Owing to the constriction of our housing quality index, the only possibility for households to increase their housing quality index would have been through investments in their housing. Using responses to questions on past improvements to housing, we regress the likelihood to invest in better housing on the indicator for having a new migrant (Table 7).

The results confirm that households with a new migrant are significantly less likely to have invested in the refurbishment of their house between survey waves. In contrast, there is no significant impact on investments in land or other assets, although this could be due to the very low number of observations. Furthermore, successive migration is financed mostly through savings so they cannot be used for housing investments. This stands in contrast to previous findings of remittances being used for housing improvements (Kagochi and Kiambigi 2012, Osili 2004). Our results suggest that remittance behaviour by successive migrants and the usage of their remittances appear to differ for first and successive migrants.

Secondly, we suggest that migration of a new migrant might be less costly than first-time migration. If we consider migration as an investment, then we would expect an initial decline in welfare and in the longer run an increase as suggested by Taylor and Lopez-Feldman (2010). We do not observe that households with a new migrant experience a decline in welfare that could have been caused by the cost of migration and the loss of a working household member. In the descriptive statistics, we saw that costs for new migrants are relatively lower than for previous migrants. Similar to the reduction of migration costs with the growth of social migrant networks, the migration experience at the household level itself can reduce costs of migration (Bryan et al. 2014). This could be happening through similar channels, such as information transfer and family connections at the destination to find a job.

Another reason for not finding an effect might be that we are looking at the wrong sample. Some of the new migrants move for family reasons, such as marriage or joining other family members, or for education, while the majority moves for work. These

Table 7 Effect of having a new migrant on likelihood to invest in different activities

	Refurbishment of house	Improvement to agricultural land	Development of non-agricultural land	Others
New migrant * 2015	− 0.2972**	0.1310	0.3897	0.1298
	(0.153)	(0.118)	(6.386)	(0.260)
2015 (=1)	0.1685*	− 0.1174	− 0.3635	0.0274
	(0.101)	(0.102)	(5.957)	(0.051)
Other controls	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes
Observations	158	108	54	60
Pseudo R^2	0.186	0.373	0.548	0.519
Log likelihood	− 26.4	− 13.7	− 2.33	− 4.86

Notes: Significance levels *10%, **5%, and ***1%. Fixed effects estimator. S.E. clustered at community level. Other controls include whether the household has a returned migrant, employment status of the household head, dependency ratio and community employment rate. Source: Authors' calculations based on MooP Ghana panel study

reasons can have quite different implications for remittance behaviour as well as household welfare. We therefore estimate the effect of a new migrant including the interaction of the treatment with an indicator for migration motive. Table 8 shows the results. They do not change either for the main estimate nor for the interaction with the migration motive. All we observe is that the coefficient of the interaction that indicates households with a new migrant moving for family reasons is positive, while the overall treatment effect is negative. All are however always statistically insignificant.

7.2 Sensitivity analysis

One concern is measurement error in the housing quality index owing to its construction from individual factor variables. In consequence, the estimates are still unbiased and consistent, but less precise which could explain the insignificant results (Wooldridge 2010). We would be concerned if there was a reason to think that measurement error in the index was systematically related to the independent variables in our model. We therefore estimate the main regression and exclude each time one component of the index to see how sensitive the results are to this. We find stable results across index compositions presented in Table 9.

We also check whether the results are sensitive to whether we use the pooled or only the baseline sample to construct the index. The results do not change (presented in Additional file 1: Table S4). Another issue might be that prices for assets change over time and in response to this the demand for assets and the distribution of assets across households might change. There is, though, no reason to think that households with a new migrant would react differently than control households to price changes in their asset purchase behaviour.

Finally, we run a difference-in-difference model on households matched at baseline applying propensity score matching (PSM) instead of entropy balancing weights similar to the analysis in Egger and Litchfield (2017). Results remain the same (see Additional file 1: Table S5).

Table 8 Testing for heterogeneity by migration motives

Reason for migration	Dependent variable: housing quality index		
	Family	Work	Education
New migrant * 2015	− 0.019	− 0.011	− 0.014
	(0.012)	(0.012)	(0.011)
New migrant moves for X reason * 2015	0.016	− 0.009	− 0.010
	(0.017)	(0.014)	(0.013)
Entropy balancing weights	Yes	Yes	Yes
Other controls	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes
Observations	960	960	960
Adjusted R^2	0.529	0.528	0.528

Notes: Significance levels *10%, **5%, and ***1%. Fixed effects estimator. S.E. clustered at community level; other controls include whether the household has a returned migrant, occupation of the household head, dependency ratio and community employment rate. Source: Authors' calculations based on MooP Ghana panel study

Table 9 Sensitivity of results of impact of having a new migrant on housing quality index using different specifications to construct index, weighted least squares

	Dependent variable: housing quality index						
	Exclude specific item from housing quality index construction:						
	Number of rooms	Dwelling ownership	Bathroom	Toilet	Drinking water	Floor material	Wall material
New migrant * 2015	0.019	− 0.017	− 0.017	− 0.015	− 0.020	− 0.013	− 0.009
	(0.014)	(0.012)	(0.012)	(0.011)	(0.015)	(0.009)	(0.008)
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Entropy balancing weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	960	960	960	960	960	960	960
Adjusted R^2	0.515	0.473	0.524	0.47	0.462	0.544	0.485
Number of clusters	93	93	93	93	93	93	93

Notes: Significance levels *10%, **5%, and ***1%. Fixed effects estimator. S.E. clustered at community level; each column presents the result of estimating the main model with the outcome variable being the housing quality index excluding one item respectively. Other controls include whether the household has a returned migrant, occupation of the household head, dependency ratio and community employment rate. Source: Authors' calculations based on MooP Ghana panel study

7.3 Community shocks

One major concern challenging our identification strategy is that of unobserved shocks experienced by the households between the two survey waves. A shock could reduce household welfare and at the same time motivate people to leave their home or deter migration, as savings would be used to cover the damages of the shock instead of financing migration. This could affect whether we observe an impact of having a new migrant on welfare of households left behind.

In 2015, the enumerators interviewed village elders to collect information about the communities. These surveys included questions about shocks experienced by the village and how many people were affected by it. The questions were asked open ended, so that the respondent could name any type of shock that s/he considered relevant. The most commonly named shocks are droughts, flooding or crop infestation by insects. We identified the communities where at least 50% of inhabitants were affected by such a shock.

In Table 10, we present the results of the main specification, only that we include a dummy variable indicating a major shock at the community level and interact this with the treatment indicator. This interaction captures the impact of households that experienced a shock and have a new migrant in 2015. The impact of having a new migrant on the housing quality index remains insignificant. Neither the coefficient of the shock variable nor its interaction with the treatment is significant.

After this test, one could still argue that an unobserved idiosyncratic shock at the household level interferes with our results. For example, a household would normally have experienced an increase in its housing quality index, but a negative shock interfered with this trajectory, for example, a household member falling sick and not being able to earn income. Instead of investing in better walls or expanding the rooms of the house, the money is used to send another member as a new migrant to find an income somewhere else or to pay for the medical bills. Only in very few cases (3%) had a new migrant moved due to negative events, such as declining yields in agriculture, a family dispute, a flood or for medical treatment. Aside from lack of evidence that the reason of migration is an idiosyncratic shock, new migrants barely send remittances. If they

Table 10 Effect of new migrant on household welfare controlling for major shocks in community

	Wealth index
New migrant*2015	− 0.021
	(0.018)
New migrant *shock* 2015	0.015
	(0.023)
Shock	− 0.018
	(0.017)
Entropy balancing weights	Yes
Other controls	Yes
Household fixed effects	Yes
Observations	902
Adjusted R^2	0.521
Number of clusters	87

Notes: Significance levels *10%, **5%, and ***1%. Fixed effects estimator. S.E. clustered at community level; other controls include whether the household has a returned migrant, occupation of the household head, dependency ratio and community employment rate. Source: Authors' calculations based on MooP Ghana panel study

had been sent to support the household through a crisis, one would expect regular remittances and higher amounts.

8 Conclusion

This paper documents the dynamic nature within households of internal migration in rural Ghana. Using a new panel dataset from 2013 and 2015, we show that many households with migrants at the baseline sent a new migrant by 2015. Looking more closely at these migrants and their households, we provide an insight into the nature of such successive migration. Within the same household, migrants move for different reasons and at different times and their connection with the origin household differs as well.

This motivates the question of how households with prior migration experience are affected if they have a new migrant. There are hypotheses for positive, negative or no effect due to the variety of factors involved and their counteracting impacts.

We find that having a new migrant does not have an impact on the housing quality index of origin households compared to those without a new migrant. We suggest that this is partially due to the stable nature of such an index over the short period of our analysis. In order to identify an impact, the households in our sample would have needed to invest in their housing to different extent between treated and control group. However, their investment priorities might lie somewhere else, for example, in their farm or business. Previous studies have found that remittances are invested in better housing whereas we do not find this for successive migrants, suggesting that behaviour differs. One insight from the literature is that older migrants are more likely to send remittances home to be used for housing improvements (Osili 2004) and that this may be in anticipation of a return home. Our sample of first migrants are older at the time of survey than successive migrants, so our results may further reflect different intentions surrounding return.

Another insight we gain is that new migrants pay relatively less for their migration than baseline migrants. This indicates that migration becomes cheaper with the

migration experience of the household so that a negative effect of migration incurred by moving costs might not materialize in this case. Furthermore, we observed that new migrants are in many aspects different from baseline migrants. Among the differences are for example the fact that new migrants are from a younger generation, coming straight from school and often not sending any remittances or only for special occasions. This also supports the zero effect we find for the housing quality index. Households with prior migration experience might not send a new migrant in expectation of future remittances and income diversification. Instead, the new migrants might move primarily to improve their own situation.

These unanswered hypotheses point at the limitations of this study. The effect we estimate is that of only 2 years or less since a new migrant left the household. The comparison of studies using longitudinal data from longer periods with those of short periods indicates that the positive returns to migration might only present itself after a certain period (Davis et al. 2010; Taylor and Lopez-Feldman, 2010). More data collection is required to confirm our results over the longer run.

Endnotes

[1]It is possible that the new migrant had migrated in the past. In such a case, not only the household as a whole would have migration experience but also the individual migrant. The response rate to the question asking how many times a migrant moved before is unfortunately very low so we cannot control for this in the analysis.

[2]We could include households that had a return migrant at baseline, but no current migrant. They also have migration experience. However, there are no such households in our data.

[3]The data was collected by the Migrating out of Poverty (MooP) Research Program Consortium in collaboration with the Centre of Migration Studies, University of Ghana.

[4]Between the two waves of the survey, we lose 167 households which had a migrant at baseline. Modelling of the attrition suggests that the attrited households are more similar to our control group, that is, they would have been less likely to have new migrants. However, without knowing what their housing quality trajectory would have been had they stayed in the sample, we cannot speculate about any potential bias this may have introduced. See Egger (2018) for details.

[5]This measure is obtained using all individuals in our data in each community. Based on their main activity, we define those who are employed and we sum all who are either employed, unemployed, doing unpaid work or self-employed. This captures how common paid employment is in a community and thus reflects the local opportunities for wage work outside the family farm or business.

[6]These assets are electric household goods, white household goods, livestock, generator, car, computer, electronic appliances, other investments, agricultural land, agricultural machinery, non-agricultural land and new house.

[7]There might arise the concern that the measure of local employment is not well defined. When we drop this variable from the estimation, results remain unchanged (see Additional file 1: Table S3).

[8]In Egger (2018), we used the number of new migrants as a measure of intensity of treatment, rather than a dummy variable, but there was no change in the results.

Additional file

Additional file 1: Table S1. Asset ownership by group and year. Table S2. First and second moments of covariates after applying entropy balancing weights, by group in 2013. Table S3. Effect of having a new migrant on asset index excluding local employment rate, weighted least squares. Table S4. Effect of having a new migrant on asset index using pooled data to construct index, weighted least squares. Table S5. Effect of new migrant on household welfare applying propensity score matching at baseline. (DOCX 30 kb)

Availability of data and materials
The dataset supporting the conclusions of this article is made available by the Migrating out of Poverty Research Consortium, University of Sussex, on the website, http://migratingoutofpoverty.dfid.gov.uk/themes/migration-data/ghanaquant. The first wave (collected in 2013) is available online; the second wave is expected to be made available online in September 2018.
The data analysis was conducted in the statistical software Stata and command-files are available upon request from the corresponding author.
This is an updated and revised version of an earlier study published in the working paper series of the Migrating out of Poverty research program consortium as number 51.

Competing interests
The IZA Journal of Development and Migration is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles".

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